VALERO BENICIA CRUDE BY RAIL PROJECT

Draft Environmental Impact Report
SCH # 2013052074
Use Permit Application 12PLN-00063

Prepared for
City of Benicia

June 2014

VALERO BENICIA CRUDE BY RAIL PROJECT

Draft Environmental Impact Report
SCH # 2013052074
Use Permit Application 12PLN-00063

Prepared for
City of Benicia

June 2014

550 Kearny Street
Suite 800
San Francisco, CA 94108
415.896.5900
www.esassoc.com

Los Angeles

Oakland

Orlando

Palm Springs

Petaluma

Portland

Sacramento

San Diego

Santa Cruz

Seattle

Tampa

Woodland Hills

202115

TABLE OF CONTENTS

Valero Benicia Crude by Rail Project
Draft Environmental Impact Report

Page

Executive Summary ES-1
ES-1 Introduction ES-1
ES-2 Project Objectives ES-1
ES-3 Project Setting and Location ES-2
ES-4 Project Description ES-3
ES-5 Alternatives ES-4
ES-6 Environmentally Superior Alternative ES-7
ES-7 Areas of Controversy and Issues to be Resolved ES-7
ES-8 Summary of Impacts ES-8

1. Introduction 1-1
1.1 Purpose of This Document 1-1
1.2 Project Overview 1-1
1.3 Project Background 1-2
1.4 Key Areas of Environmental Concern 1-3
1.5 Public Comment on the Draft EIR 1-4
1.6 Areas of Controversy 1-4
1.7 Confidential Business Information 1-4
1.8 Organization of the Document 1-6
1.9 Use of this Document by Agencies 1-7
1.10 Permits and Approvals 1-7

2. Summary of Environmental Impacts 2-1

3. Project Description 3-1
3.1 Project Overview and Location 3-1
3.1.1 Introduction 3-1
3.1.1.1 The Refinery 3-1
3.1.1.2 The Proposed Project 3-1
3.1.2 Location 3-2
3.2 Project Objectives and Components 3-5
3.2.1 Project Objectives 3-5
3.2.2 Project Component Summary 3-5
3.3 The Existing Refinery 3-7
3.3.1 Overview of Petroleum Refining 3-7
3.3.1.1 Types of Crude Oil 3-7
3.3.1.2 The Refining Process 3-8
3.3.1.3 Refinery Optimization 3-9
3.3.2 The Benicia Refinery 3-10

Page
3.3.2.1 Crude Oil Processing ... 3-10
3.3.2.2 Crude Feedstocks ... 3-12
3.3.2.3 Refinery Maintenance and Monitoring Activities ... 3-15
3.4 Components of the Proposed Project ... 3-17
3.4.1 New and Modified Facilities and Equipment ... 3-17
3.4.1.1 Tank car Unloading Rack ... 3-17
3.4.1.2 Unloading Rail Spurs ... 3-17
3.4.1.3 Tank Cars ... 3-19
3.4.1.4 Ancillary Facilities ... 3-20
3.4.2 Project Operation ... 3-20
3.4.2.1 Tank car Transport and Unloading ... 3-20
3.5 Future Crude Oil Feedstock ... 3-22
3.6 Project Construction ... 3-25
3.6.1 Schedule ... 3-25
3.6.2 Site Preparation ... 3-25
3.6.3 Construction Labor Force ... 3-25
3.6.4 Construction Materials and Services ... 3-26
3.6.5 Construction Traffic ... 3-26
3.7 Federal Preemption of Railroad Regulation ... 3-26

4. Environmental Setting, Impacts, and Mitigation Measures
4.0 Approach to the Analysis of Impacts ... 4.0-1
4.1 Air Quality ... 4.1-1
4.2 Biological Resources ... 4.2-1
4.3 Cultural Resources ... 4.3-1
4.4 Energy Conservation ... 4.4-1
4.5 Geology and Soils ... 4.5-1
4.6 Greenhouse Gas Emissions ... 4.6-1
4.7 Hazards and Hazardous Materials ... 4.7-1
4.8 Hydrology and Water Quality ... 4.8-1
4.9 Land Use and Planning ... 4.9-1
4.10 Noise ... 4.10-1
4.11 Transportation and Traffic ... 4.11-1

5. CEQA Statutory Sections ... 5-1
5.1 Significant Unavoidable Environmental Impacts ... 5-1
5.2 Significant Irreversible Environmental Effects ... 5-1
5.3 Growth-Inducing Impacts ... 5-2
5.4 Cumulative Impacts ... 5-3
5.4.1 General and Regional Plans Considered in the Cumulative Analysis ... 5-4
5.4.2 Specific Projects Considered in the Cumulative Analysis ... 5-4
5.4.2.1 Other Recent Valero Benicia Refinery Projects ... 5-4
5.4.2.2 Other Crude by Rail Projects in California ... 5-5
5.4.2.3 Other Relevant Local Projects ... 5-5
5.4.2.4 Other City of Benicia Projects ... 5-5
5.4.3 Areas of Potential Cumulative Impacts ... 5-5
5.4.3.1 Air Quality ... 5-5
5.4.3.2 Biological Resources ... 5-15
5.4.3.3 Cultural Resources ... 5-16
5.4.3.4 Energy Conservation ... 5-16
5.4.3.5 Geology and Soils ... 5-16
5.4.3.6 Greenhouse Gas Emissions ... 5-17

Page
5.4.3.7 Hazards and Hazardous Materials 5-17
5.4.3.8 Hydrology and Water Quality 5-17
5.4.3.9 Land Use and Planning 5-19
5.4.3.10 Noise 5-19
5.4.3.11 Transportation and Traffic 5-20
5.5 Effects Found Not to Be Significant 5-21

6. Analysis of Alternatives 6-1
6.1 General Consideration of Alternatives 6-1
6.1.1 Identification of Alternatives 6-1
6.1.2 Alternatives Screening Methodology 6-2
6.1.3 Consistency with Project Objectives 6-2
6.1.4 Feasibility 6-3
6.1.5 Potential to Eliminate Significant Environmental Effects 6-4
6.2 Potentially Significant Impacts of the Project 6-4
6.3 Alternatives Considered but Dismissed from Further Consideration in this EIR 6-4
6.3.1 Locate Tank car Unloading Racks at the Port of Benicia Valero Marine Terminal 6-5
6.3.2 Locate Tank car Unloading Racks at the AMPORTS Property Near Benicia Marine Terminal 6-5
6.3.3 Receiving Crude from the Proposed WesPac Energy--Pittsburg Terminal 6-5
6.3.4 Project with an Onsite Wye Rail Spur 6-6
6.4 Alternatives to the Project 6-6
6.4.1 No Project Alternative 6-6
6.4.2 Reduced-Project Alternatives 6-7
6.4.2.1 Alternative 1 – Limiting Project to One 50-Car Train Delivery per Day 6-7
6.4.2.2 Alternative 2 – Two 50-Car Trains Delivered during Nighttime Hours 6-8
6.4.3 Alternative 3 – Offsite Unloading Terminal 6-8
6.4.4 Environmentally Superior Alternative 6-10

7. Report Preparation 7-1
7.1 Report Authors 7-1
7.1.1 Lead Agency 7-1
7.1.2 Consultants 7-1
7.2 Agencies and Organizations Contacted 7-2

8. Glossary and Acronyms 8-1
8.1 Glossary 8-1
8.2 Acronyms and Abbreviations Used in This EIR 8-5

9. References 9-1

Page

Appendices

A. Notice of Preparation/Initial Study A-1
B. Scoping Report B-1
C.1 Areas of Controversy—Potential Air Quality Impacts From Increased Use of Heavy Canadian Crudes C.1-1
C.2 Areas of Controversy—Potential Air Quality Impacts From Increased Use of Light Sweet Crudes C.2-1
D. Discussion of Confidential Business Information D-1
E.1 Construction Emissions E.1-1
E.2 Marine Vessel Criteria Pollutant and GHG Baseline Emissions E.2-1
E.3 Air Permit Application, February 2013 ..... E.3-1
E.4 Air Permit Application, Project Update #1, November 2013 ..... E.4-1
E.5 Air Quality and GHG Emissions Supplement E.5-1
E.6 Updated Methodology for Assessment of Risk and PM2.5 Concentrations at Receptors near Locomotive Tracks in Fairfield, CA E.6-1
F. Railroad Crude Oil Release Rate Analysis for Route between Roseville and Benicia F-1
G. Valero Emergency Procedures Manual, Sections 203 and 206 ..... G-1
H. UPRR Hazardous Material Emergency Response Plan H-1
I. Transportation Impact Analysis I-1
J. Mitigation Monitoring Reporting Program J-1
K. McGovern Report for City of Benicia Valero Crude by Rail Project K-1
L. Union Pacific Railroad Statement re: Preemption L-1

List of Figures

3-1 Project Location 3-3
3-2 Valero Refinery Boundary 3-4
3-3 Site Plan 3-6
3-4 Crude Oil Classes 3-7
3-5 Schematic View of Crude Oil Distillation and Downstream Processing 3-8
3-6 Typical Natural Yields of Light and Heavy Crude Oils 3-9
3-7 Schematic of Typical Petroleum Refinery 3-11
3-8 West Coast Crude Deliveries Compared to Valero's Typical Crudes and Blended Crude Feedstock Capability 3-13
3-9 API vs Sulfur in Blended Crudes Processed at Valero Benicia Refinery, 2010 to 2013 3-14
3.10 Unloading Rack 3-18
3.11 West Coast Crude Deliveries and Sample of Crudes Available by Rail 3-24
4.5-1 Active and Potentially Active Bay Area Earthquake Faults 4.5-3
4.7-1 Evolution of Rail Industry Tank Car Standards for Crude Oil 4.7-7
4.9-1 Existing Land Use Designations 4.9-3
4.9-2 Existing Zoning 4.9-6
4.10-1 Typical A-Weighted Sound Levels 4.10-2
4.10-2 Noise Monitor Location and Sensitive Receptors 4.10-7

Page

List of Tables

2-1 Summary of Impacts and Mitigation Measures 2-2
3-1 Available North American Crudes 3-23
4.1-1 Air Quality Data Summary (2008–2012) for the Project Area 4.1-5
4.1-2 Ambient Air Quality Standards and Bay Area Air Basin Attainment Status 4.1-6
4.1-3 Average Daily Construction Exhaust Emissions 4.1-14
4.1-4 Baseline Maritime Emissions Within the Bay Area Air Basin 4.1-19
4.1-5 Annual Net Operational Exhaust Emissions Within the Bay Area Air Basin 4.1-19
4.1-6 Annual Operational Exhaust Emissions within the Sacramento Valley Air Basin 4.1-20
4.1-7 Emissions Factors Comparison for 1,000,000 Barrels Delivered per 1,000 Miles Travelled Outside of the Bay Area and Sacramento Basins 4.1-21
4.1-8 Examples of Emissions Outside of the Bay Area and Sacramento Basins 4.1-22
4.1-9 Maximum Cancer and Noncancer Risk in the Bay Area Basin 4.1-25
4.1-10 Maximum Cancer and Noncancer Risk in the Sacramento Basin 4.1-26
4.2-1 Special-Status Species Considered for the Proposed Project 4.2-5
4.5-1 Modified Mercalli Intensity Scale 4.5-6
4.6-1 California Greenhouse Gas Emissions 4.6-2
4.6-2 Recommended Actions of Climate Change Scoping Plan Relevant to the Refinery 4.6-5
4.6-3 Project Construction Greenhouse Gas Emissions 4.6-11
4.6-4 Baseline Marine Vessel GHG Emissions within California 4.6-12
4.6-5 Project Annual Net GHG Emissions Generated within California 4.6-12
4.6-6 Emissions Factors Comparison for 1,000,000 Barrels Delivered per 1,000 Miles Travelled Outside of California 4.6-13
4.6-7 Examples of GHG Emissions Outside of California 4.6-14
4.7-1 Schools within 1/4 mile of the UPRR Mainline 4.7-23
4.8-1 Designated Beneficial Uses 4.8-5
4.10-1 Average Existing Leq in the Project Area for Daytime, Evening, and Nighttime Periods 4.10-6
4.10-2 Noise Level Performance Standards for Noise-Sensitive Land Uses 4.10-9
4.10-3 Vibration Source Levels from Construction Equipment 4.10-15
4.10-4 Typical Maximum Noise Levels from Construction Equipment 4.10-16
4.11-1 Existing At-Grade Rail Operations 4.11-7
4.11-2 Existing Off-Peak Hour Intersection Level of Service (LOS) 4.11-8
5-1 Potential Projects for Cumulative Effects Evaluation 5-6
5-2 Cumulative Health Risk at near the Refinery 5-13
5-3 Cumulative Health Risk at the Maximum Exposed Individual Receptor 5-14

This page intentionally left blank

EXECUTIVE SUMMARY

ES-1 Introduction

This Environmental Impact Report (EIR) is an informational document that discloses to the public and to decision-makers the environmental effects of the proposed Valero Benicia Refinery's Crude by Rail project (Project). This Executive Summary includes the following sections:

- Introduction (ES-1)
- Project Objectives (ES-2)
- Project Setting and Location (ES-3)
- Project Description (ES-4)
- Alternatives (ES-5)
- Environmentally Superior Alternative (ES-6)
- Areas of Controversy and Issues to be Resolved (ES-7)
- Summary of Impacts (ES-8)

A comparative summary of the impacts of the Project and the alternatives to the Project is provided in Table 2-1, in Chapter 2. The EIR assesses the direct, indirect, and cumulative environmental impacts that could occur as a result of constructing, operating, and maintaining the Project. These analyses are based upon information submitted by Valero in its application for a Use Permit to the City of Benicia for the Project. This EIR is an informational document that, in itself, does not determine whether the Project should be approved, but informs local officials in the planning and decision-making process.

ES-2 Project Objectives

The Valero Benicia Refinery (Refinery) converts crude oil into finished products, including gasoline, jet fuel, liquefied petroleum gas, heating oil, fuel oil, asphalt, petroleum coke, and sulfur. The Project would provide an alternate means of delivering crude oil feedstock to the Refinery. The Project has the following objectives:

1. Allow for the delivery of up to 70,000 barrels per day of North American-sourced crude oil by rail.

2. Replace marine vessel delivery with rail delivery of up to 70,000 barrels per day of crude oil.

3. Mitigate project-related impacts.

4. Implement the Project without changing existing Refinery process equipment or Refinery process operations, other than operation of the Project components.

5. Continue to meet requirements of existing rules and regulations pertaining to oil refining including the State of California Global Warming Solutions Act of 2006 (AB 32).

ES-3 Project Setting and Location

The Refinery is located at 3400 East Second Street, an industrial area in the eastern portion of the City of Benicia, in Solano County. The Refinery lies in a general north-south orientation near and west of Interstate 680. The Refinery is located along the northern edge of the Suisun Bay below a low range of coastal hills. To the west of East Second Street is open space, and the closest residential areas are approximately 3,000 feet to the south and west of the Refinery, and approximately 2,100 feet to the northwest of the Project site. Refinery operations occupy approximately 330 acres of the 880 acre Valero property.

The Refinery dock is located on the Carquinez Strait between the Benicia-Martinez Bridge and the Port of Benicia wharf. The Refinery's marine terminal and pipeline to the Refinery provide access for receiving and shipping bulk cargoes by marine vessel. The existing Union Pacific Railroad (UPRR) rail line provides rail access for the Refinery and for the Benicia Industrial Park. The Benicia Industrial Park is located east and north of the Refinery. Presently, the Refinery uses tank cars to receive chemicals used in refining and to ship refined products from the Refinery.

A new tank car unloading rack capable of unloading two parallel rows of tank cars (one on each side) and transferring crude oil to the Refinery would be installed as part of the Project in the northeastern portion of the main Refinery property, between the eastern side of the lower tank farm and the fence adjacent to Sulphur Springs Creek.

The new tank car unloading facilities would include a liquid spill containment sump with the capacity to contain the contents of at least one tank car. In addition, the existing liquid spill containment for tanks abutting the tank car unloading facilities would be modified to allow installation of the unloading facilities. Part of the existing containment berm for the tank field would be removed and a new concrete berm would be constructed approximately 12 feet west of the existing earthen berm.

The Project would install approximately 8,880 track-feet of new track on Refinery property. Three new track turnouts and one crossover would be installed. The Project would also realign approximately 3,560 track-feet located on Refinery property.

New rail spurs and parallel storage and departure spur would be constructed between the eastern side of the lower tank farm and the western side of the fence along Sulphur Springs Creek.

Ancillary facilities affected by the Project would include crude oil offloading pumps and pipeline and associated infrastructure, spill containment structures, a firewater pipeline, groundwater wells, and a service road.

ES-4 Project Description

Overview

The purpose of the Project is to install new equipment, pipelines, and infrastructure to allow the Refinery to receive a portion of its crude oil feedstock deliveries by tank car.

The Project would allow Valero to accept up to 100 tank cars of crude oil a day in two 50-car trains. The trains would enter the Refinery on an existing rail spur that crosses Park Road. The crude oil unloaded from the tank cars would be pumped to the existing crude oil storage tanks in the Refinery via a new crude offloading pipeline, connected to existing piping located within the Refinery. Valero would ask UPRR to schedule Valero's trains so that none of them cross Park Road during the commute hours of 6:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Valero would operate the Project components 24 hours per day, 7 days per week, and 365 days per year.

Based on Valero's plans, the crude oil delivered by rail would displace up to 70,000 barrels per day of the crude oil that is presently delivered by marine vessels. Crude oil delivered to the Refinery by tank car would not displace crude oil delivered to the Refinery by pipeline.

The crude oil to arrive by tank car would originate at sites in North America and be shipped by UPRR. UPRR would transport tank cars on existing rail lines from sources in North America to Roseville, California, where the cars would be assembled into a train for shipment into the Refinery. Valero would own or lease the tank cars that would be used to transport crude oil from Roseville to Benicia. Under regulations adopted by the Pipeline and Hazardous Materials Safety Administration (PHMSA), crude oil shipped by rail must be shipped in tank cars built to the "DOT-111" specification. In 2011, the Association of American Railroads voluntarily imposed more stringent standards on the design of DOT-111 tank cars. Tank cars that meet these new standards are generally known by the number "1232," and are referred to herein as "1232 Tank cars." All DOT-111 tank cars ordered after October 1, 2011 must meet the standards for 1232 Tank cars. DOT-111 tank cars ordered before 2011 that do not meet the standards for 1232 Tank cars are commonly known as "legacy" DOT-111 tank cars. Valero has committed that, when the PHMSA regulations call for use of a DOT-111 car, Valero would use 1232 Tank cars rather than legacy DOT-111 cars. See Section 3.4.1.3, in the *Project Description* for further discussion of tank cars. UPRR owns and operates the locomotives that would be used to transport the tank cars from Roseville to Benicia.

The Project would not involve any changes to the existing Refinery operations or process equipment, other than the construction and operation of the Project components. The Project would not increase the amount of crude oil that can be processed at the refinery, or the amounts of petroleum products that can be produced. The Project does not propose any change to the Bay

Area Air Quality Management District (BAAQMD) operating permit regarding the Refinery's crude oil processing rate. The Project does not propose changes to the emissions limits in the current BAAQMD permits, although the Project does require approval of an Authority to Construct from the BAAQMD.

Project Components

The Project would consist of the following primary components:

- Installation of a single tank car unloading rack capable of offloading two parallel rows of 25 crude oil railcars.
- Construction of two parallel, offloading rail spurs to access the tank car unloading rack along with a parallel departure track to store tank cars in preparation for departure, for a total of 8,880 track-feet of new track on Refinery property.
- Installation of approximately 4,000 feet of 16-inch diameter crude oil pipeline and associated components and infrastructure between the offloading rack to the existing crude supply piping.
- Replacement and relocation of approximately 1,800 feet of tank farm dikes.
- Relocation of an existing firewater pipeline, compressor station, and underground infrastructure.
- Relocation of groundwater wells along Avenue "A."
- Construction of a service road adjacent to the proposed unloading rack.

The Refinery proposes to begin construction in 2014 and to commence operations in late-2014 or early 2015. Construction is expected to take approximately 25 weeks. The Project would require twenty additional employees or contractors.

ES-5 Alternatives

No Project Alternative

Under the No Project alternative, the Project would not be constructed, which would prevent crude oil from being transported to the Refinery via tank car. The Refinery's existing facilities at the site of the proposed unloading racks and spurs would remain and the Refinery would continue to use marine vessels to import crude oil. The amount of California crude oil delivered to the Refinery by pipeline would remain unchanged. Air emissions (both criteria pollutants and greenhouse gases) from marine vessels that transport crude oil would remain unchanged, because there would be no reduction in marine vessel trips.

Compared to the Project, the No Project alternative would result in higher emissions of criteria pollutants and greenhouse gases within California. Global greenhouse gas emissions would be higher with the No Project alternative than with the Project. The No Project alternative would have no impact to the Sacramento Air Quality Management District or the Yolo-Solano Air Quality Management District. Valero would not be able to achieve most of its Project objectives.

Reduced-Project Alternatives

A reduced-project alternative considers components of the Project that could potentially be eliminated or reduced from the full Project scope. Two reduced-project alternatives are analyzed in the EIR:

Alternative 1: Limiting Project to One 50-Car Train Delivery per Day

Under this alternative the Project would operate with a 50% reduction in the proposed number of train deliveries to the Refinery per day. Deliveries would be limited to a maximum of one[1] 50-car train each day, containing a daily total of 35,000 barrels. This single train would be delivered during nighttime hours (between 8:00 p.m. and 5:00 a.m.) and once emptied, would depart the Refinery during nighttime hours and be returned to its origination point. All other aspects of this alternative would be the same as the Project.

For most of the environmental topics, this alternative would have essentially the same impacts as the Project. For Air Quality and Greenhouse Gas emissions, this alternative would reduce air emissions from trains but would result in smaller reductions in air emissions from marine vessels. Although most emissions from both the Project and this alternative would not exceed any levels of significance, both would still result in a significant offsite impact for NOx, while overall emissions reductions for this alternative would be less than for the Project. This alternative may lessen the likelihood of potential impacts to local traffic at Park Road in Benicia's Industrial Park area during peak traffic times. There is a larger window for achieving a scheduled Park Road train crossing within the longer off-peak nighttime hours. This alternative would not allow Valero to fully achieve the primary Project objectives 1 and 2, but would still fulfill Project objectives 3 through 5.

UPRR has taken the position that any limitation on the volume of product shipped or the frequency, route, or configuration of such shipments is clearly preempted under federal law. UPRR has summarized its position in a statement set forth in Appendix L.Thus, Alternative 1 may be legally infeasible.

Alternative 2: Two 50-Car Trains Delivered during Nighttime Hours

Under this alternative the Project would be required to schedule all Park Road train crossings during nighttime hours only (between 8:00 p.m. and 6:00 a.m.). This could be accomplished

[1] This means that one 50-car train would be delivered for unloading each day and after unloading the 50-car train would return to its origination point.

through either a single 100-car train or sequencing two 50-car trains such that they are delivered and subsequently depart only during nighttime hours. All other aspects of this alternative would be the same as the Project.

As with the single 50-car alternative describe above, for most environmental topics, this alternative would have essentially the same impacts as the Project.

The exception to this would be the increased potential for local noise effects. The Project's nighttime noise impacts at the Refinery would be less than significant. Under this alternative, while the noise levels from train movements would be the same, if all trains were brought in and depart during nighttime the potential noise duration would be greater than that of the Project. As under the 50-car reduced-project alternative, this alternative would lessen potential impacts to local traffic by restricting the time of day when the trains are scheduled to arrive and depart. However, some tank car deliveries could extend beyond its scheduled delivery window into peak traffic times as compared to one nighttime and one day time delivery. This alternative would still allow Valero to achieve most of its Project objectives.

Alternative 3: Offsite Unloading Terminal

This alternative would consist of a separate, offsite facility where crude oil could be shipped by either marine vessel or rail, and then transferred to the Refinery presumably by a new pipeline. There are two variations to this alternative: 1) offsite terminal would be developed and operated by Valero, and 2) offsite terminal would be independently developed and operated by a third party. Most of the impacts identified for the Project would occur at a Valero-owned offsite terminal, although through thoughtful siting, potential impacts to local traffic flow could likely be reduced. Locating the unloading racks at a new facility outside the Refinery would involve greater construction impacts for the facility itself than would occur if the unloading racks were within the Valero Refinery.

Under the third-party operator variant, new or existing infrastructure could be developed to receive crude oil and transfer it to Valero via new pipeline. In this case it is likely that new CEQA review would be required for the offsite facility, and the pipeline to Valero would have to be considered within this analysis as a direct impact of the project.

There are many unknowns under this alternative, including whether this would be a new facility or an existing one, and how far away this facility would be from the Refinery. The requirement for a new pipeline from this offsite facility alone would include substantive environmental impacts from all construction activities (e.g., air quality, greenhouse gas emissions, noise, biological and cultural resources), which could exceed those of construction of the Project. Either variant of this alternative would simply add the impacts of the new pipeline construction and operation to the impacts of a tank car unloading facility, but at a different location. Thus, this alternative's overall impacts would be at least somewhat greater than those of the Project. Although this alternative would meet all objectives of the Project and could reduce the impacts to

the local Refinery / Benicia area, many of these same impacts would be simply transferred to another location.

ES-6 Environmentally Superior Alternative

CEQA Guidelines Section 15126.6(e)(2) requires an EIR to identify an environmentally superior alternative. If the environmentally superior alternative is the No Project Alternative, the EIR also must identify an environmentally superior alternative from among the other alternatives. In general, the environmentally superior alternative is defined as that alternative with the least adverse impacts to the Project area and its surrounding environment.

As explained in Section 6.4.2, Alternative 1 (reducing the Project to single 50-car train per day) is environmentally superior to the Project in a few respects. Alternative 1 would reduce the emission of criteria pollutants, toxic air emissions, and greenhouse gases from trains as compared with the Project, and avoid the Project's significant NOx impact in the Sacramento Metro AQMD. However, for the reasons described above, this alternative may be legally infeasible because of federal preemption. Alternative 1 would also reduce the impacts of train crossings on traffic. Since the Project would not have a significant effect on traffic, however, Alternative 1 would not avoid any significant traffic effect.

The Project, however, is environmentally superior to Alternative 1 with respect to overall air quality. Alternative 1 would result in greater emissions of criteria pollutants, toxic air emissions, and greenhouse gases than the Project overall, because Alternative 1 involves 50% more emissions of these same pollutants from marine vessels.

ES-7 Areas of Controversy and Issues to be Resolved

Areas of controversy known to lead agencies, including issues raised by agencies and the public, must be identified in the Executive Summary of an EIR (CEQA Guidelines Section15123). The scoping phase of the EIR, conducted between August 9, 2013 and September 13, 2013, identified the following key areas of concern for consideration in the EIR:

- Properties and parameters of crude oil to be transported and refined;
- Relationship of the Project to the Valero Improvement Project;
- Effects of train operations on local streets and I-680;
- Construction, operation, and transportation-related effects on air quality;
- Potential effects on biological resources in Sulphur Springs Creek and the Suisun Marsh;
- Potential hazardous materials releases resulting from an accident;
- Emergency response procedures and responsibility during an accident;
- Range of potential effects from extraction of crude oil at its source through its transportation to the Refinery.

Issues to be resolved, including a choice among alternatives, and whether and how to mitigate potential significant impacts, also must be identified in an Executive Summary (CEQA Guidelines Section15123). The main issue to be resolved in this EIR is which among the alternatives would meet most of the basic Project objectives with the least environmental impact. Balancing sometimes competing environmental values can be challenging because it rests on assumptions of relative value.

Decision-makers may elect to balance relative values of environmental resources and, thereby, resolve the issues considered in this EIR with a different conclusion than the one summarized in Section ES-6 and discussed in Section 6.4.4, *Environmentally Superior Alternative*.

ES-8 Summary of Impacts

Resource Areas Evaluated

This section summarizes the potential impacts resulting from implementation of the Project or alternatives. The affected environment and the potential direct and indirect effects of the Project are described and evaluated in Chapter 4 of this EIR for the resource areas listed below. Other CEQA considerations, including the cumulative impact analysis, are in Chapter 5, and the alternatives analysis is in Chapter 6. Chapter 4 is organized into the following 11 environmental resource or issue areas:

- 4.1 Air Quality
- 4.2 Biological Resources
- 4.3 Cultural Resources
- 4.4 Energy Conservation
- 4.5 Geology and Soils
- 4.6 Greenhouse Gas Emissions
- 4.7 Hazards and Hazardous Materials
- 4.8 Hydrology and Water Quality
- 4.9 Land Use and Planning
- 4.10 Noise
- 4.11 Transportation and Traffic

A detailed analysis of each environmental topic, each potential impact and the mitigation measure(s) needed, if any, is contained in Chapter 4.

Summary of Impacts

Implementing the Project could result in the potential for impacts to occur to the resources listed above. The Project would result in no impact or less-than-significant impacts to 10 of these 11 environmental resource or issue areas. The Project would result in significant and unavoidable impacts to Air Quality. Where significant impacts are identified, feasible mitigation measures are proposed that would reduce each of these potential impacts to a less-than-significant level.

A summary table (Table 2-1 in Chapter 2) provides an overview of each impact of the Project and the mitigation measure needed, if any, to reduce the impact to a less-than-significant level, for each of the resource areas assessed in this EIR.

CHAPTER 1
Introduction

1.1 Purpose of This Document

This Environmental Impact Report (EIR) discloses to the public and the City's decision-makers the environmental consequences of the proposed Valero Benicia Refinery's Crude by Rail project (Project). This document assesses the environmental impacts that might result from the Project, as it is described in the application to the City, as well as the cumulative environmental impacts in the vicinity of the Project area. The analysis and conclusions in this document do not require that the Project be approved or denied. Rather, this document provides information about the Project's environmental impacts to assist the City in deciding whether to approve the project. This document is based upon Valero's application and supplemental materials that Valero submitted to the City of Benicia and the Bay Area Air Quality Management District (BAAQMD).

1.2 Project Overview

The Project would allow the Refinery to receive crude oil by rail. Currently, these crudes are not readily accessible at the Refinery. The crudes would originate at sites in North America. Union Pacific Railroad (UPRR) would transport the crudes in tank cars using existing rail lines to Roseville, California, and then to the Refinery.

The Project involves the installation of a new tank car unloading rack, rail track spurs, pumps, pipeline, and associated infrastructure at the Refinery. The Project would allow the Refinery to accept up to 100 tank cars of crude oil a day[1] in two 50 tank car trains. The trains would enter the Refinery on an existing rail spur crossing Park Road outside the southern boundary of the Refinery. The crude oil unloaded from the tank cars would be pumped to the existing crude oil storage tanks in the Refinery via a new pipeline connected to existing piping infrastructure.

The Project would allow Valero to receive up to 70,000 barrels[2] per day of the crude oil by rail. Based on Valero's current plans, Valero would reduce its shipments of crude by marine vessel by the same amount. The crude oil delivered to the Refinery by tank car would not displace the crude oil delivered by pipeline.

Assuming an average ship holds 350,000 barrels, and the Project displaces the maximum of 70,000 barrels per day of waterborne crude, the Project could displace as many as 73 ship

1 A day here is defined as a 24 hour period, midnight to midnight.
2 One barrel = 42 gallons of crude oil.

deliveries per year. (70,000 x 365 days/yr / 350,000 barrels /average ship = 73 ships/year.) The Project could displace the total quantity of crude oil delivered by marine vessel to the Refinery by as much as 25,550,000 barrels in a 365 day year. Based on a three-year baseline period from December 10, 2009 to December 9, 2012, annual marine vessel deliveries could be reduced by as much as 82 percent.

The Project would not include, nor would it require, any changes to existing Refinery operations or process equipment, other than installation and operation of the Project unloading rack and other Project components. The Project would not change the Refinery's crude oil processing rate[3] or increase the Refinery's air emissions, except for emissions from the unloading of crude.

The Project would consist of the following primary components:

- Installation of a single tank car unloading rack capable of offloading two parallel rows of 25 crude oil tank cars.
- Construction of two parallel, offloading rail spurs to access the tank car unloading rack along with a parallel departure track to store tank cars in preparation for departure, for a total of 8,880 track-feet of new track on Refinery property.
- Installation of approximately 4,000 feet of 16-inch diameter crude oil pipeline and associated components and pump infrastructure between the offloading rack and the existing crude supply piping.
- Replacement and relocation of approximately 1,800 feet of existing tank farm dikes.
- Relocation of an existing firewater pipeline, compressor station, and underground infrastructure.
- Relocation of groundwater wells along Avenue "A."
- Construction of a service road adjacent to the proposed unloading rack.

Construction activities are scheduled to begin in 2014 and are expected to take approximately 25 weeks. Implementation of the Project would result in the addition of approximately 20 new permanent refinery personnel (four crews of five).

1.3 Project Background

The City of Benicia, serving as Lead Agency under CEQA prepared an Initial Study (see Appendix A) in accordance with CEQA Guidelines Section 15063 to determine the potential environmental consequences of approval and implementation of the Project. The Initial Study concluded that although the Project could have a significant effect on the environment, there would not be a significant effect in this case because mitigation measures were added to the Project that would avoid or reduce all impacts to a less than significant level. Mitigation measures

[3] The Refinery's crude oil processing rate is limited to an annual average of 165,000 barrels per day (daily maximum of 180,000 barrels per day) by BAAQMD permit. This permit limit would remain unchanged.

were included to avoid potentially significant effects in the areas of air quality, biological resources, cultural resources, geology and soils, hydrology and water quality, and transportation and traffic.

On May 31, 2013 the City of Benicia issued a Notice of Intent (NOI) to adopt an Initial Study / Mitigated Negative Declaration (IS/MND) for the Project. The issuance of the NOI began a 30-day public comment period, which concluded on July 1, 2013. On July 11, 2013, the Planning Commission held a public meeting on the Project.

In light of the comments received on the IS/MND, the City subsequently determined that an EIR should be prepared pursuant to CEQA Guidelines Section 15064. On August 9, 2013, the City published and distributed a Notice of Preparation (NOP) to advise interested local, regional, and state agencies, and the public, that an EIR would be prepared for the Project. The NOP solicited both written and verbal comments on the EIR's scope during a 30-day comment period.

In addition to the NOP, the City notified the public about a public scoping meeting through two newspaper notices (1/4 page advertisement and a legal notice) and the City website. Notifications provided basic Project information; the date, time, and location of the scoping meeting; and a brief explanation of the public scoping process.

On September 12, 2013, a public scoping meeting was held by the Planning Commission. The scoping process provides the means to determine those issues that interested participants consider to be the principal areas for study and analysis in the EIR. Written comments were also collected during the comment period that ended on September 13, 2013. Eighteen commenters submitted written comments during the scoping period and eight oral comments were received at the scoping meeting. Additional comments and letters have been received after the IS/MND comment period. The Scoping Report (included as Appendix B) provides an overview and a summary of the written and oral comments provided by agencies and individuals during the scoping period for the Project, and includes all of the comments received during both the IS/MND comment period and the EIR scoping period.

1.4 Key Areas of Environmental Concern

The Initial Study (see Appendix A) prepared for the Project included analysis of all the topics listed in the CEQA Environmental Checklist (CEQA Guidelines Appendix G): Aesthetics, Agriculture and Forestry Resources, Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Mineral Resources, Noise, Population and Housing, Public Services, Recreation, Transportation and Traffic, and Utilities and Service Systems.

Based on the results of the Initial Study, the City has determined that the Project would not result in impacts to the following topics and these criteria have not been carried forward for further analysis in the EIR:

- Agriculture and Forestry Resources
- Mineral Resources

The Initial Study also concluded that the following topics would result in less than significant impacts and have not been carried forward for further analysis in the EIR:

- Aesthetics
- Population and Housing
- Public Services
- Recreation
- Utilities and Service Systems

1.5 Public Comment on the Draft EIR

This Draft EIR is being circulated to state and local agencies and interested individuals who may wish to review and comment on the report. Written comments may be submitted to the City of Benicia during the 45-day public review period. Written comments on this Draft EIR will be accepted via regular mail, fax, and e-mail and at a public meeting that will be noticed under separate cover. All comments received will be addressed in a Response to Comments document, which, together with this Draft EIR, will constitute the Final EIR for the Project.

1.6 Areas of Controversy

In addition to the key areas of environmental concern considered in the EIR as described above, public comment received on the IS/MND and during scoping (see Appendix B) has identified a number of areas of controversy on potential environmental impacts of the Project that this EIR intends to address in the following sections. Specifically these are:

1. The geographic area of study considered for impact analysis of the Project and potential indirect impacts of the Project.

2. The source of the Project's crude feedstocks, potential changes in the quality of the feedstocks, and potential impact on Refinery operations and/or emissions.

3. Relationships between the Valero Improvement Project, a previous project at the Refinery, and the Project.

4. Railroad hazardous material operational safety and tank car specification information.

5. Cumulative impacts of the Project and other similar refinery or oil terminal projects within the State of California.

Item 2 is addressed in Appendices C.1 and C.2 while the rest are addressed within the body of this Draft EIR.

1.7 Confidential Business Information

Under CEQA, a lead agency may require an applicant to submit data and information that is necessary to determine whether the proposed project may have a significant effect on the

environment. (Public Resources Code § 21160.) If any or all of the information submitted is a "trade secret" as defined in Government Code Section 6254.7, the lead agency is prohibited from including the information in the CEQA document or otherwise disclosing the information. (*Id.*) Government Code Section 6254.7 defines trade secret to include:

> "any formula, plan, pattern, process, tool, mechanism, compound, procedure, production data, or compilation of information which is not patented, which is known only to certain individuals within a commercial concern who are using it to fabricate, produce, or compound an article of trade or a service having commercial value and which gives its user an opportunity to obtain a business advantage over competitors who do not know or use it." (Government Code § 6254.7(d).)

At the City's request, Valero has provided the City with data and information regarding the proposed project. Valero has designated the following information to be confidential under Section 21160:

- The specific North American crudes that Valero plans to purchase and ship by rail (publicly identified only as light sweet);
- The properties (weight, sulfur content, vapor pressure, and acidity) of specific crudes delivered to Valero in the past;
- The properties (weight, sulfur content, vapor pressure, and acidity) of specific crude blends processed at the refinery;
- Data purchased by Valero showing the weight and sulfur content of specific crudes, including North American crudes;
- Data generated by Valero showing the weight and sulfur content of specific crudes, including North American crudes;
- Detailed information regarding the weight and sulfur content of crude blends suitable for processing at the Benicia refinery based on the refinery's unique configuration; and
- Detailed daily measurements of the weight and sulfur content of crude blends processed at the Benicia refinery in the past.

As explained more fully in Appendix D, the City has determined that all of the information described above meets the definition of trade secret under Government Code Section 6254.7. All of the information has competitive value, and has been protected from disclosure by Valero. Thus, under PRC Section 21160, the City is prohibited from disclosing the information in this EIR or otherwise.

Moreover, the disclosure of confidential business information could potentially expose Valero and possibly other refiners to a claim or suit for violation of the antitrust laws. Generally, antitrust laws prohibit competitors from sharing price, output, and other competitively sensitive information that may enable anticompetitive coordination in pricing or production that harms consumers. Price-fixing agreements are per se unlawful. (*Todd v. Exxon Corp.*, 275 F.3d 191,198 (2d Cir. 2001).) Even in the absence of direct "smoking gun" evidence of a price-fixing

agreement, however, a price-fixing agreement may be inferred based on "parallel" conduct among competitors accompanied by "plus factors." Courts have stated that exchanging information of competitive value can constitute a "plus factor" for assessing parallel behavior under the antitrust laws. (*See id.* ("Information exchange is an example of a facilitating practice that can help support an inference of a price-fixing agreement.").) The FTC has explained as follows:

> "One area for concern is exchanging price or other sensitive business data among competitors . . . . Any data exchange or statistical reporting that includes current prices, or information that identifies data from individual competitors, can raise antitrust concerns if it encourages more uniform prices than otherwise would exist."
>
> Information about future plans should be closely guarded; disclosing future plans outside the company could alter competitors' decisions and raise antitrust concerns." (Federal Trade Commission, Guide to the Antitrust Laws, Dealings with Competitors: Spotlight on Trade Associations, http://www.ftc.gov/bc/antitrust/trade_associations.shtm.)

1.8 Organization of the Document

This document is organized into the following chapters:

- **Chapter 1 – Introduction**
- **Chapter 2 – Summary of Environmental Impacts:** Summarizes environmental impacts that could result from implementation of the Project. The summary of each resource area indicates the level of significance of potential impacts to those resources.
- **Chapter 3 – Project Description:** Provides a detailed description of the Project, including its location, background information, major objectives, and technical characteristics.
- **Chapter 4 – Environmental Settings, Impacts, and Mitigation Measures:** Contains an analysis of environmental resource areas. Describes the general approach to analysis of the Project. Discussion of each resource area is divided into: a) the setting, which describes environmental conditions and regulatory information; b) the standards of significance for determining the degree or level of potential environmental impacts for each issue; c) potential impacts, which indicate the environmental effects that are anticipated from the Project, and d) mitigation measures, if needed.
- **Chapter 5 – CEQA Statutory Sections:** Provides discussions of various CEQA-mandated considerations including significant and unavoidable environmental impacts, cumulative impacts, and growth-inducing impacts.
- **Chapter 6 – Analysis of Alternatives:** Describes alternatives to the Project and analyzes their associated environmental effects.
- **Chapter 7 – Report Preparation:** Lists report authors by section and City staff that assisted with the preparation and review of the EIR as well as agencies and organizations consulted.
- **Chapter 8 – Glossary and Acronyms:** Provides a number of technical terms used in the refining industry to describe the operations and equipment that are in use at the Refinery. The glossary includes selected definitions and in some cases expanded descriptions of these

terms that allow the reader of this document who is unfamiliar with the refining industry to understand the basic operations within a refinery.

- **Chapter 9 – References:** Lists of references used in the entire document.
- **Appendices:** Project background information, including the Notice of Preparation, Initial Study / Mitigated Negative Declaration, Scoping Report, Areas of Controversy, and Technical Reports for Air Quality, Hazards, and Transportation.

1.9 Use of this Document by Agencies

In accordance with CEQA, as amended, the City of Benicia must consider the Project's environmental impacts as disclosed in this EIR before the City may approve Valero's application for a Use Permit. BAAQMD also may rely on this EIR when considering the Authority to Construct permit and when preparing amendments to the Refinery's Title V Permit.

1.10 Permits and Approvals

The Project will require permits and approvals before construction and operation can begin. Among them are the Use Permit as well as grading and building permits not covered by the Annual Permit Agreement with the City. A BAAQMD Authority to Construct permit would also be required. In addition, the Project will be included in the Refinery's Title V Permit at the time the Title V Permit is revised.

This page intentionally left blank

CHAPTER 2
Summary of Environmental Impacts

This chapter provides a summary of the environmental impacts of the Project, as identified and analyzed in this EIR. Table 2-1 includes statements of impact and related mitigation measures. Statements of Project-specific impacts and mitigation measures have been extracted from the analysis set forth in Chapter 4 of this document; statements of cumulative impacts and mitigation measures have been extracted from Chapter 5. The information in Table 2-1 is arranged in four columns: 1) environmental impacts; 2) level of significance without mitigation; 3) adopted or recommended mitigation measures; and 4) level of significance with mitigation measures applied.

TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE VALERO BENICIA CRUDE BY RAIL PROJECT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Air Quality			
Impact 4.1-1a: Construction of the Project would contribute to an existing or projected air quality violation.	Potentially Significant	**Mitigation Measure 4.1-1: Implement BAAQMD Basic Mitigation Measures.** Valero and/or its construction contractors shall comply with the following applicable BAAQMD basic control measures during Project construction: • All exposed dirt non-work surfaces (e.g., parking areas, staging areas, soil piles, and graded areas, and unpaved access roads) shall be watered two times a day. • All haul trucks transporting soil, sand, or other loose material off-site shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. • All vehicle speeds on unpaved roads shall be limited to 15 mph. • Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California Airborne Toxics Control Measure Tile 13, Section 2485 of California of Regulations). Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation. • A publicly visible sign with the telephone number and person to contact at the City of Benicia regarding dust complaints shall be posted throughout construction. Valero and/or contractor shall respond and take corrective action within 48 hours of notification by the City. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.	Less than Significant
Impact 4.1-1b: Operation of the Project would contribute to an existing or projected air quality violation.	Potentially Significant	None available.	Significant and Unavoidable
Impact 4.1-2: The Project could result in a cumulatively considerable net increase in criteria pollutant and ozone precursor emissions.	Potentially Significant	None available.	Significant and Unavoidable
Impact 4.1-3: The Project could expose sensitive receptors to substantial pollutant concentrations.	Less than Significant	None required	Less than Significant
Impact 4.1-4: The Project could generate objectionable odors affecting a substantial number of people.	Less than Significant	None required	Less than Significant

TABLE 2-1 (continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE VALERO BENICIA CRUDE BY RAIL PROJECT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Biological Resources			
Impact 4.2-1: The Project could have a substantial adverse effect on nesting birds in the Sulphur Springs Creek riparian corridor.	Potentially Significant	**Mitigation Measure 4.2-1:** Project construction activities should avoid the nesting season of February 15 through August 31, if feasible. If seasonal avoidance is not possible then no sooner than 30 days prior to the start of any Project activity a biologist experienced in conducting nesting bird surveys shall survey the Project area and all accessible areas within 500 feet. If nesting birds are identified, the biologist shall implement a suitable protective buffer around the nest and no activities shall occur within this buffered area. Typical buffers are 250 feet for songbirds and 500 feet for raptors, but may be increased or decreased according to site-specific, Project-specific, activity-specific considerations such as visual barriers between the nest and the activity, decibel levels associated with the activity, and the species of nesting bird and its tolerance of the activity. Construction activities that are conducted within a reduced buffer shall be conducted in the presence of a qualified full-time biological monitor.	Less than Significant
Impact 4.2-2: The Project could have a substantial adverse effect on the Sulphur Springs Creek riparian corridor.	Potentially Significant	Implement **Mitigation Measure 4.8-1**	Less than Significant
Impact 4.2-3: The Project could have a substantial adverse effect on federally protected wetlands.	Potentially Significant	Implement **Mitigation Measure 4.8-1**	Less than Significant
Impact 4.2-4: The Project could interfere with wildlife movement in the Sulphur Spring Creek riparian corridor	Less than Significant	None required	Less than Significant
Impact 4.2-5: The Project may not be in conformance with applicable habitat conservation plans.	No impact	None required	No impact
Impact 4.2-6: The Project could have a substantial adverse effect on special-status wildlife species in the Suisun Marsh disturbed by an increased frequency (high traffic volumes) of tank cars through the marsh.	Less than Significant	None required	Less than Significant
Impact 4.2-7: In the event of a train accident that involves a relatively large amount of oil spilled from one or more tank cars, the Project could have a substantial adverse effect on special-status natural communities and special-status species, including those present in the Suisun Marsh.	Less than Significant	None required	Less than Significant

TABLE 2-1 (continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE VALERO BENICIA CRUDE BY RAIL PROJECT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Biological Resources (cont.)			
Impact 4.2-8: The Project could have a substantial adverse effect on federally protected wetlands.	Less than Significant	None required	Less than Significant
Impact 4.2-9: The Project may not be in conformance with applicable habitat conservation plans.	Less than Significant	None required	Less than Significant
Cultural Resources			
No impacts			
Energy Conservation			
Impact 4.4-1: Construction and operation and maintenance of the Project would result in consumption of energy and could cause adverse effect on local and regional energy supplies or requirements.	Potentially Significant	Implement **Mitigation Measure 4.1-1**	Less than Significant
Impact 4.4-2: Transportation energy usage for the Project could result in wasteful or unnecessary consumption of energy.	Less than Significant	None required	Less than Significant
Geology and Soils			
Impact 4.5-1: The Project would not expose people or structures to potential adverse effects involving rupture of a known earthquake fault.	Less than Significant	None required	Less than Significant
Impact 4.5-2: The Project would not expose people or structures to potential adverse effects involving strong seismic ground shaking.	Less than Significant	None required	Less than Significant
Impact 4.5-3: The Project would not expose people or structures to potential adverse effects involving seismic-related ground failure, including liquefaction	Potentially Significant	**Mitigation Measure 4.5-1:** Consistent with the geotechnical investigations and deformation analysis conducted to evaluate the potential for liquefaction hazards, the Valero Benicia Refinery shall incorporate into the final project design all recommendations to overcome lateral displacement, horizontal ground separation, and vertical settlement as provided by the licensed geotechnical engineer. Specifically, the Valero Benicia Refinery, in its design of the railroad project element located in areas identified as underlain by liquefiable or problematic	Less than Significant

TABLE 2-1 (continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE VALERO BENICIA CRUDE BY RAIL PROJECT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Geology and Soils (cont.)			
Impact 4.5-3 (cont.)		soils, shall design for total seismic lateral displacements of 8 inches to 39 inches. Railroad ties and slabs shall be analyzed to evaluate the effect of up to a 6 inch wide horizontal ground separation and all recommendations to overcome such horizontal ground separation provided by the licensed geotechnical engineer incorporate into the final project design. A differential settlement of 2 inches across the gage width shall be analyzed to evaluate rail car tipping potential and all recommendations provided by the licensed geotechnical engineer incorporate into the final project design. All geotechnical design shall comply with seismic design requirements of CBC. **Mitigation Measure 4.5-2:** Valero Benicia Refinery shall include into its current track inspection program, regular and, in the event of a seismic incident with potential for track damage, post-earthquake inspections of the proposed track sections to ensure compliance with Federal Railroad Administration (FRA) track safety standards. Additionally, in the event of an incident with potential for track damage, such as an earthquake and associated secondary ground failure (such as liquefaction or lateral spreading) track inspection shall occur after the occurrence and before the operation of any train over that track.	
Impact 4.5-4: The Project would not expose people or structures to potential adverse effects involving landslides.	Less than Significant	None required	Less than Significant
Impact 4.5-5: The Project would not result in substantial soil erosion or loss of topsoil.	Less than Significant	None required	Less than Significant
Impact 4.5-6: The Project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in liquefaction.	Less than Significant	None required	Less than Significant
Impact 4.5-7: The Project would be located on expansive soil.	Less than Significant	None required	Less than Significant
Greenhouse Gas Emissions			
Impact 4.6-1: The Project would generate direct and indirect GHG emissions.	Less than Significant	None required	Less than Significant
Hazards and Hazardous Materials			
Impact 4.7-1: The Project could pose a significant hazard to the public or environment during operation of the Project or routine transport or disposal of hazardous materials.	Less than Significant	None required	Less than Significant

TABLE 2-1 (continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE VALERO BENICIA CRUDE BY RAIL PROJECT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Impact 4.7-2: The Project could pose significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.	Less than Significant	None required	Less than Significant
Impact 4.7-3: The Project could create a hazard to the public or environment through reasonably foreseeable upset or accident conditions during train maneuver at the rail unloading facility.	Less than Significant	None required	Less than Significant
Impact 4.7-4: The Project could create a hazard to the public or the environment through reasonably foreseeable upset or accident conditions during the line hookup and crude oil transfer from a tank car at the unloading facility.	Less than Significant	None required	Less than Significant
Impact 4.7-5: The Project could create a hazard to the public or the environment through reasonably foreseeable upset or accident conditions due to corrosion of process related equipment handling crude oil.	Less than Significant	None required	Less than Significant
Impact 4.7-6: Operation of the Project could emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.	Less than Significant	None required	Less than Significant
Impact 4.7-7: The Project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	Potentially Significant	Implement **Mitigation Measure 4.11-4**	Less than Significant
Impact 4.7-8: Operation of the Project could expose people or structures to significant risk, injury, or loss from wildland fires.	Less than Significant	None required	Less than Significant

TABLE 2-1 (continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE VALERO BENICIA CRUDE BY RAIL PROJECT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Hydrology and Water Quality			
Impact 4.8-1: The Project would not violate any water quality standards or otherwise substantially degrade water quality.	Potentially Significant	**Mitigation Measure 4.8-1:** The Applicant and/or its contractor shall prepare and implement a storm water management plan (SWMP) for construction of the Project. The Project is covered under the Applicant's National Pollutant Discharge Elimination System (NPDES) permit and storm water pollution prevention plan (SWPPP). A notice of intent (NOI) application and notice of termination (NOT) application are not required. Implementation of the SWMP shall start with the commencement of construction and continue through the completion of the Project. The SWMP shall identify pollutant sources (such as sediment) that may affect the quality of storm water discharge and implement best management practices (BMPs) consistent with the California Stormwater Quality Association's BMP Handbook for Construction to reduce pollutants in storm water. The Applicant or the construction contractor shall install erosion and storm water control measures on the construction site such as installation of a silt fence and other BMPs, particularly at locations close to storm drains and water bodies. The BMPs shall also include practices for proper handling of chemicals such as avoiding fueling at the construction site and overtopping during fueling and installing spill containment pans.	Less than Significant
Impact 4.8-2: The Project could require withdrawal of groundwater or result in a substantial increase in impervious surface area within the Refinery.	Less than Significant	None required	Less than Significant
Impact 4.8-3: The Project could alter streams or the existing drainage within the Refinery.	Less than Significant	None required	Less than Significant
Impact 4.8-4: The Project could substantially change runoff flow rates or increase the potential for flooding.	Less than Significant	None required	Less than Significant
Impact 4.8-5: The Project could increase storm water runoff.	Less than Significant	None required	Less than Significant
Impact 4.8-6: The Project could place structures within a 100-year flood hazard areas at risk.	Less than Significant	None required	Less than Significant
Impact 4.8-7: The Project could place people or structures within inundation areas for flooding.	Less than Significant	None required	Less than Significant
Land Use and Planning			
Impact 4.9-1: The Project would not physically divide an established community.	Less than Significant	None required	Less than Significant
Impact 4.9-2: The Project would be in conformance with applicable regional or local plans and policies adopted for the purpose of avoiding or mitigating environmental effects.	Less than Significant	None required	Less than Significant

TABLE 2-1 (continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE VALERO BENICIA CRUDE BY RAIL PROJECT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Noise			
Impact 4.10-1: Operation and maintenance of the Project could result in exposure of persons to noise levels in excess of standards established by the City of Benicia.	Less than Significant	None required	Less than Significant
Impact 4.10-2: The Project would result in the generation of ground borne vibration.	Less than Significant	None required	Less than Significant
Impact 4.10-3: Operation of the Project could result in exposure of persons to a permanent increase in ambient noise levels.	Less than Significant	None required	Less than Significant
Impact 4.10-4: Construction of the Project would not result in a substantial temporary or periodic increase in ambient noise levels.	Less than Significant	None required	Less than Significant
Transportation and Traffic			
Impact 4.11-1: The Project would not cause intersection operations to degrade to worse than LOS D, would not cause a substantial increase in traffic volumes at intersections already operating at LOS F with the Project, would not cause a substantial increase in average vehicle delay a train crossings, and would not cause an increase in the queue length caused by trains crossing Park Road that substantially impedes other traffic (such as traffic on the I-680 mainline, or at an adjacent upstream intersection wherein traffic not destined over the Park Road crossing is unable to continue along the travel way).	Less than Significant	None required	Less than Significant
Impact 4.11-2: The Project would not conflict with the Solano County Congestion Management Program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.	Less than Significant	None required	Less than Significant

TABLE 2-1 (continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES FOR THE VALERO BENICIA CRUDE BY RAIL PROJECT

Environmental Impact	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Transportation and Traffic (cont.)			
Impact 4.11-3: The Project would not substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment), or due to the proposed increased frequency/length of train crossings.	Less than Significant	None required	Less than Significant
Impact 4.11-4: The Project would not result in inadequate emergency access.	Potentially Significant	**Mitigation Measure 4.11-4:** • Coordinate with the City of Benicia Fire Department to finalize the City of Benicia Fire Department/Valero Benicia Refinery Fire Department Operation Aid Agreement ("Agreement") to be implemented in the event an emergency occurs during a Project train crossing. The "Agreement" shall provide methods of adequately informing the Fire Department of the expected train crossing schedule and alternate routes to access the Park Road and Bayshore Road industrial areas during the event that a train crosses Park Road. In order to inform Benicia Dispatch of a train crossing during an emergency, Valero shall provide, install, and maintain camera(s) at specified location(s) determined by the City, with coordination from Valero. The camera shall meet the City's standards and have a real-time connection to Benicia Dispatch. The camera connection will signal to Benicia Dispatch that emergency responders shall use East 2nd Street as the identified alternative route to the Park Road and Bayshore Road industrial areas. East 2nd Street was identified for its direct access to area and the Opticom system in place at all signalized intersections. The camera must be installed and operational prior to commencement of the Project or certificate of occupancy. In order to minimize potential impacts associated with utilizing the alternative route, Valero shall provide the necessary devices for the City's emergency response vehicles that are not equipped for the Opticom system. The emergency response vehicles identified to receive a device shall be those without the necessary device as of the date the "Agreement" is executed. Valero shall be responsible for the maintenance of the camera during the life of the Project. • Utilize the Refinery's existing onsite emergency response team to assist with responding to off-site emergencies within the Park Road and Bayshore Road industrial areas as requested by the City of Benicia Fire Department under the existing mutual aid agreement, if an emergency occurs during the event of a train crossing on Park Road. The procedures for the occurrence of this support by the Valero Refinery Fire personnel are outlined in the proposed Benicia Fire-Valero Fire Operational Aid Agreement.	Less than Significant
Transportation and Traffic (cont.)			
Impact 4.11-5: The Project would not conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.	Less than Significant	None required	Less than Significant

This page intentionally left blank

CHAPTER 3
Project Description

3.1 Project Overview and Location

3.1.1 Introduction

3.1.1.1 The Refinery

The Valero Benicia Refinery (Refinery) presently receives its crude oil by pipeline and marine vessels. Crude oil produced within California (primarily from the San Joaquin Valley) is delivered by pipeline into the Refinery. Crude oils originating from the United States and from locations outside the United States, including Canada, are delivered by marine vessels to the Valero Marine Terminal at the Port of Benicia. The crude oils are unloaded and pumped via pipelines to crude oil storage tanks within the Refinery.

3.1.1.2 The Proposed Project

The Valero Crude by Rail project (Project) would enable the Refinery to receive up to 70,000 barrels per day of crude oil by tank car. The Project involves the installation of rail spur tracks, a tank car unloading rack, pumps, connecting pipelines, and infrastructure.

If the Project is approved, Valero will accept up to 100 tank cars of crude oil a day in two 50-car trains. The trains would enter the Refinery on an existing rail spur crossing Park Road. The crude oil unloaded from the tank cars would be pumped to the existing crude oil storage tanks in the Refinery via a new crude offloading pipeline, connected to existing piping located within the Refinery. The Project would require twenty additional employees or contractors. The trains would not be scheduled to arrive or depart between the hours of 6:00 AM – 9:00 AM or 4:00 PM – 6:00 PM weekdays. Valero would operate the Project components 24 hours per day, 7 days per week, and 365 days per year.

Based on Valero's plans, the crude oil delivered by rail would displace up to 70,000 barrels per day of the crude oil that is presently delivered by marine vessels. Crude oil delivered to the Refinery by tank car would not displace crude oil delivered to the Refinery by pipeline.

The crude oil to arrive by tank car would originate at sites in North America and be shipped by Union Pacific Railroad (UPRR). UPRR would transport tank cars on existing rail lines from sources in North America to Roseville, California, where the cars would be assembled into a train

for shipment into the Refinery. Valero would own or lease the tank cars that would be used to transport crude oil. UPRR owns and operates the locomotive engines that would be used.

Implementing the proposed Project could reduce marine vessel delivery of crude oil by as much as 25,550,000 barrels in a 365 day year. Based on the three-year baseline period from December 10, 2009 to December 9, 2012 annual marine vessel deliveries could be reduced by as much as 82 percent.

The Project would not involve any changes to the existing Refinery operations or process equipment, other than the construction and operation of the Project components. The Project would not increase the amount of crude oil that can be processed at the refinery, or the amounts of petroleum products that can be produced. The Refinery's crude oil processing rate is limited to an annual average of 165,000 barrels per day (daily maximum of 180,000 barrels per day) by its Bay Area Air Quality Management District (BAAQMD) operating permit. The Project does not propose any change to this limit. The Project does not propose changes to the emissions limits in the current BAAQMD permits, although the Project does require approval of an Authority to Construct from the BAAQMD. In connection with this approval, the BAAQMD will consider locomotive emissions and tank car unloading emissions as may be caused by the Project.

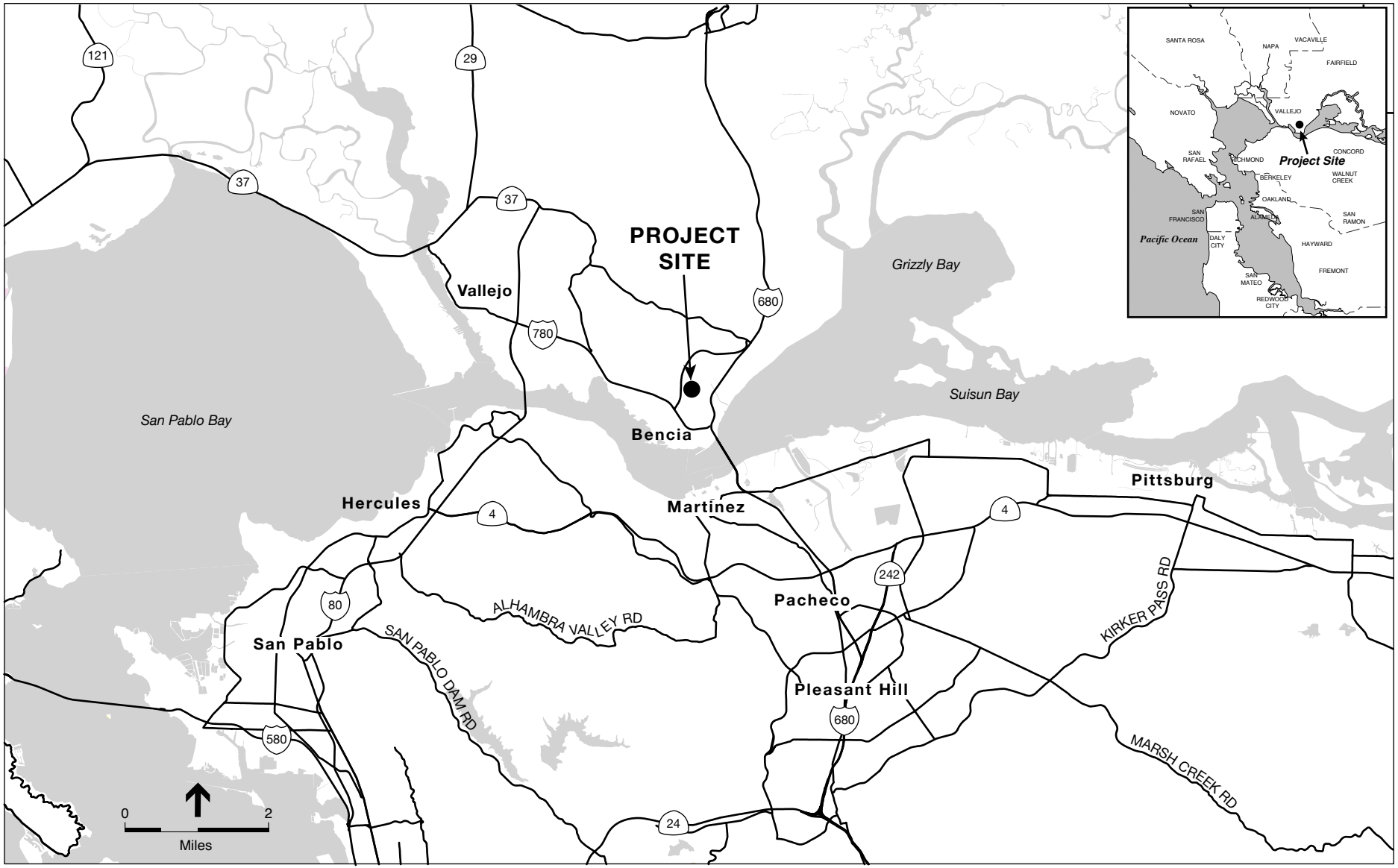
3.1.2 Location

The Refinery is located at 3400 East Second Street, an industrial area in the eastern portion of the City of Benicia, in Solano County. The Refinery lies in a general north-south orientation near and west of Interstate 680. The Refinery is located along the northern edge of the Suisun Bay below a low range of coastal hills. To the west of East Second Street is open space, and the closest residential areas are approximately 3,000 feet to the south and west of the Refinery, and approximately 2,100 feet to the northwest of the proposed Project site. Figure 3-1 shows a location map of the region.

Refinery operations occupy approximately 330 acres of the 880 acre Valero property. The lands and facilities of the Refinery are depicted in Figure 3-2.

The Refinery dock is located on the Carquinez Strait between the Benicia-Martinez Bridge and the Port of Benicia wharf. The marine terminal for the Refinery and pipeline to the Refinery provide access for receiving and shipping bulk cargoes by marine vessel. The existing UPRR rail line provides rail access for the Refinery and for the Benicia Industrial Park. The Benicia Industrial Park is located east and north of the Refinery. Presently, the Refinery uses tank cars to receive chemicals used in refining and to ship refined products from the Refinery.

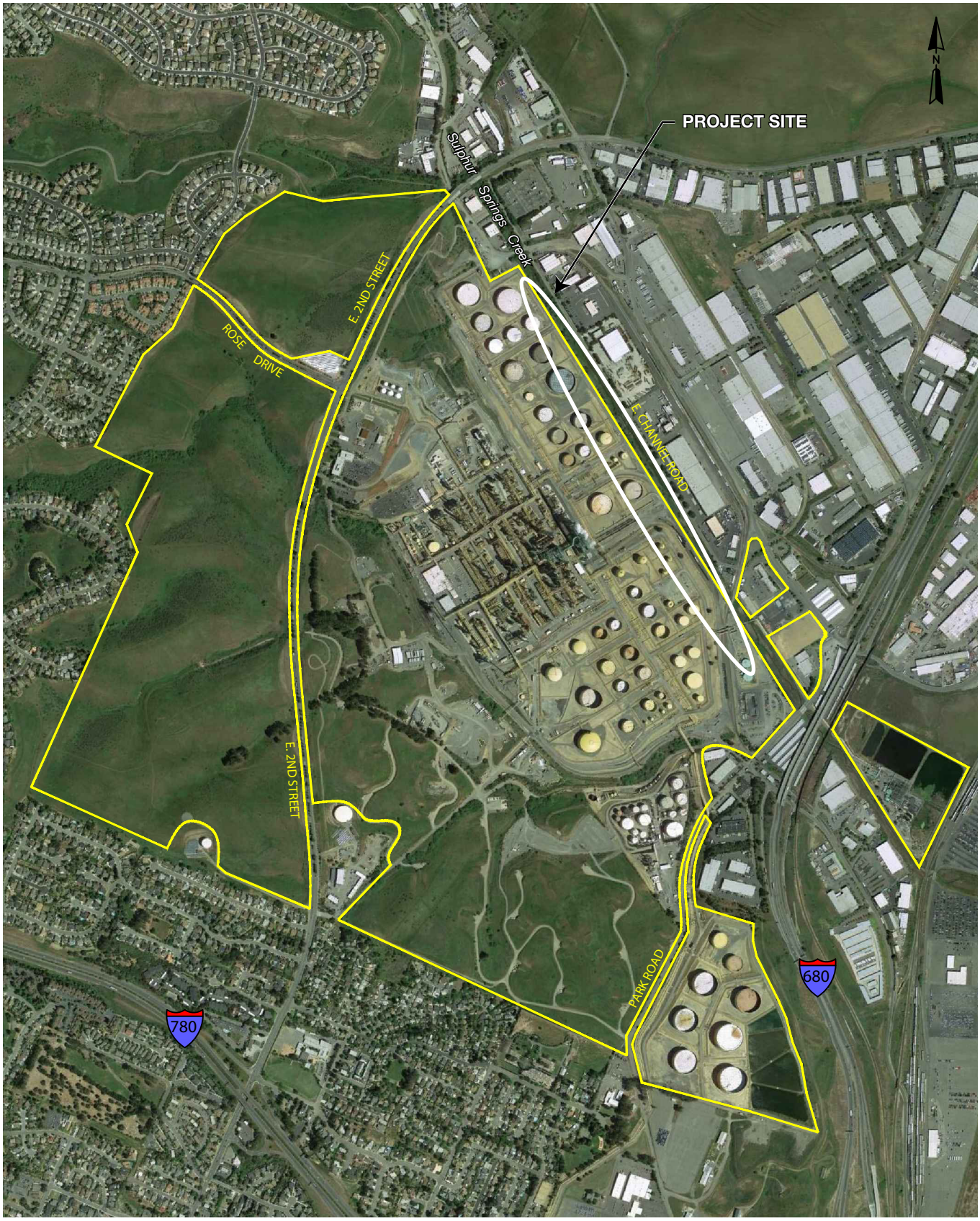
The Refinery and proposed Project site (within the Refinery) are zoned General Industrial. Present land use at the proposed Project site is petroleum refining and storage. Construction and operation of facilities associated with this proposed Project would be within the Refinery's property boundaries.



SOURCE: ESA

Benicia Valero CBR . 202115.01

Figure 3-1
Project Location



Aerial Photo Source: © 2012 Google Earth Pro Ver 6.2.2.6613

LEGEND

PROPERTY BOUNDARY

0 1/8 1/4 1/2

MILE

SOURCE: ERM

Benicia Valero CBR . 202115.01

Figure 3-2

Valero Refinery Boundary

3.2 Project Objectives and Components

3.2.1 Project Objectives

The Valero Benicia Refinery converts a range of crude oil and other feedstocks into gasoline and other petroleum products. The Project would provide an alternate means of delivering crude oil feedstock to the Refinery. The Project has the following objectives:

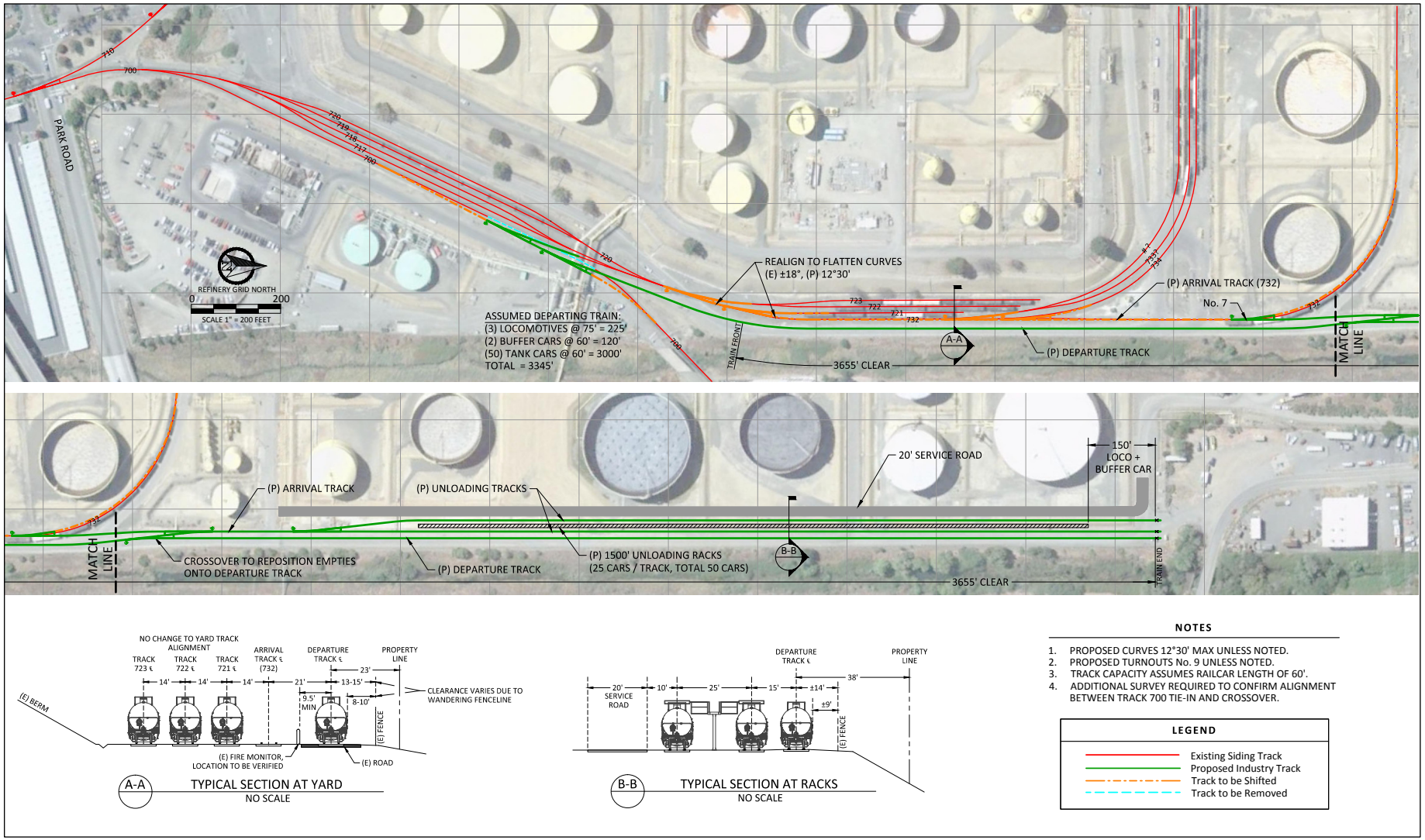
1. Allow for the delivery of up to 70,000 barrels per day of North American-sourced crude oil by rail.
2. Replace marine vessel delivery with rail delivery of up to 70,000 barrels per day of crude oil.
3. Mitigate project-related impacts.
4. Implement the proposed Project without changing existing Refinery process equipment or Refinery process operations, other than operation of the Project components.
5. Continue to meet requirements of existing rules and regulations pertaining to oil refining including the State of California Global Warming Solutions Act of 2006 (AB 32).

As a result of implementation of the proposed Project, the Refinery would be able to continue to efficiently produce fuels and other petroleum products for the California market and would remain economically competitive.

3.2.2 Project Component Summary

The proposed Project is shown in Figure 3-3, and would consist of the following primary components:

- Installation of a single tank car unloading rack capable of offloading two parallel rows of 25 crude oil tank cars.
- Construction of two parallel, offloading rail spurs to access the tank car unloading rack along with a parallel departure track to store tank cars in preparation for departure, for a total of 8,880 track-feet of new track on Refinery property.
- Installation of approximately 4,000 feet of 16-inch diameter crude oil pipeline and associated components and pump infrastructure between the offloading rack and the existing crude supply piping.
- Replacement and relocation of approximately 1,800 feet of existing tank farm dikes.
- Relocation of an existing firewater pipeline, compressor station, and underground infrastructure.
- Relocation of groundwater wells along Avenue “A.”
- Construction of a service road adjacent to the proposed unloading rack.



SOURCE: Valero

Benicia Valero CBR . 202115.01

Figure 3-3

Site Plan

3.3 The Existing Refinery

3.3.1 Overview of Petroleum Refining

Refineries convert crude oil into marketable petroleum products such as gasoline, diesel fuel, jet fuel, kerosene, heating oil, coke, asphalt, and petroleum gases such as butane and propane. Refiners design and operate their refineries so as to maximize the value of the product slate produced from each type of crude oil. Often, for example, refiners seek to maximize the amount or "yield" of transportation fuels produced from a particular type of crude oil, because transportation fuels are the most valuable petroleum products.

3.3.1.1 Types of Crude Oil

Crude oils contain thousands of different chemical compounds. Most of these compounds are hydrocarbons, consisting solely of hydrogen and carbon atoms. Crude oils also have other compounds containing, for example, sulfur, nitrogen, oxygen, and metals.

Hydrocarbons range in “weight,” measured by the number of carbon atoms present in each molecule. The lightest hydrocarbons, for example, are petroleum gases such as methane, ethane, propane, and butane. Each molecule of these gases 1 to 4 carbon atoms. The hydrocarbons in gasoline are heavier, with anywhere from 5 to 12 carbon atoms in each molecule. The hydrocarbons in tar and asphalt are much heavier, with more than 70 carbon atoms in each molecule.

There are many different crude oils, with many different properties, produced all over the world. Crudes are commonly classified based on their relative weight and sulfur content. The weight of a crude oil is sometimes described as its “density” or “gravity.” The relative weight of a crude oil depends on the proportion of heavy to light hydrocarbons. The weight of different crudes is commonly measured according to a gravity scale developed by the American Petroleum Institute (API). API gravity is a measure of a crude oil’s weight as compared to water. Most API gravity values fall between 10 and 70 gravity degrees.

The sulfur content of crude oil generally ranges anywhere from 0.5% to 3%. Generally, crudes with a sulfur content of less than 1% are known as “sweet” crudes. Generally, crudes with a sulfur content greater than 1% are known as “sour” crudes. Crude oils are generally categorized as follows in Figure 3-4:

Crude Oil Class	Property Range	
	Gravity (°API)	**Sulfur (wt.%)**
Light Sweet	35-60	0-0.5
Light Sour	35-60	> 0.5
Medium Medium Sour	26-35	0-1.1
Medium Sour	26-35	> 1.1
Heavy Sweet	10-26	0-1.1
Heavy Sour	10-26	> 1.1

SOURCE: International Council on Clean Transportation (ICCT), 2011

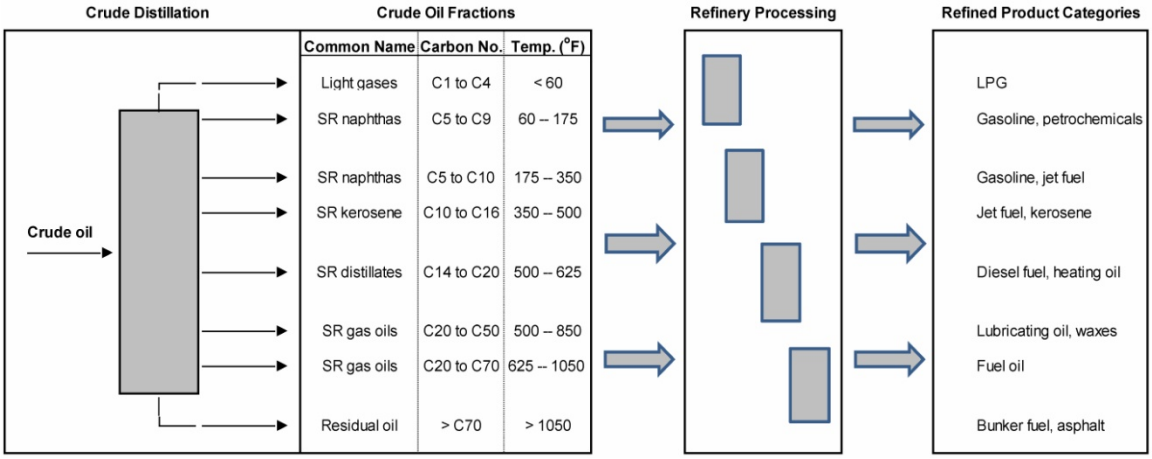
Figure 3-4
Crude Oil Classes

Refiners select particular crudes based on a number of factors, including the unique configuration of each refinery, the quality of available crudes, the price of each crude, the market demand for specific products, the market price of specific products, and the specifications of the products to be produced.

There is a wide variety of crudes available in the marketplace at any given time, with a wide range of API gravities and sulfur content. As a general rule, heavier crudes require more processing than light crudes, and sour crudes require more processing than sweet crudes. Thus, the "quality" of a crude oil is generally considered to be a function of its weight and sulfur content. Light, sweet crudes are considered the highest quality and are the most expensive. Examples include West Texas Intermediate, Louisiana Light Sweet, and Brent. Medium sour crudes are less expensive. Examples include Mars, Arab Light, Arab Medium, and Urals. Heavy sour crudes are the least expensive. Examples include Maya, Cerro Negro, Cold Lake, and Western Canadian Select (see Table 3-1).

3.3.1.2 The Refining Process

The first step in the refining process is to separate crude oil into components through distillation. The components are commonly referred to as "fractions." Lighter fractions have relatively lower boiling points, while heavier fractions have relatively higher boiling points. Common fractions include, from lightest to heaviest, petroleum gases, naphthas, kerosene, middle distillate, gas oil, and residue.



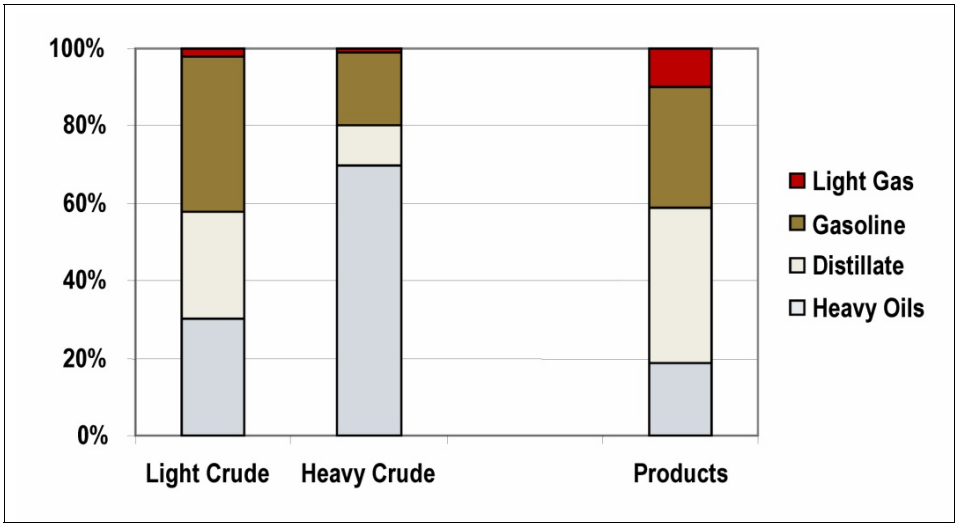
SOURCE: ICCT, 2011

Figure 3-5
Schematic View of Crude Oil Distillation and Downstream Processing

After a crude oil is separated into fractions through distillation, the resulting streams are treated in various "process units" and ultimately blended into marketable products. Some process units remove sulfur and other impurities from process streams. Other process units chemically alter process streams. Refiners use hydrocrackers, catalytic cracking units, and coker units, for example, to make some process streams lighter by breaking larger hydrocarbons into smaller

ones. This is commonly known as “cracking.” A refiner might, for example, take a stream in the gas oil range and break the hydrocarbons down into the gasoline range. This would allow the refiner to increase the amount of gasoline, and reduce the amount of heating oil, produced from a particular type of crude oil.

Figure 3-6 compares the fractions of a typical light crude (35° API) and a typical heavy crude (25° API) with the average demand profile for a product slate in developed countries. The figure illustrates how refiners often need to convert fractions into lighter streams in order to meet the typical demand for products.



SOURCE: ICCT, 2011

Figure 3-6
Typical Natural Yields of Light and Heavy Crude Oils

Refiners may chemically alter the shape of the hydrocarbons in naphtha streams through catalytic reforming, alkylation, isomerization, and etherification. These processes allow Refiners to increase octane in gasolines and increase the amount of gasoline produced from a type of crude oil.

Refiners use hydrotreaters, also known as hydrofiners, to remove sulfur and other impurities from refinery streams. Hydrotreaters remove sulfur in the form of hydrogen sulfide, which is then converted into elemental sulfur in sulfur recovery units. Impurities come out of the process as solids, or in the case of sulfur, as a hot liquid (or “molten sulfur”).

3.3.1.3 Refinery Optimization

Refinery operations are extremely complex, and involve a great many individual decisions. Refiners must decide, for example, what crudes to purchase and what mix of products to produce. Refiners must also identify the best way to convert the selected crudes into the desired mix of products. Decisions must be made at each step of the process. During distillation, for example, a refiner must determine the particular range of hydrocarbon weights for each fraction produced. This is known as setting the “cut points” or boiling points of each range. Thereafter, each refiner

must decide how each intermediate stream should be processed in different process units, and ultimately blended into finished products.

The schematic in Figure 3-7 reflects the operation of a typical refinery, and illustrates the complexity of the process.

Each refiner continually seeks to “optimize” the operation of its refinery by identifying and implementing the most profitable operating strategy. The optimum strategy is different for each refinery because no two refineries are the same. Each refinery has a unique “configuration,” consisting of the number and types of process units, the throughput capacity and technical characteristics of each unit, and the flow patterns connecting the various units. Based on its particular configuration, each refinery operates under a variety of constraints. Constraints include, for example, how much crude can be processed on any given day, the quality of the crude that can be processed, and the product slate that can be produced from a particular type of crude oil.

Refinery operations are so complex that virtually all refiners use the “linear programming” technique to plan refinery operations. Linear programming involves the use of a mathematical model to determine the most profitable operating strategy for a particular refinery. The model “inputs” include variables such as the configuration and constraints of the refinery in question, the crudes available, market demand, product prices, and product specifications. The model “outputs” include the crudes that should be purchased, the product slate that should be produced, the cut points, and the manner in which each intermediate process stream should be treated and blended.

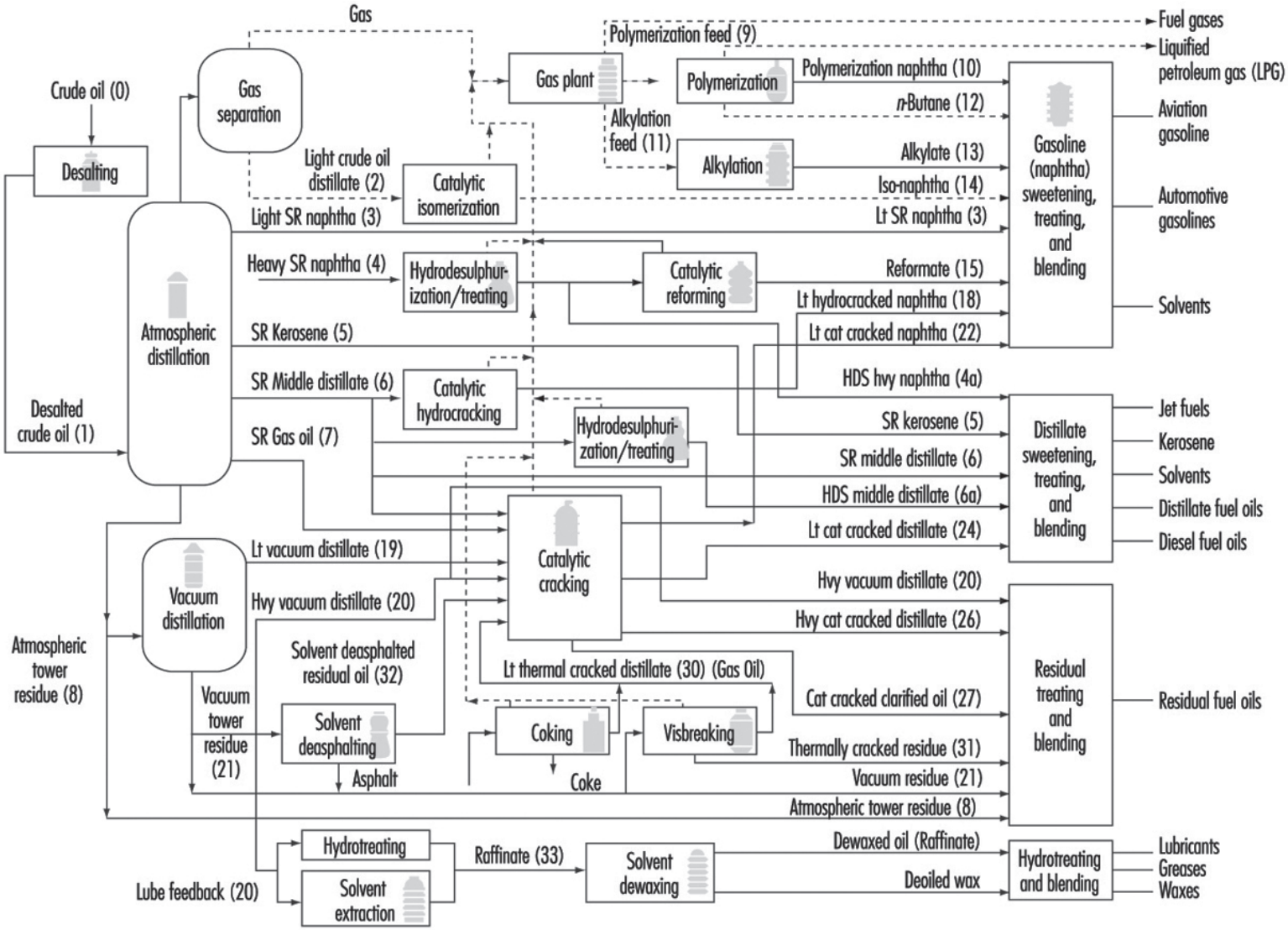
3.3.2 The Benicia Refinery

The Benicia Refinery converts crude oil into finished products, including gasoline, jet fuel, liquefied petroleum gas (LPG), heating oil, fuel oil, asphalt, petroleum coke, and sulfur. The Refinery produces 10 percent of the clean-burning California Air Resources Board (CARB) gasoline used in California, and 25 percent of the CARB gasoline used in the San Francisco Bay Area (Valero, 2014).

3.3.2.1 Crude Oil Processing

The Refinery contains a variety of equipment, including distillation columns, storage tanks, reactors, vessels, heaters, boilers, and other ancillary equipment. The Refinery also operates its own asphalt plant, wastewater treatment plant, and a marine terminal at the Port of Benicia. The marine terminal receives crude oil, refinery products, and feedstock deliveries and exports via marine vessels and barges. The Refinery uses rail transport to import chemicals used in refining and to export refinery products such as asphalt, petroleum coke, and LPG.

Crude oils delivered to the Refinery are transferred into storage tanks located in the crude oil tank farm north of the marine terminal. The crude oils are stored in external floating roof tanks which are configured and operated to comply with the stipulations of the BAAQMD Regulation 8-5. Valero combines crude oils from these storage tanks into blends that are then pumped to the Refinery process units located north of the tank farm.



SOURCE: OSHA, 1996

Benicia Valero CBR . 202115.01

Figure 3-7
Schematic of Typical Petroleum Refinery

The Refinery contains a variety of different process units. The Pipestill Unit separates crude blends into fractions. The Fluid Catalytic Cracking Unit (FCCU) and the Hydrocracker Unit make heavier process streams lighter by breaking larger hydrocarbons into smaller ones. The Hydrofining Units and the Sulfur Recovery Unit remove sulfur from process streams and convert it into elemental sulfur. The Coker Unit converts residual oil into petroleum coke and lighter process streams. The Alkylation, Dimersol, and Reforming Units change the shape of hydrocarbons in gasoline-range process streams that will ultimately be blended into different grades of gasoline. Each process unit has a maximum capacity, and operates under a permit from the BAAQMD.

Overall, the Refinery's BAAQMD Title V permit limits Valero to processing a maximum of 180,000 barrels of crude oil on any given day, and an average of 165,000 barrels per day on an annual basis. (Title V permit, condition 20820, part 50.)

The Refinery currently exports petroleum coke and LPG from the Refinery to off-site customers. Once a day, during the daytime hours, up to 12 railcars loaded with petroleum coke leave the Refinery via Track 700, and cross Park Road towards the AMPORTS Benicia Terminal facility directly to the south. The product is then off-loaded into storage silos near the dock for eventual loading onto marine vessels for export. The empty coke railcars are brought back onto the Refinery for reloading for the next day's transfer operations.

Similar export operations take place with railcars transporting LPG destined for customers. The quantity of these export operations vary with season and production volume. On an annual basis it averages approximately two railcars per day. The Refinery also occasionally imports LPG.

Between 2004 and 2010, Valero made significant modifications to the Refinery's process units and other equipment. These modifications were collectively known as the "Valero Improvement Project" (VIP). The City certified the VIP project EIR and approved the VIP project in April of 2003, and later certified the VIP EIR addendum in July 2008. The VIP project enabled Valero to process crude blends that are heavier and more sour than previous blends, reduce the use of gas oil as a feedstock, and increase the maximum crude oil throughput. All elements of the VIP project were operational as of 2011, except for construction of a replacement hydrogen plant. Valero is currently considering whether to construct the replacement hydrogen plant, based on the fact that the Refinery currently has a sufficient supply of hydrogen to meet Valero's needs. Valero has obtained all approvals needed from the City and the BAAQMD to construct the hydrogen plant. The BAAQMD Permit-to-Construct expires in December of 2014.

3.3.2.2 Crude Feedstocks

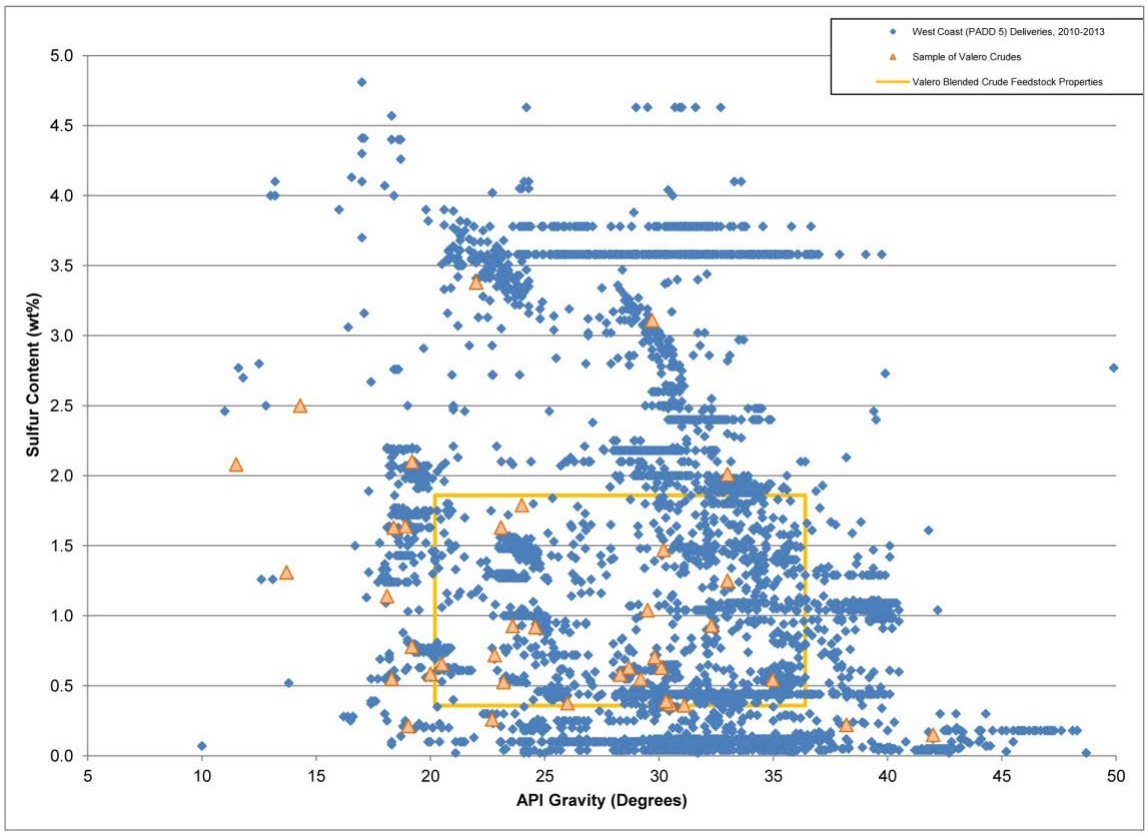
Valero can choose from a wide variety of crudes available in the marketplace at any given time. These crudes range from light sweet to heavy sour, with a range of options in between.

Like all petroleum refiners, Valero selects particular crudes based on linear programming. This analysis takes into account a number of factors, including the unique configuration of its refinery, the quality of available crudes, the price of each crude, the market demand for specific products,

the market price of specific products, and the specifications of the products to be produced. Because many of these factors are constantly changing, Valero's crude feedstocks change based on new developments and conditions.

The VIP project enabled Valero to increase the average weight and sulfur content of its crude feedstocks while simultaneously reducing emissions of criteria pollutants by thousands of tons per year. Before the VIP project became operational, the Refinery was capable of processing crude blends that contained a maximum of 30% heavy, sour crudes. The VIP project gave Valero the flexibility to process crude blends that contain as much as 60% heavy, sour crudes.

In the last three years, Valero has purchased a variety of crudes ranging from light sweet to heavy sour. The yellow triangles in Figure 3-8 show the API Gravity and sulfur content of various specific crudes that Valero has purchased in the past three years. For comparison, the blue diamonds shown on Figure 3-8 display the API Gravity and sulfur content of all crudes delivered to west coast refineries during the same period – in other words, all crudes purchased by all refiners in the west coast region.



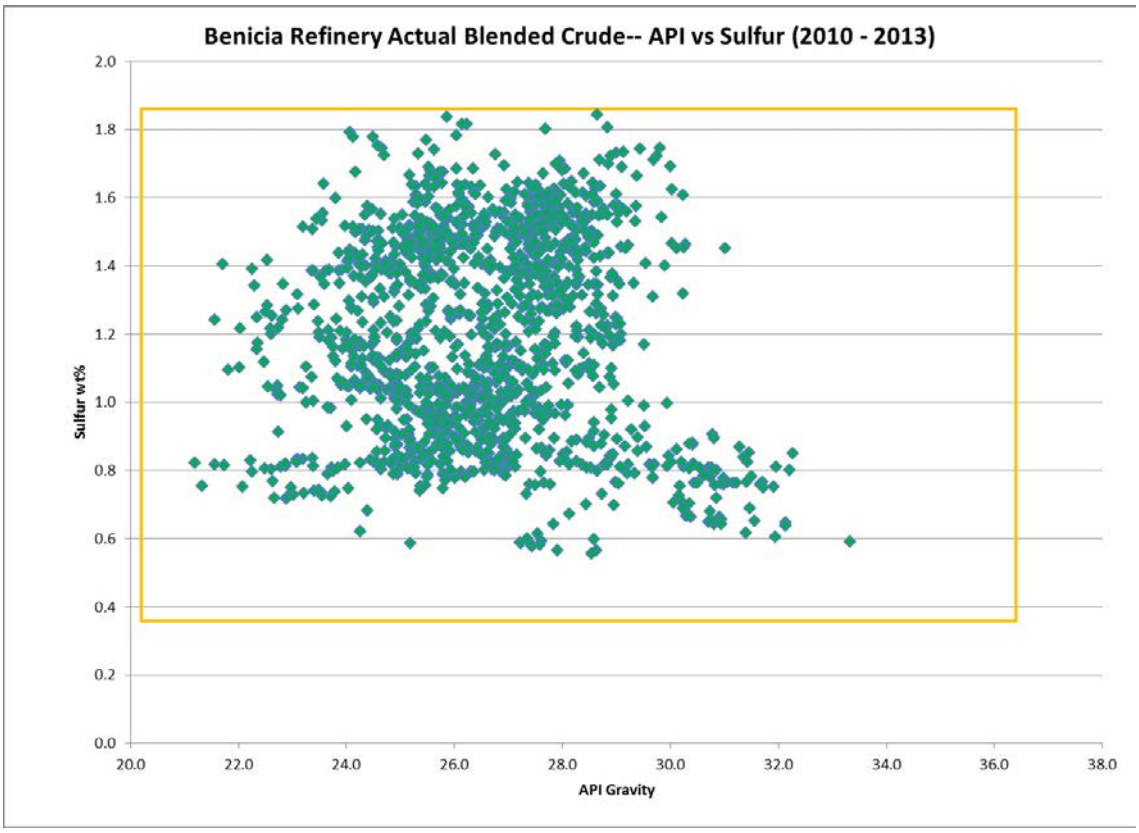
SOURCE: Valero, 2013

Figure 3-8
West Coast Crude Deliveries Compared to Valero's Typical Crudes and Blended Crude Feedstock Capability

Valero does not process all crudes as they are delivered to the Refinery. Based on the Refinery's unique configuration, Valero must blend different crudes into a specific range of weight and sulfur content before they can be processed. This range, shown as the yellow box on Figure 3-8 is roughly between 20° and 36° API gravity, and between 0.4%-1.9% sulfur content.

If the Refinery attempted to process crudes outside of these ranges, a variety of problems could arise. If the sulfur content of a crude blend exceeds 1.9%, this could result in violation of Valero's BAAQMD permits and BAAQMD regulations. On the other hand, if sulfur content of a blend is less than 0.4%, the sulfur handling units would not operate properly. Processing a crude blend that is too heavy (lower than 20° API Gravity) could damage equipment, result in poor fuel quality, and/or reduce the amount of crude processed (based on balanced refinery operation).

Based on the Refinery's actual operation, moreover, it is clear that the optimum range of weight and sulfur for crude blends is much narrower than the yellow box in Figure 3-8. As Figure 3-9 shows, the substantial majority of the crude blends processed over a recent three year period at the Refinery ranged between 24° and 29° API gravity, and had a sulfur content ranging from 0.08%-1.6 %.



SOURCE: Valero, 2013

Figure 3-9
API vs Sulfur in Blended Crudes Processed at Valero Benicia Refinery, 2010 to 2013

3.3.2.3 Refinery Maintenance and Monitoring Activities

3.3.2.3.1 Maintenance Activities

Operation of a refinery requires substantive on-going maintenance activities. Maintenance is needed so that all refinery process units operate within their design parameters, especially for emissions, and to assure that products meet quality and quantity goals. Regular maintenance is essential to the overall safe operation of the refinery.

In addition to the on-going activities, scheduled maintenance actions, called turnarounds, are also necessary. The term "turnaround" refers to the period of time when refinery equipment is not available to process feedstocks, as opposed to refinery equipment's typical 24 hour a day, 365 day a year operation. There are a number of reasons to schedule a period when equipment would be out of operation. Some of these reasons are:

1. To inspect the internals of refinery vessels;
2. To clean pipe and vessel internals;
3. To upgrade existing refinery equipment and vessels;
4. To renew catalysts in vessels which do not use continuous regeneration;
5. To make connections for new equipment being installed at the Refinery;
6. To perform maintenance on critical equipment; and
7. To repair and renew piping and equipment before they fail.

Turnarounds are termed major when significant portions of the refinery are shut down; minor turnarounds may affect only certain units, or parts of the total Refinery.

Refinery turnarounds affect production. Therefore, Refinery staff plans carefully, so that work would be accomplished quickly in a turnaround and that process units can be started up again as soon as possible. The planning includes ensuring all necessary supplies and equipment are on-site and available when needed. Refinery maintenance and technical staff as well as additional contract maintenance staff work in shifts around the clock to minimize the duration of a turnaround.

Turnarounds may take place every year, but the Refinery usually plans major turnarounds to occur several years apart to maximize the overall production of the Refinery. At the Valero Benicia Refinery, major turnarounds occur at 5 to 6-year intervals and minor turnarounds typically occur at mid-points between major turnarounds. These turnarounds are part of the Refinery's normal, ongoing maintenance program and do not require City permits or environmental review.

A major turnaround offers the chance to change other equipment and processes in the Refinery during that scheduled downtime. Thus, the turnaround schedule becomes the controlling factor when planning and scheduling upgrades or other major changes to the process equipment at the Refinery.

3.3.2.3.2 Monitoring Activities

When processing a range of crude oils, there is a potential for adverse effects of contaminants on refinery equipment, so process conditions must be regularly monitored. At the Refinery, two particular programs are in place as part of the Refinery's safety systems to identify, track and manage these potential risks. The first is the Management of Change (MOC) process. The MOC program is an integral part of the Refinery's Process Safety Management (PSM) program. Management of Change procedures are in place to manage changes to process streams, chemicals, technology, equipment, and procedures. Before crude oils are processed at the Refinery they are evaluated for their potential impact on equipment and operations. This evaluation includes a review of, among other things, the acid content of the material (Total Acid Number (TAN)) and sulfur content.

Excess amounts of TAN and chlorides can corrode and crack certain metallurgy at unacceptable rates, reducing equipment life and affecting safe refinery operations. The refinery carefully monitors TAN and chloride content to ensure the equipment continues to operate safely. If the TAN or chloride content were to increase above the set parameters, the equipment would not last as long and the refinery would have to shut down more frequently to do preventative maintenance and equipment replacements resulting in much higher operating costs. Valero would not allow high levels of acid content and chloride content in the refining process as that would affect its safe operations.

Only after this extensive review are any new materials approved for processing. Monitoring of changes continues with routine sampling of the new blended crude stream as well as sampling other process streams for corrosion, dew point, and other parameters necessary to ensure safe operations.

The second program in place is the Mechanical Integrity (MI) program. The MI program is another integral part of the Refinery's Process Safety Management (PSM) program. The MI program includes an extensive plan for the ongoing field monitoring and evaluation of piping and equipment to determine the actual condition of the equipment. An array of hundreds of thousands of condition monitoring locations (CML) has been established to organize data to determine pipe and equipment metal thicknesses and corrosion rates. The positive material identification (PMI) element of the MI program is utilized to positively verify the actual materials of construction for equipment in the Refinery. As an example, Valero's PMI program includes a special procedure for identification of low-silicon carbon steel material which is known to be less resistant to corrosion under certain conditions when processing higher sulfur crudes. Under this comprehensive MI program, strategies are developed for CML monitoring frequencies and to forecast the timing for equipment replacement or repair. As a direct result of this program, and not only as a result of VIP, various upgrades have been made at the Refinery to continue to safely process a variety of crude oils.

As a Cal/OSHA Voluntary Protection Program (Cal/VPP) Star Site since 2006, the Refinery's safety management systems have undergone extensive reviews by Cal/OSHA and their auditors. This includes a thorough review of the MOC and MI programs. Cal/VPP is designed to recognize

employers and their employees who have implemented safety and health programs that effectively prevent and control the hazards inherent in oil refining. These programs go beyond Cal/OSHA standards and provide the best feasible protection at the Refinery.

3.4 Components of the Proposed Project

3.4.1 New and Modified Facilities and Equipment

3.4.1.1 Tank car Unloading Rack

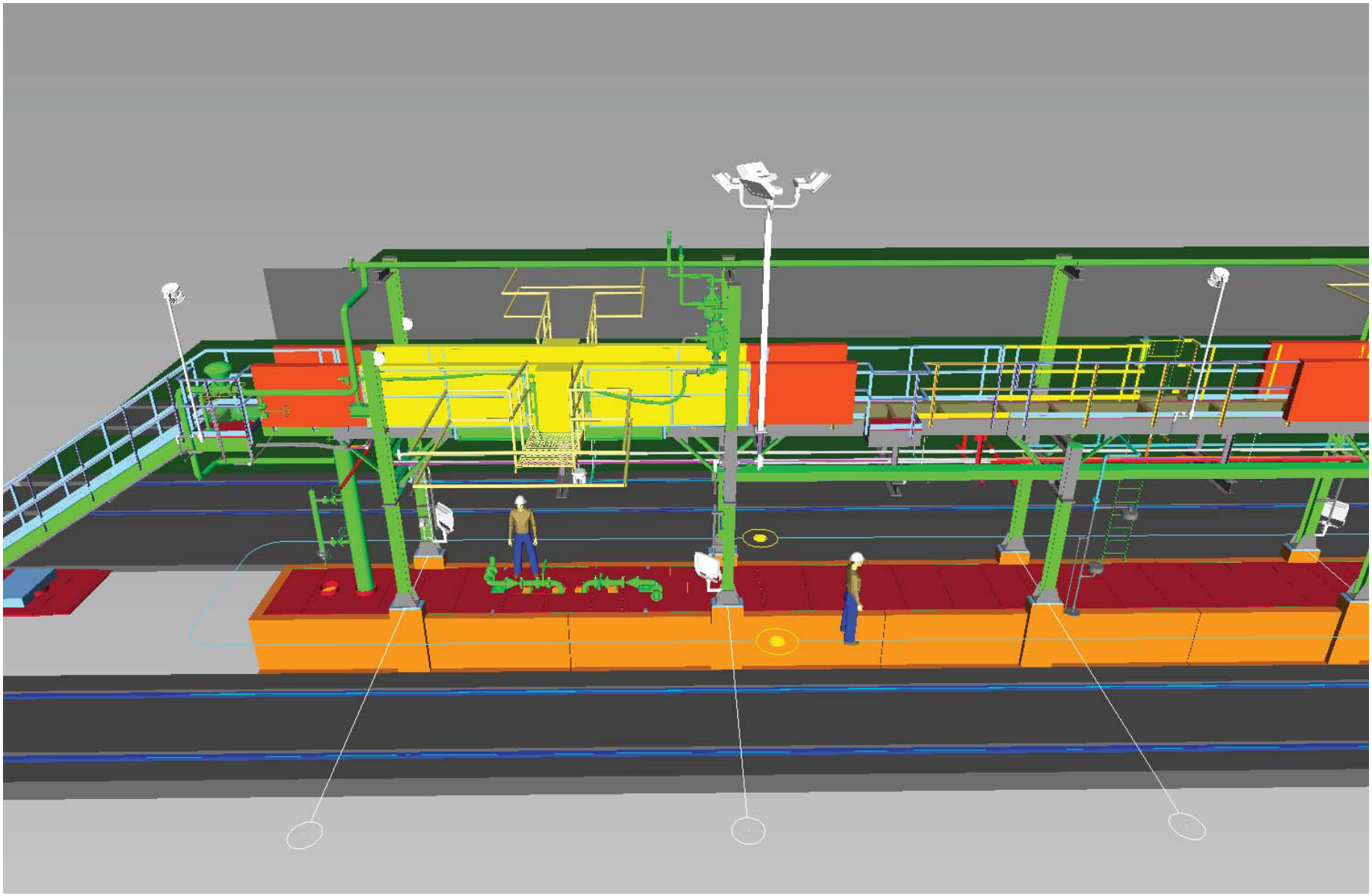
A new unloading rack (see Figure 3-10) capable of unloading two parallel rows of tank cars (one on each side) and transferring crude oil to the Refinery would be constructed for the Project. The 1,500-foot-long unloading rack would be used only for unloading crude oil; there would be no loading of crude oil or other materials at this rack. The rack would be installed in the northeastern portion of the main Refinery property, between the eastern side of the lower tank farm and the fence adjacent to Sulphur Springs Creek (see Figures 3-2 and 3-3). The fence would not be relocated to accommodate the new construction. The unloading rack platform walkway would be approximately 13 feet above grade. A majority of the lighting (primarily consisting of 25 new aluminum poles with lights mounted 12 feet above the platform) and tank car access walkways would be mounted to the unloading rack structure. A minimum of 23 feet vertical clearance is required by UPRR for facilities that bisect a railway track, and this would be the height of the proposed walkways. The tank car unloading rack would include directional lighting to illuminate tank car connecting points beneath the tank cars, walkways, access platforms, and a service road. The rack would use isolation valves specified to comply with BAAQMD best available control technology (BACT) requirements for fugitive air emissions.

The new tank car unloading facilities would include a liquid spill containment sump with the capacity to contain the contents of at least one tank car (shown in Figure 3-10 below the blue colored rails). The rack area would be sloped inward towards the centerline of the rack. A roadside curb would be provided east of the tracks near the fence line to further contain any minor spills and leaks. In addition, the existing liquid spill containment for tanks abutting the tank car unloading facilities would be modified to allow installation of the unloading facilities. Part of the existing containment berm for the tank field would be removed and a new concrete berm would be constructed approximately 12 feet west of the existing earthen berm.

3.4.1.2 Unloading Rail Spurs

Currently, the existing rail tracks at the Refinery serve the upper coke silo for petroleum coke loading and the intermediate tank farm for the LPG transfers. There are no unloading rail spurs for crude oil deliveries at the Refinery.

As a part of the proposed Project, existing tracks would be realigned and two unloading rail spurs and a parallel storage and departure spur would be constructed to allow for receipt of tank cars at the unloading rack (see Figure 3-3). The rail spurs and the parallel storage and departure spur



SOURCE: Valero

Benicia Valero CBR . 202115.01

Figure 3-10
Unloading Rack

would be constructed between the eastern side of the lower tank farm and the western side of the fence along Sulphur Springs Creek and would occupy a portion of Avenue "A." The distance between the existing fence and the centerline of the departure/storage track would be approximately 14 feet. The centerline of the adjacent rail spur would be 15 feet from the centerline of the departure/storage track, with another 25 feet between the centerline of this rail spur to the western spur.

The proposed Project would install approximately 8,880 track-feet of new track on Refinery property. This would primarily consist of tracks servicing the tank car unloading rack and the tank car departure spur. To allow the tank cars to migrate between spurs, three new track turnouts and one crossover would be installed. The proposed Project also proposes realigning approximately 3,560 track-feet located on Refinery property.

3.4.1.3 Tank Cars

All tank cars used to transport crude oil from Roseville to Benicia would be owned or leased by Valero. Each tank car is nominally 60 feet long, with a capacity of approximately 700 barrels and a maximum gross weight on rail of 286,000 pounds.

Under regulations adopted by the Pipeline and Hazardous Materials Safety Administration (PHMSA), crude oil shipped by rail must be shipped in tank cars built to the "DOT-111" specification. DOT-111 tank cars are non pressure tank cars. The cars have a minimum shell thickness of 7/16 inch and a design pressure of up to 500 pounds per square inch gage (psig)..

In 2011, the Association of American Railroads (AAR) voluntarily imposed more stringent standards on the design of DOT-111 tank cars. AAR issued the new standards through Casualty Prevention Circular 1232 (CPC-1232). CPC-1232 established the following requirements for DOT-111 cars:

- Thicker tank shell and tank heads;
- Higher tensile strength, normalized steel to improve the ability of tank cars to survive an accident;
- Protective head shields at both ends of tank car;
- Consolidated top fittings located beneath a robust steel protective housing; and
- A reclosing pressure relief device to reduce the likelihood of over-pressure if the car is involved in an accident and pool fire.

Tank cars that meet these new standards are generally known by the number "1232," and are referred to herein as "1232 Tank cars." All DOT-111 tank cars ordered after October 1, 2011 must meet the standards for 1232 Tank cars. DOT-111 tank cars ordered before 2011 that do not meet the standards for 1232 Tank cars are commonly known as "legacy" DOT-111 tank cars.

Valero would comply with all legal requirements applicable to the transport of crude oil by rail, including all tank specification requirements. In one respect, however, Valero would exceed legal

requirements. Valero has committed that, when the PHMSA regulations call for use of a DOT-111 car, Valero would use 1232 Tank cars rather than legacy DOT-111 cars.

3.4.1.4 Ancillary Facilities

Ancillary facilities affected by the proposed Project would include crude oil offloading pumps and pipeline and associated infrastructure, spill containment structures, a firewater pipeline, groundwater wells, and a service road.

The existing spill containment structure around the lower tank farm consists of a 5- to 10-foot-tall, earthen berm to provide secondary containment for tanks. The existing liquid secondary containment structure for the tanks abutting the tank car unloading facilities would be modified to allow installation of the unloading facilities. Approximately 1,800 feet of the existing earthen containment berm along the eastern edge of the tank farm would be removed and a new, 8-foot-tall concrete berm would be constructed approximately 12 feet west of the existing earthen berm. The resulting containment capacity of the shared containment system would continue to meet or exceed minimum regulatory containment requirements.

There is an existing firewater pipeline, several groundwater monitoring wells, a compressor station, and a carbon dioxide line in the vicinity of Avenue “A.” These facilities would be relocated to accommodate the new rail tracks.

Existing groundwater monitoring wells along Avenue “A” that interfere with the proposed facilities would be relocated or removed. The wells would be replaced in-kind or abandoned, as approved by the Regional Water Quality Control Board. Abandoned wells would be sealed and capped in accordance with Solano County and California Department of Water Resources procedures.

A new service road, approximately 20 feet wide, would be added along the western side of the new unloading rail spurs.

3.4.2 Project Operation

3.4.2.1 Tank car Transport and Unloading

The tank car unloading rack would accommodate up to 25 tank cars on each side at one time (up to two, 50 tank car “switches” per day would be transported to the rack by train). The tank cars would be emptied into a single pipeline located between the two rail spurs at slightly below ground level (see Figure 3-3). Each side of the rack would have 25 unloading stations, which would “bottom-unload” closed-dome tank cars using 4-inch-diameter hose, with dry disconnect couplings that would connect to a common header between the two sides of the rack (a check valve, connected to the top of each tank car via 2-inch-diameter hose would open to allow ambient air to enter during unloading and immediately close when unloading is finished). Three new pumps would be located on the western side of a new service road between Tanks 1720 and 1716. Two pumps operating in parallel would pump the crude oil from the unloading rack header via a new 16-inch pipeline. The third pump will be installed as a spare pump. This will facilitate

periodic maintenance on the primary pumps. Once emptied, the 50 tank cars would be disconnected from the rack, moved to an on-site departure spur, and then replaced by another 50-rail-car switch.

A typical tank car handling scenario is described below:

1. Tank cars carrying crude oil destined for the Refinery arrive at the UPRR Roseville railyard.

2. UPRR-operated locomotives would move up to a 50 car unit train directly from the Roseville railyard via UPRR mainlines to Benicia and then onto the Refinery unloading tracks on Refinery property, traveling at up to 50 miles per hour (mph) on the Main line. When crossing Park Road at the Refinery property entrance, the trains would travel at approximately 5 mph.

3. Up to 25 tank cars would be positioned on the unloading tracks located on each side of the unloading rack. UPRR would leave its locomotives attached to each 25 tank car train.

4. UPRR would turn over operation of the trains to Valero for offloading.

5. A check valve would be installed onto each vent valve on the top of each tank car. The vent valve on the top of each tank car would be opened and the accompanying check valve would only allow fresh air into each tank car, and would prevent release of hydrocarbon fugitive emissions to the atmosphere. At each end car and on approximately every 8 tank cars in the 25 tank car string, a hose would be connected from the tank car's vent connection to a separate "equalization header." The equalization header would ensure the vapor spaces above the stored liquid crude in the tank cars is equalized between the tank cars. Individual drain hoses would be manually connected to the bottom of each tank car by on-site workers.

6. Valero would drain the contents of each tank car by gravity into a collection pipe (collection header) and then pump the contents directly into storage tankage located in the Refinery's crude oil storage tank field.

7. After the tank cars are emptied, the empty tank cars would be moved onto the departure spur on Refinery property adjacent to the unloading rack, where a train of up to 50 empty tank cars would be reassembled in preparation for transport off-site. Prior to departure, UPRR and Valero would conduct a safety inspection and ready the train for departure.

8. UPRR would transfer the empty 50 tank car train across Park Road and then east on the UPRR mainlines returning to UPRR's Roseville railyard. UPRR would assemble up to a 100 empty tank car train and transfer it to accept new loads from the North American crude source.

UPRR owns and maintains the main line between the Roseville railyard and the Bay Area. The line is part of the Martinez subdivision. UPRR operates freight trains on the line, and allows Capitol Corridor Joint Powers Authority (Capitol Corridor) passenger trains to operate on the line.

Freight trains on the line include unit, manifest, and local trains. Unit trains carry just one commodity, such as grain or crude oil. All of the cars in a unit train are shipped together from the

same origin to the same destination. Manifest trains are express trains that carry a variety of different commodities in cars with different origins and different destinations. Local trains make multiple stops at terminals along the line. All of the trains carrying crude oil to the Refinery would be unit trains travelling from an oil producing region to the Refinery.

The passenger trains are scheduled to the minute. UPRR dispatches the passenger trains so as to meet these precise schedules. Freight trains do not typically run on regular schedules. In its normal course of operation, however, UPRR dispatches freight trains so as to avoid congestion that results in delayed deliveries.

If the Project were approved, Valero would ask UPRR to schedule Valero's unit trains so that none of them cross Park Road during the commute hours of 6:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. UPRR has agreed to make all reasonable effort to comply with this request and, therefore, it is expected that Valero's unit trains will avoid crossing Park Road during the commute hours. UPRR has demonstrated the ability to regularly meet passenger train schedules -- the Capitol Corridor trains dispatched by UPRR are on time 97% of the time. One can assume that UPRR will have little difficulty scheduling trains around a three hour window and a two hour window, given their success in meeting the much more precise one-minute schedules required by Capitol Corridor. Moreover, UPRR currently avoids dispatching freight trains during the commute hours in order to ensure that freight trains do not delay the Capitol Corridor passenger trains. Valero's requested schedule, therefore, is consistent with UPRR's existing practice for dispatching freight trains.

Valero would schedule delivery of one train between the nighttime hours 8:00 PM and 5:00 AM, and a second train in the daytime hours (except during the commute hours). It would take Valero approximately 12 hours to unload each train and prepare the empty train for the return trip to Roseville. Thus, two trains would cross Park Road during the evening hours, and two would cross Park Road during the daytime hours other than the hours of 6:00 AM to 9:00 AM and 4:00 PM to 6:00 PM.

Operations noted in Steps 1 through 8 could occur at any time of day/7 days per week/365 days per year. These operations would be dynamic and subject to change based on changing business conditions.

The proposed Project could result in the addition of approximately 20 new permanent refinery personnel (four crews of five), spread among different work shifts (two shifts per day) and on different days (four crews per week).

3.5 Future Crude Oil Feedstock

The Project would allow Valero to receive North American crudes at the Benicia Refinery that currently have limited accessibility. There are many North American crudes available in the market today, with a wide range of weight and sulfur content. Available North American crudes are listed on Table 3-1.

TABLE 3-1
AVAILABLE NORTH AMERICAN CRUDES

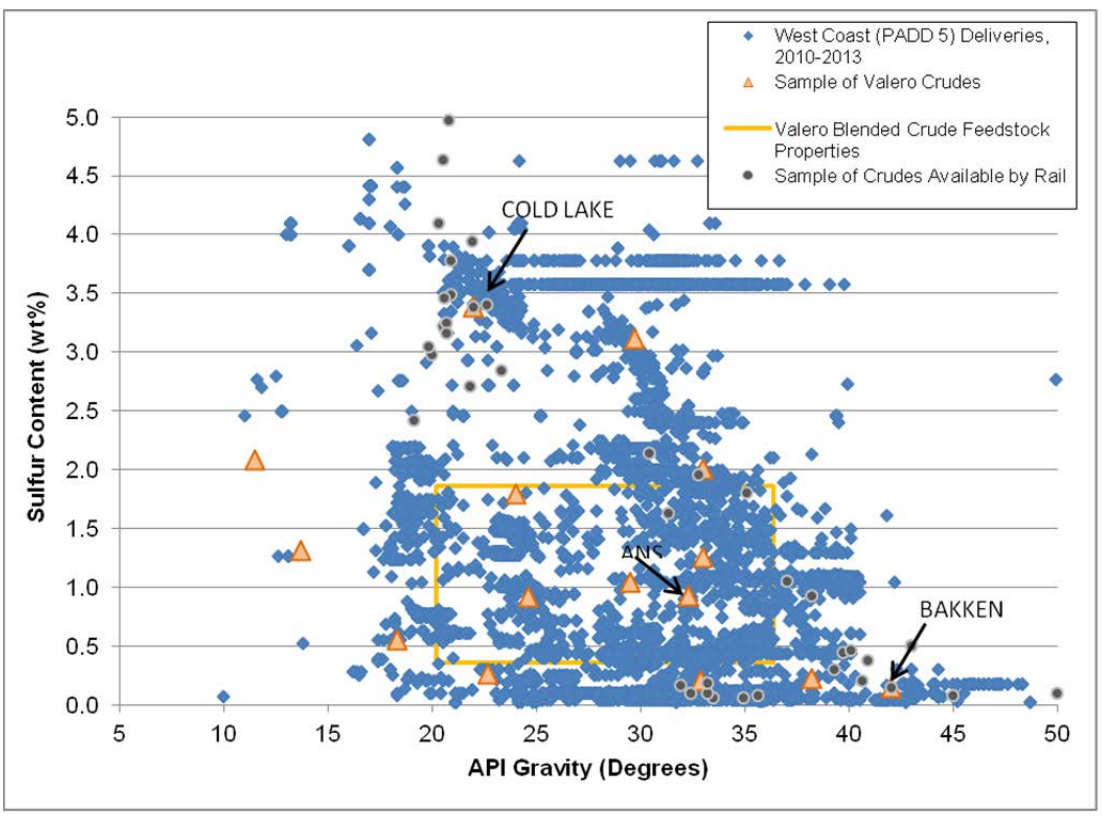
Type	Crude	Origin
Light Sweet	New Mexico Sweet	New Mexico
Light Sweet	Utah Sweet	Utah
Light Sweet	Bakken	North Dakota
Light Sweet	Canadian Manitoba Sweet	Canada
Light Sweet	Light Sweet Synthetic	Canada
Light Sweet	Husky Synthetic Blend	Canada
Light Sweet	Mixed Sweet Blend	Canada
Light Sweet	Niobar	Colorado
Light Sweet	Suncor Synthetic A	Canada
Light Sweet	Premium Albian Synthetic	Canada
Light Sweet	Long Lake Light Synthetic	Canada
Light Sweet	Sour Light Edmonton	Canada
Light Sweet	Shell Synthetic Light	Canada
Light Sweet	Syncrude Synthetic	Canada
Light Sweet	West Texas Intermediate	Texas
Light Sweet	Wyoming Sweet	Wyoming
Light Sour	Light Sour Blend	Canada
Light Sour	Peace River Sour	Canada
Medium Sour	Bow River South	Canada
Medium Sour	Sour High Edmonton	Canada
Medium Sour	Kearl Lake	Canada
Medium Sour	Midale	Canada
Medium Sour	Mixed Sour Blend	Canada
Heavy Sour	Albian Heavy Synthetic	Canada
Heavy Sour	Access Western Blend	Canada
Heavy Sour	Bow River North	Canada
Heavy Sour	Cold Lake	Canada
Heavy Sour	Cold Lake	Canada
Heavy Sour	Fosterton	Canada
Heavy Sour	Lloyd Blend	Canada
Heavy Sour	Lloyd Kerrobert	Canada
Heavy Sour	Suncor Synthetic H	Canada
Heavy Sour	Peace River Heavy	Canada
Heavy Sour	Smiley-Coleville	Canada
Heavy Sour	SHE	Canada
Heavy Sour	Western Canadian Blend	Canada
Heavy Sour	Western Canadian Select	Canada
Heavy Sour	Wabasca Heavy	Canada

SOURCE: McGovern, 2014 (See Appendix K)

Once the Project is complete, Valero plans to obtain North American crudes that are, on average, lighter and sweeter than Valero's current feedstocks. According to Valero, the North American crudes will be "Alaskan North Slope (ANS) look-alikes or sweeter" (Valero, 2013). As explained above, however, Valero selects crudes based on a range of variables that can change over time. Thus, the project could foreseeably result in Valero's purchase of any of the crudes listed above as well as others that might become available.

Moreover, Valero must blend its crude feedstocks to a narrow range of weight and sulfur content before processing. This constraint in turn limits the range of crude feedstocks that Valero can purchase. Although Valero can acquire individual crudes ranging from light sweet to heavy sour, the *average* weight and sulfur content of Valero's crude feedstocks over any given period of time must remain relatively constant.

Figure 3-11 displays the API Gravity and sulfur content of (1) all crudes delivered to west coast refineries over a three year period; (2) a sample of crudes purchased by Valero over that same period; and (3) a sample of North American crudes that would be available by rail if the Project were approved and constructed. As the Figure shows, North American crudes span a similar range of weight and sulfur content as crudes recently purchased by Valero, as well as all crudes recently purchased by west coast refineries. In any case, the average weight and sulfur content of all crudes purchased by Valero must remain with the yellow box.



SOURCE: Valero, 2013

Figure 3-11
West Coast Crude Deliveries and Sample of Crudes Available by Rail

3.6 Project Construction

The following sections provide information on the construction phase of the proposed Project.

3.6.1 Schedule

The Refinery is scheduled to begin construction in 2014 and commence operations in late-2014 or early 2015. Construction is expected to take approximately 25 weeks. Construction work would be conducted in two 10-hours shifts per day, seven days per week for most activities.

3.6.2 Site Preparation

Construction activities would take place mostly near the lower tank farm area, along Avenue “A” within the Refinery. Pipeline construction would take place in this area, which includes Avenue ”A”, Avenue “D”, 9th Street, and 14th Street.

Construction activities would include excavation and grading, demolition of the existing spill containment berm, realignment of existing track, and construction of a new containment wall, unloading rack, new rail tracks, and piping and associated equipment. All new track construction / operation would comply with the California Building Codes and CPUC General Orders 26-D, 72-B, and 75-D.

Most of the area that would be disturbed by the Project lies between the tank farm containment berm and the property fence, and is already graded. A part of this affected area that is graded and paved with asphalt forms Avenue “A.” New tracks would result in a cut volume of approximately 16,000 cubic yards and fill volume of 2,000 cubic yards. Containment berm work would result in a cut volume of 3,000 cubic yards. The new rail unloading rack would also result in a cut volume of 1,500 cubic yards. The net cut volume is approximately 18,500 cubic yards.

Material deliveries would include, but would not be limited to, pumps, pipes, valves, fittings, structural steel, plates, concrete, rebar, formwork, machinery and equipment, electrical equipment, electrical conduit and cable, instrumentation, insulation, gaskets, bolts, nuts, rail tracks, and fill material from off-site. Deliveries would also be required for additional services equipment (e.g., portable toilets and temporary office trailers for construction contractors).

3.6.3 Construction Labor Force

The construction workforce would include workers conducting activities inside the Refinery in and around the Project site. The total workforce is estimated to include 121 construction workers per day over the construction period.

3.6.4 Construction Materials and Services

Laydown areas located off-site north and east of the Refinery at 251 West Channel Road and 443 Industrial Way, respectively, would host proposed Project equipment, and may also contain temporary office trailers, security lighting, and other incidental features.

3.6.5 Construction Traffic

The proposed Project would generate additional construction and personal vehicle trips during the construction period. Vehicle traffic would include employees, administrative personnel, management, materials, bus drivers, and soil deliveries.

Prior to commencing construction, Valero would be required to submit a traffic control plan to the City and other agencies as may be appropriate. Public safety measures approved by the City Engineer would be maintained at key intersections or other driveways that may be affected by construction vehicle ingress and egress. No physical entrance, roadway, or intersection improvements would be needed to accommodate construction traffic volume.

Parking and on-site services would be provided for construction workers. Parking for the construction contractors would be in the two existing lots on the southern side of the main Refinery area. All temporary administrative, sanitary, and comfort services would be provided in the areas designated for these purposes on Refinery property. There would be no parking or other services off-site.

3.7 Federal Preemption of Railroad Regulation

Under the Commerce Clause of the United States Constitution, no state or local government may impose laws or regulations that unduly burden interstate commerce. Because railroads are a key component of the system of interstate commerce, most aspects of railroad operations are governed exclusively by federal law.

With respect to land use requirements, the Interstate Commerce Commission Termination Act (ICCTA) affords railroads flexibility in making necessary improvements and modifications to rail infrastructure, subject to requirements of the federal Surface Transportation Board. Congress afforded railroads this flexibility because of the integrated national nature of the American rail system and the need for uniform and consistent standards across the country. As a general matter, ICCTA broadly preempts state and local regulation of railroads. This preemption extends to “the construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks, or facilities . . . . [T]he remedies provided under this part with respect to regulation of rail transportation are exclusive and preempt the remedies provided under Federal or State law.

The courts have repeatedly held that the ICCTA preempts state and local regulation, i.e., “those state laws that may reasonably be said to have the effect of ‘managing’ or ‘governing’ rail transportation.” *Norfolk Southern Railway Company v. City of Alexandria*, 608 F.3d 150, 157-158

(4th Cir. 2010) (city ordinance and permit regulating the transportation of bulk materials, including ethanol, was preempted by the ICCTA). The ICCTA also preempts state and local regulation of the construction and operation of rail lines. *Emerson v. Kansas City S. Ry. Co.*, 503 F.3d 1126 (10th Cir. 2007); *Friberg v. Kansas City S. Ry. Co.*, 267 F.3d 439 (5th Cir. 2001); *Green Mountain R.R. Corp. v. Vermont*, 404 F.3d 638 (2d Cir. 2005) (preconstruction permitting of a transload facility); *City of Auburn v. United States*, 154 F.3d 1025 (9th Cir. 1998) (environmental and land use permitting). As one court noted, "[i]t is difficult to imagine a broader statement of Congress' intent to preempt state regulatory authority over railroad operations." *CSX Transp. v. Georgia Public Service Comm'n*, 944 F. Supp. 1573, 1581 (N.D. Ga. 1996).[1]

UPRR has taken the position that, among other types of regulation, any limitation on the volume of product shipped or the frequency, route, or configuration of such shipments is clearly preempted under federal law. UPRR has summarized its position in a statement set forth in Appendix L.

[1] While it is clear that UPRR does not require local land use permits in order to make improvements or modifications to its operations or rail lines, as noted above, UPRR states that they are committed to operating their business safely and working with the communities they serve to address concerns about those operations.

This page intentionally left blank

CHAPTER 4

Environmental Setting, Impacts, and Mitigation Measures

4.0 Approach to the Analysis of Impacts

Organized by environmental resource area, this chapter provides an integrated discussion of the environmental setting (including the regional, local and/or Project setting; regulatory setting; and Project baseline) and environmental consequences (including environmental impacts and mitigation measures for potentially significant impacts) associated with the construction, operation, and maintenance of the Project.

4.0.1 CEQA Requirements

The California Environmental Quality Act (CEQA) and the CEQA Guidelines require that the environmental analysis for an Environmental Impact Report (EIR) must evaluate impacts associated with a project and identify mitigation measures for any potentially significant impacts. All phases of a project are evaluated in the analysis. The CEQA Guidelines state:

- *An EIR shall identify and focus on the significant environmental effects of the proposed project. In assessing the impact of a proposed project on the environment, the lead agency should normally limit its examination to changes in the existing physical conditions in the affected area as they exist at the time the notice of preparation [NOP] is published, or where no notice of preparation is published, at the time environmental analysis is commenced. Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects. The discussion should include relevant specifics of the area, the resources involved, physical changes, alterations to ecological systems, and changes induced in population distribution, population concentration, the human use of the land (including commercial and residential development), health and safety problems caused by the physical changes, and other aspects of the resource base such as water, historical resources, scenic quality, and public services. The EIR shall also analyze any significant environmental effects the project might cause by bringing development and people into the area affected (CEQA Guidelines Section 15126.2[a]).*

- *The EIR shall discuss any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans. Such regional plans include, but are not limited to, the applicable air quality attainment or maintenance plan or State Implementation Plan, area-wide waste treatment and water quality control plans, regional transportation plans, regional housing allocation plans, regional blueprint plans, plans for*

the reduction of greenhouse gas emissions, habitat conservation plans, natural community conservation plans and regional land use plans for the protection of the Coastal Zone, Lake Tahoe Basin, San Francisco Bay, and Santa Monica Mountains (CEQA Guidelines Section 15125[d]).

- *An EIR shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy* (CEQA Guidelines Section 15126.4[a]). *Mitigation measures must be fully enforceable through permit conditions, agreements, or other legally-binding instruments* (CEQA Guidelines Section 15126.4[a][2]). *Mitigation measures are not required for effects which are not found to be significant* (CEQA Guidelines Section 15126.4[a][3]).

4.0.2 Section Contents and Definition of Terms

Chapter Organization

Chapter 4 is organized into the following 11 environmental resource or issue areas:

4.1 Air Quality
4.2 Biological Resources
4.3 Cultural Resources
4.4 Energy Conservation
4.5 Geology and Soils
4.6 Greenhouse Gas Emissions
4.7 Hazards and Hazardous Materials
4.8 Hydrology and Water Quality
4.9 Land Use and Planning
4.10 Noise
4.11 Transportation and Traffic

Section Contents

Sections 4.1 through 4.11 include this basic information:

- **Regional, Local, and/or Project Setting:** provides an overview of the physical environmental conditions in the area at the time of, or prior to, the publication of the NOP, that could be affected by implementation of the Project in accordance with State CEQA Guidelines Section 15125.

- **Regulatory Setting:** identifies the laws, regulations, ordinances, plans, and policies that are relevant to each resource area.

- **Project Baseline:** identifies the actual existing physical conditions to provide a point of comparison between pre-project conditions (the baseline) and post-project conditions in order to determine whether the change in the environment caused by the Project is significant under CEQA. The baseline is tailored to each resource area, and is predicated on the significance criteria under which the impacts are assessed. For most resource areas, the baseline is the same as the "environmental setting," i.e., the physical environmental conditions in the vicinity of the Project as they existed in the spring of 2013 when the Initial Study / Mitigated Negative Declaration (IS/MND) was prepared for the Project (see Appendix A). (CEQA Guidelines §§ 15125(a), 15126.2(a)). In sections where this is not the case, the baseline used and the reasoning for the baseline are discussed in detail.

- **Significance Criteria:** provides the criteria used in this document to define the level at which an impact would be considered significant in accordance with CEQA. Significance

criteria are based on CEQA Guidelines Section 15064.5, Appendix F, and the checklist presented in Appendix G; factual or scientific information and data; and regulatory standards of the City of Benicia, and federal, State, and local agencies.

- **Impact Identification:** each section identifies and lists impacts sequentially. An impact statement precedes the discussion of each impact and provides a summary of the impact topic. Each impact is categorized as one of the following:
  - ***No Impact*:** would not cause any change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required.
  - ***Less than Significant*:** would not cause a substantial adverse change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required.
  - ***Less than Significant with Mitigation*:** would cause a substantial adverse change in the physical conditions of the environment; one or more feasible mitigation measures would reduce the environmental effects to a less-than-significant level.
  - ***Significant and Unavoidable*:** would cause a substantial adverse change in the physical conditions of the environment; there is either no feasible mitigation available or, even with implementation of feasible mitigation measures, the project would cause a significant adverse effect on the environment.
- **Mitigation Measures:** recommended where feasible to avoid, minimize, rectify, reduce, or compensate for potential significant, adverse impacts of the Project in accordance with CEQA Guidelines Section 15126.4. Each mitigation measure is identified numerically to correspond with the number of the impact it addresses.

4.0.3 Other Impact Analysis

Cumulative impacts resulting from a combination of the Project's impacts with impacts from other closely related past, present, and reasonably foreseeable probable future projects are discussed in Chapter 5, *CEQA Statutory Sections.* Chapter 6, *Analysis of Alternatives*, analyzes the impacts of alternatives to the Project for each resource area, as compared to the impacts of the Project.

4.0.4 Geographic Scope of Analysis

CEQA requires the City to consider and discuss the Project's impacts on the environment, including any impacts of the Project that might be felt outside the Project area. Impacts felt outside the Project area, however, may be discussed in less detail if they are indirect and/or difficult to predict. The City is not required to speculate, and may limit its analysis to impacts that are reasonably foreseeable.

Some of the Project's potential impacts would be felt only within the Refinery complex, such as any geological impacts. Other impacts might, at least potentially, extend into the Refinery's immediate vicinity. Examples include impacts in the areas of aesthetics, biological resources, hydrology and water quality, land use and planning. Other Project impacts could, at least

potentially, be felt beyond the Refinery's immediate vicinity. Examples include impacts in the areas of air quality, greenhouse gas emissions, hazards, and transportation.

The analysis in each environmental resource area below includes a discussion of any Project impacts that might be felt outside the Project area and/or outside the Project's immediate vicinity. Project impacts that are indirect and/or difficult to predict are discussed in less detail than direct impacts that can be predicted with reasonable certainty.

4.1 Air Quality

4.1.1 Introduction

Air quality depends on the balance between the rate and location of pollutant emissions and the meteorological conditions and topographic features that disperse those pollutants. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants, and consequently affect air quality. This section analyzes and evaluates the potential impacts of the Project on regional and local air quality from both stationary and mobile sources of air emissions. Mitigation measures are presented to reduce these impacts to less than significant levels. Analysis of potential impacts with regard to greenhouse gases is provided in Section 4.6, *Greenhouse Gas Emissions*.

4.1.2 Setting

This setting description provides an overview of region-specific information related to climate and meteorology, air pollutants of concern, existing air quality conditions, sensitive receptors, and the regulatory setting pertaining to the Project area.

4.1.2.1 Climate and Meteorology

The Valero Benicia Refinery (Refinery) is located in the City of Benicia within the San Francisco Bay Area Air Basin (Bay Area Basin). The Bay Area Basin encompasses the nine-county region including all of Alameda, Contra Costa, Santa Clara, San Francisco, San Mateo, Marin, and Napa Counties, and the southern portions of Solano and Sonoma Counties. The climate of the greater Bay Area, including Benicia, is a Mediterranean-type climate characterized by warm, dry summers and mild, wet winters. The climate is determined largely by a high-pressure system that is almost always present over the eastern Pacific Ocean off the west coast of North America. High-pressure systems are characterized by an upper layer of dry air that warms as it descends, restricting the mobility of cooler marine-influenced air near the ground surface, and resulting in the formation of subsidence inversions. In winter, the Pacific high-pressure system shifts southward, allowing storms to pass through the region. During summer and fall, emissions generated within the Bay Area can combine with abundant sunshine under the restraining influences of topography and subsidence inversions to create conditions that are conducive to the formation of photochemical pollutants, such as ozone and secondary particulates, such as sulfates and nitrates.

The air pollution potential is lowest for those regions closest to the Bay, due largely to good ventilation and less influx of pollutants from upwind sources. The occurrence of light winds in the evenings and early mornings occasionally results in elevated pollutant levels. Wind flow patterns are controlled by air circulation in the atmosphere, which is affected by air pressure and the variable topography of the coastal areas adjacent to the Carquinez Strait, the only sea-level gap between San Francisco Bay and the Central Valley. Prevailing winds in the Project area are from the southwest

passing through the Carquinez Strait. During the summer and fall months, high pressure offshore coupled with low pressure in the Central Valley causes marine air to flow northeastward through the Carquinez Strait. Sometimes atmospheric conditions cause air to flow from the east. East winds usually contain more pollutants than the cleaner marine air from the west. In the summer and fall months, this can cause elevated pollutant levels to move into the central Bay Area through the Carquinez Strait. These high-pressure periods are usually accompanied by low wind speeds, shallow mixing depths, higher temperatures, and little or no rainfall.

Temperature fluctuations in the Project area tend to be small because of the strong marine influence on the climate. However, on certain occasions, offshore continental airflow can bring more extreme variations in temperature. The mean annual temperature in Benicia is 63 degrees Fahrenheit with prevailing winds from west to southeast. Annual rainfall averages 19 inches and falls mostly from December through April (City of Benicia, 2013).

4.1.2.2 Air Pollutants of Concern

The U.S. Environmental Protection Agency (USEPA) has identified criteria air pollutants that are a threat to public health and welfare. These pollutants are called “criteria” air pollutants because standards have been established for each of them to meet specific public health and welfare criteria (see Section 4.1.2.5, *Regulatory Setting*). Below are descriptions of criteria pollutants that are a concern in the Project area.

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and that can cause substantial damage to vegetation and other materials. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving precursor organic compounds (POC) and nitrogen oxides (NO_x). POC and NO_x are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours.

Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of POC and NO_x under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is an air quality pollutant of concern because it acts as a respiratory irritant. NO_2 is a major component of the group of gaseous nitrogen compounds commonly referred to as NO_x. A precursor to ozone formation, NO_x is produced by fuel combustion in motor vehicles, industrial stationary sources (such as industrial activities), ships, aircraft, and rail transit. Typically, NO_x emitted from fuel combustion is in the form of nitric oxide (NO) and NO_2. NO is often converted to NO_2 when it reacts with ozone or undergoes photochemical reactions in the atmosphere.

Carbon Monoxide

Carbon monoxide (CO) is a non-reactive pollutant that is a product of incomplete combustion and is mostly associated with motor vehicle traffic. High CO concentrations develop primarily during winter when periods of light winds combine with the formation of ground level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia.

Particulate Matter

Particulates less than 10 microns in diameter (PM_{10}) and particulates less than 2.5 microns in diameter ($PM_{2.5}$) can be inhaled into air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. According to a study by the California Air Resources Board (CARB), exposure to ambient $PM_{2.5}$ can be associated with approximately 14,000 to 24,000 premature annual deaths statewide (CARB, 2009). Particulates can also damage materials and reduce visibility.

Other Criteria Pollutants

Sulfur dioxide (SO_2) is a combustion product of sulfur or sulfur-containing fuels such as coal. SO_2 is also a precursor to the formation of atmospheric sulfate and particulate matter (both PM_{10} and $PM_{2.5}$) and contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain. Lead has a range of adverse neurotoxic health effects, and was formerly released into the atmosphere primarily via the combustion of leaded gasoline. The phase-out of leaded gasoline in California resulted in decreasing levels of atmospheric lead.

4.1.2.3 Existing Air Quality

The Bay Area Air Quality Management District (BAAQMD) operates a regional monitoring network that measures the ambient concentrations of criteria pollutants. Existing and probable future general levels of air quality in the Project area can generally be inferred from ambient air quality measurements conducted by BAAQMD at its monitoring stations. The major criteria pollutants of concern in the Bay Area (i.e., ozone, PM_{10}, $PM_{2.5}$, CO, NO_2, and SO_2) are monitored at a number of locations. Background ambient concentrations of pollutants are determined by pollutant emissions in a given area, and wind patterns and meteorological conditions for that area. As a result, background concentrations can vary among different locations within Solano County. However, areas located close together and exposed to similar wind conditions can be expected to have

similar background pollutant concentrations. The closest BAAQMD monitoring station to Benicia is the Tuolumne Street station in Vallejo. The Vallejo station is located about 5.5 miles northwest of the Refinery and monitors ozone, CO, NO_2, and $PM_{2.5}$. Because Benicia and the Vallejo station are close and are exposed to similar wind locations, these areas can be expected to have similar background pollutant concentrations.

The fact that the results from the Vallejo monitoring station are representative of emissions in Benicia is confirmed by the results of an air monitoring study conducted just west of the Refinery from 2007-2008. In April 2007, the BAAQMD installed a temporary portable air monitoring station west of the refinery near East Second Street and collected approximately 18 months of data. Criteria pollutants (Ozone, NO_x, SO_2, CO and PM_{10}) were measured, as well as $PM_{2.5}$ and other organic compounds. Results were shared with the community during a meeting in May 2009. The results of this portable air monitoring station correlated closely with the results from the monitoring stations in Vallejo and Concord. In fact, typical concentrations at the Vallejo and Concord stations were higher than the concentrations in Benicia. Benicia's CO, NO_x and benzene concentrations were among the lowest in the Bay Area. PM_{10} and other organic compounds were well below the Bay Area average. Ozone concentrations in Concord were higher than in Benicia (BAAQMD, 2009a).

Table 4.1-1 shows a 5-year (2008 through 2012) summary of data collected at the Tuolumne Street station compared to National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS), which are presented in more detail in Table 4.1-2.

As shown in Table 4.1-1, the State 1-hour ozone standard was exceeded once in 2008 and twice in 2009. The State 8-hour ozone standard was exceeded three times in 2008, once in 2009, and twice in 2010, while the national 8-hour ozone standard was exceeded only once in 2010. CARB estimates that in 2008, 2009, 2011, and 2012, the federal $PM_{2.5}$ 24-hour standard was exceeded approximately seven times, five times, six times, and once per year, respectively, while there were no exceedances of the State or federal annual average standards during the entire 5-year summary period. As indicated in the table, no exceedances of the applicable CO or NO_2 standards were recorded at the Tuolumne Street station during the 5-year period (CARB, 2013).

4.1.2.4 Sensitive Receptors

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions sources, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air quality-related health problems than the general public. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, with greater associated exposure to ambient air quality. Recreational uses are also considered sensitive due to the greater exposure to ambient air quality conditions because vigorous exercise associated with recreation places a high demand on the human respiratory system.

TABLE 4.1-1
AIR QUALITY DATA SUMMARY (2008–2012) FOR THE PROJECT AREA

Pollutant	State/ National Standards	Monitoring Data by Year				
		2008	2009	2010	2011	2012
Ozone, O_3						
Highest 1-Hour Average, ppm	0.09 / --	**0.109**	**0.104**	0.091	0.090	0.085
Days over State 1-Hour Standard		1	2	0	0	0
Highest 8-Hour Average, ppm	0.070/0.075	**0.075**	**0.074**	**0.081**	0.070	0.063
Days over State/National 8-Hour Standards		3/0	1/0	2/1	0/0	0/0
Carbon Monoxide, CO						
Highest 8-Hour Average, ppm	9.0 / 9	2.31	2.23	1.94	2.41	2.24
Days over State 8-Hour Standards		0	0	0	0	0
Nitrogen Dioxide, NO_2						
Highest 1-Hour Average, ppm	0.18 / 0.10	0.067	0.049	0.055	0.047	0.052
Days over State/National 1-Hour Standards		0	0	0	0	0
Annual Average, ppm	0.030/0.053	0.010	0.010	0.009	0.010	0.009
Exceed State/National Annual Standards?		0	0	0	0	0
Fine Particulate Matter, $PM_{2.5}$						
Highest 24-Hour Average, $\mu g/m^3$	- / 35 *	**50.0**	**38.9**	29.5	**54.2**	**36.8**
Est. days over National 24-Hour Standard		7.1	5.4	0.0	6.0	1.0
Annual Average, $\mu g/m^3$	12 /12.0**	9.9	9.7	7.7	9.7	8.9
Exceed State/National Standards?		No	No	No	No	No

NOTES: All data were measured at the Vallejo-Tuolumne Street station. Generally, state standards are not to be exceeded and national standards are not to be exceeded more than once per year. Values in bold are in excess of applicable standard; ppm = parts per million; and $\mu g/m^3$ = micrograms per cubic meter.

* The national $PM_{2.5}$ 24-hour standard is 35 $\mu g/m^3$, averaged over 3 years. There is no state $PM_{2.5}$ 24-hour standard.

** The new national $PM_{2.5}$ annual average standard was strengthened to12.0 $\mu g/m^3$ on December 14, 2012, but it was not in affect for the years sampled.

SOURCE: CARB, 2013

The Project is located within the Refinery in an area designated for General Industrial uses in the City of Benicia General Plan (City of Benicia, 1999). Sensitive uses are not immediately adjacent to the developed part of the Refinery. In general, the Refinery complex is bordered by 470 acres of mostly undeveloped Valero property to the south and west, and general industrial uses to the north and east. Residential uses are located to the south (Hillcrest neighborhood) and west (Southampton neighborhood) of the Valero buffer land boundaries. The closest sensitive receptors to the Project would be residences in neighborhoods northwest of the Refinery, approximately 2,100 feet northwest of the proposed northern extent of the new unloading tracks and approximately 2,250 feet northwest of the proposed northern extent of the new unloading *racks.* There are no sensitive receptors within 2,000 feet of any of the Project components. Land uses immediately northeast and southeast of the Refinery are also non-sensitive land uses, consisting of Interstate 680 and the Benicia Industrial Park.

4.1.2.5 Regulatory Setting

Criteria Air Pollutants

Regulation of air pollution is achieved through both national and State ambient air quality standards and emission limits for individual sources of air pollutants. As required by the federal Clean Air Act (CAA), the USEPA has identified criteria pollutants and has established NAAQS to protect public health and welfare. NAAQS have been established for ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. To protect human health and the environment, the USEPA has set "primary" and "secondary" maximum ambient standards for each of the criteria pollutants. Primary standards were set to protect human health, particularly sensitive individuals such as children, the elderly, and individuals suffering from chronic lung conditions such as asthma and emphysema. Secondary standards were set to protect the natural environment and prevent further deterioration of animals, crops, vegetation, and buildings.

The NAAQS are defined as the maximum acceptable concentration that may be reached, but not exceeded more than once per year. California has adopted more stringent ambient air quality standards for most of the criteria air pollutants. Table 4.1-2 presents both sets of ambient air quality standards (i.e., national and State) and the Bay Area Basin's attainment status for each standard. California has also established State ambient air quality standards for sulfates, hydrogen sulfide, and vinyl chloride.

TABLE 4.1-2
AMBIENT AIR QUALITY STANDARDS AND BAY AREA AIR BASIN ATTAINMENT STATUS

Pollutant	Averaging Time	State Standard		National Standard	
		Concentration	Attainment Status	Concentration	Attainment Status
Ozone	1-Hour 8-Hour	0.09 ppm 0.070 ppm	Non-Attainment Non-Attainment	– 0.075 ppm	– Non-Attainment
Carbon Monoxide	1-Hour 8-Hour	20 ppm 9.0 ppm	Attainment Attainment	35 ppm 9 ppm	Attainment Attainment
Nitrogen Dioxide	1-Hour Annual	0.18 ppm 0.030 ppm	Attainment Attainment	100 ppb 0.053 ppm	– Attainment
Sulfur Dioxide	1-Hour 3-Hour 24-Hour Annual	0.25 ppm – 0.04 ppm –	Attainment – Attainment –	75 ppb 0.5 ppm * 0.14 ppm 0.030 ppm	Attainment Attainment Attainment Attainment
Respirable Particulate Matter (PM_{10})	24-Hour Annual	50 µg/m^3 20 µg/m^3	Non-Attainment Non-Attainment	150 µg/m^3 –	Unclassified –
Fine Particulate Matter ($PM_{2.5}$)	24-Hour Annual	– 12 µg/m^3	– Non-Attainment	35 µg/m^3 12.0 µg/m^3 **	Non-Attainment Attainment**
Lead	30-Day Quarterly	1.5 µg/m^3 –	Attainment –	– 1.5 µg/m^3	– Attainment

NOTES: ppm = parts per million; ppb = parts per billion; µg/m^3 = micrograms per cubic meter.

* Secondary National Standard.
** The new national $PM_{2.5}$ annual average standard was lowered to 12.0 µg/m^3 on December 14, 2012; attainment for this new standard has yet to be determined. The Bay Area was in attainment of the previous national $PM_{2.5}$ standard of 15 µg/m^3.

SOURCE: BAAQMD, 2014a.

As shown in the table, the Bay Area is currently classified as non-attainment for the 1-hour State ozone standard as well as for the federal and State 8-hour standards. Additionally, the Bay Area is classified as non-attainment for the State 24-hour and annual arithmetic mean PM_{10} standards as well as the State annual arithmetic mean and the national 24-hour $PM_{2.5}$ standards. The Bay Area is unclassified or classified as attainment for all other pollutants standards (BAAQMD, 2014a).

Toxic Air Contaminants

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources, but does not directly regulate air toxics emissions. Under the Act, toxic air contaminant (TAC) emissions from individual facilities are quantified and prioritized. "High-priority" facilities are required to perform a health risk assessment and, if specific thresholds are violated, are required to communicate the results to the public in the form of notices and public meetings. Depending on the risk levels, emitting facilities are required to implement varying levels of risk reduction measures. The BAAQMD implements AB 2588, and is responsible for prioritizing facilities that emit air toxics, reviewing health risk assessments, and implementing risk reduction procedure. Pursuant to the requirements of AB 2588, the BAAQMD publishes an air toxics emissions inventory that details the TAC emissions of facilities throughout the Bay Area.

Federal

USEPA is responsible for implementing the programs established under the federal CAA, such as developing and reviewing the NAAQS and judging the adequacy of State Implementation Plans (SIPs), but has delegated the authority to implement many of the federal programs to the states while retaining an oversight role to ensure that the programs continue to be implemented.

State of California

CARB is responsible for establishing and reviewing the State standards, compiling the California SIP and securing approval of that plan from USEPA, conducting research and planning, and identifying TACs. CARB also regulates mobile sources of emissions in California, such as construction equipment, trucks, and automobiles, and oversees the activities of California's air quality management districts, which are organized at the county or regional level. Air quality management districts are primarily responsible for regulating stationary sources at industrial and commercial facilities within their geographic areas and for preparing the air quality plans that are required under the federal CAA and California CAA.

Bay Area Air Quality Management District

BAAQMD is the regional agency with jurisdiction over the nine-county region located in the Bay Area Basin. The Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC), county transportation agencies, cities and counties, and various non-governmental organizations also join in the efforts to improve air quality through a variety of programs. These programs include the adoption of regulations and policies, as well as implementation of extensive education and public outreach programs. BAAQMD is also responsible for attaining and/or maintaining air quality in the Bay Area Basin within federal and

State air quality standards. Specifically, BAAQMD has the responsibility to monitor ambient air pollutant levels throughout the Bay Area and to develop and implement strategies to attain the applicable federal and State standards.

Authority to Construct/Permit to Operate

The BAAQMD requires that any person or facility that puts in place, builds, erects, installs, modifies, modernizes, alters, or replaces any article, machine, equipment, or other contrivance, the use of which may cause, reduce, or control the emission of air contaminants first secure written authorization from the BAAQMD in the form of an Authority to Construct Permit.[1] The BAAQMD implements the permit process through a pre-construction review and approval process that takes place after the equipment is designed, but before it is installed. The pre-construction review for new and modified sources applies to both stationary and portable sources of emissions that do not qualify for a permit exemption (BAAQMD, 2013). After an Authority to Construct has been issued and construction is complete, BAAQMD staff may inspect the facility in operation to verify that equipment performs as required. If it does, the BAAQMD issues a Permit to Operate, which may contain specific operating conditions for equipment. The permit must be renewed annually (BAAQMD, 2013). The Project would emit regulated, fugitive reactive organic gases (ROG) from unloading rack, pumps, and pipeline components, such as flanges and valves, and therefore the facility must obtain an Authority to Construct permit and Permit to Operate from the BAAQMD.

Title V Federal Operating Permit (Title V)

Title V of the 1990 federal CAA Amendments requires all major sources and some minor sources of air pollution to obtain an operating permit. A Title V permit grants a source permission to operate. The permit includes all air pollution requirements that apply to the source, including emissions limits and monitoring, record keeping, and reporting requirements. It also requires that the source report its compliance status with respect to permit conditions to the permitting authority. Under Title V of the federal CAA, any source that emits or has the potential to emit 100 tons per year or more of any criteria air pollutant is a major source and must obtain a Title V operating permit. Title V permits in the Bay Area are issued by the BAAQMD and implemented by Regulation 2, Rule 6 of the BAAQMD *Rules and Regulations*. The Refinery is a major facility and currently holds a Title V operating permit. Based on the BAAQMD's rules, the Project would qualify as a Minor Permit Revision of the Title V operating permit in accordance with Regulation 2-6-215 because it is not an administrative or significant permit revision. The proposed revisions are not considered to be administrative or significant because there are no proposed revisions that meet the definition for administrative revisions under Regulation 2-6-201 or that meet the definition for significant revisions under Section 2-6-226. Valero would submit a Title V permit modification application following receipt of the Authority to Construct permit for the Project.

New Source Review

New Source Review is a preconstruction permitting program established as part of the 1977 federal CAA Amendments. In the Bay Area, the BAAQMD has partial delegation to

[1] Unless the source is specifically excluded or exempt from permit requirements.

implement the New Source Review program. It applies to new and modified major sources requiring an Authority to Construct. It serves to ensure that air quality is not significantly degraded from the addition of new and modified stationary sources and that any large new or modified industrial source would be as clean as possible, using Best Available Control Technology (BACT), Best Available Control Technology for Toxics (TBACT), and emission offsets. The Bay Area Basin is currently a non-attainment area for state ozone, PM_{10}, and $PM_{2.5}$ standards; accordingly, some of the requirements under the BAAQMD's policy are more stringent than federal policy.

Bay Area Air Quality Management District (CEQA) Guidelines

On June 2, 1010, the BAAQMD adopted CEQA thresholds of significance for air quality impacts within the BAAQMD (2010 Thresholds) (2010a). At that time, BAAQMD recommended that local lead agencies conducting air quality analysis under CEQA use these thresholds of significance. On November 29, 2010, the California Building Industry Association filed a petition for writ of mandate in Alameda County Superior Court challenging the 2010 Thresholds on various grounds. On March, 5, 2012 the court in that case ruled that the BAAQMD failed to comply with CEQA before adopting the 2010 Thresholds (Alameda Superior Court, 2012a). The Court ordered the BAAQMD to set aside its approval of the Thresholds and "cease dissemination and publication of the Thresholds" as thresholds of general application (Alameda Superior Court, 2012b). The Court did not find that the Thresholds themselves were invalid or unlawful for any reason other than the fact that the BAAQMD failed to comply with CEQA before adopting them (Alameda Superior Court, 2012a). Nor did the Court in any way restrain any lead agencies from relying on the same thresholds.

The BAAQMD appealed the Superior Court's decision and, on August 13, 2013, the First Appellate District reversed the trial court ruling (First Appellate District, 2013). The petitioner then filed a petition for review with the California Supreme Court. On November 26, 2013, the Supreme Court granted limited review (Supreme Court, 2013). The grant of review superseded the Court of Appeal opinion, such that the Superior's Court's ruling will remain in effect while the matter is pending before the Supreme Court (BAAQMD 2014b).

Because the Superior Court ruling remains in place, the BAAQMD "is no longer recommending that the Thresholds be used as a generally applicable measure of a project's significant air quality impacts" (BAAQMD 2014b). Lead agencies remain free, however, to apply any significance thresholds that are based on substantial evidence in the record. Lead agencies could, for example, use the significance thresholds set forth in the BAAQMD's December 1999 "CEQA Guidelines" (1999 Thresholds). Lead agencies may also use the 2010 Thresholds, as long as the decision to use a particular threshold is based on substantial evidence. The BAAQMD's "Revised Draft Options and Justification Report" cites a variety of evidence in support of the 2010 Thresholds.

Air Quality Plans

Air quality plans developed to meet federal requirements are referred to as State Implementation Plans (SIPs). The federal CAA and the California CAA require plans to be developed for areas designated as nonattainment (with the exception of areas designated as nonattainment for the

State PM_{10} standard). At a public hearing on September 15, 2010, the BAAQMD Board of Directors adopted the final Bay Area 2010 Clean Air Plan (2010 CAP), and certified the Final Environmental Impact Report on the 2010 CAP. The 2010 CAP serves to update the 2005 Bay Area Ozone Strategy in compliance with the requirements of the Chapter 10 of the California Health & Safety Code. This plan includes ozone control measures and also considers the impacts of these control measures on particulate matter, air toxics, and greenhouse gas emissions in a single, integrated plan.

The 2010 CAP control strategy includes revised, updated, and new measures in the three traditional control measure categories: stationary sources measures, mobile source measures, and transportation control measures. In addition, the 2010 CAP identifies two new categories of control measures, including land use and local impact measures and energy and climate measures (BAAQMD, 2010b).

Air Toxics Program

The BAAQMD's Air Toxics Program integrates federal and State air toxics mandates with local goals that have been established by the BAAQMD's Board of Directors. The program consists of several elements that are designed to identify and reduce public exposure to TACs. Under the preconstruction review of new and modified sources program, proposed projects are reviewed for potential health impacts, with the requirement that significant new/modified sources use the Best Available Control Technology to minimize TAC emissions. All applications for new or modified permits are reviewed for air toxics impacts, in accordance with the BAAQMD's Risk Management Policy and by Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.

City of Benicia General Plan

The City of Benicia General Plan includes specific policies to preserve and enhance existing development and to provide for orderly and appropriate new development of the City of Benicia until approximately the year 2020. The following General Plan policies are relevant to air quality analysis of the project (City of Benicia, 1999):

> ***Policy 4.8.1*:** Evaluate potential hazards and environmental risks to sensitive receptors before approving development;
>
> ***Policy 4.9.1*:** Establish whether a significant air pollution problem exists in Benicia and the City's role in resolving it; and
>
> ***Policy 4.10.1:*** Support implementation of the BAAQMD Clean Air Plan.

4.1.2.6 Project Baseline

Under CEQA, the project baseline is normally defined as the physical conditions of the environment as it exists at the time of publication of the Notice of Preparation of the project EIR or at the time the environmental analysis commenced. There are two important exceptions to this rule. First, the baseline for increased emissions from existing permitted equipment includes emissions associated with maximum operation of the equipment allowed under existing permits

if, and only if, the permits were issued in connection with prior CEQA review. Second, where an existing facility's operations regularly fluctuate over time, the lead agency may use an average of recent conditions rather than the conditions that happen to exist when environmental review begins.

The Project here would not result in any emissions increases from existing, permitted Refinery equipment. The Project would, however, result in emissions increases from locomotives traveling to and from the Refinery. The Project would also reduce emissions from ships traveling to and from the Refinery. For purposes of analyzing these transportation-related emissions, this analysis uses as the baseline the annual average of emissions over a three-year period. A three-year average is commonly used as the baseline for CEQA review of refinery modification projects to more accurately account for the cyclic nature of refinery operations. This is because while refineries tend to operate at capacity for extended periods of time, refineries also undergo periodic multi-week unit-specific and plant-wide shutdowns for scheduled maintenance (referred to as a turnaround). These scheduled maintenance activities can be as frequent as annually to as infrequent as once every six years. Market forces can also cause refineries to vary their production to meet market demand. For the reasons described, the annual average based on three previous years of operation is more representative of a facility’s baseline operation than a single point in time. This approach is consistent with the project baseline defined in *Greenhouse Gas Emissions (Section 4.6).*

Annual average baseline emissions for the Project were estimated using a baseline period from December 2009, through November 2012. The applicant filed the Use Permit Application for this project in December 2012.

The three-year baseline includes emissions within the Bay Area Basin from ships that transport crude oil to the Refinery, and tugboats that escort the ships. Ship emissions include emissions from main engines, auxiliary engines, and auxiliary boilers during the round-trip between the sea buoy, 11 nautical miles west of the Golden Gate Bridge, and the Refinery marine terminal, and for vessel operation while docked at the Refinery marine terminal.

During public review of the IS/MND, some commenters opined that the Project would result in emissions increases from existing, permitted Refinery equipment. That is not the case (See Appendices C.1 and C.2). If the Project would result in emission increases from existing, permitted Refinery equipment, it is important to note that the baseline would include emissions from the maximum operation of the Refinery equipment within permit limits. The Valero Improvement Project (VIP) involved substantial modifications to the Refinery equipment and an increase in the Refinery's overall throughput limit. The City prepared and adopted an EIR for the VIP project, and the BAAQMD relied on this CEQA review in approving air quality permits for the Refinery as modified. Since these permits were issued in connection with CEQA review, the baseline includes the full scope of operation of existing equipment allowed under existing BAAQMD permits.

4.1.3 Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to air quality if it would:

a) Conflict with or obstruct implementation of the applicable air quality plan;

b) Violate any air quality standard or contribute to an existing or projected air quality violation;

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

d) Expose sensitive receptors to substantial pollutant concentrations; or

e) Create objectionable odors affecting a substantial number of people.

4.1.3.1 Analysis Methodology

Emission estimates for the Project presented in this section were prepared by Environmental Resource Management (ERM), a consultant of the Applicant, and independently reviewed by the City's consultant, Environmental Science Associates (ESA). Project-related construction and operation emissions within the BAAQMD were estimated and compared to significance thresholds recommended in the BAAQMD's *Revised Draft Options and Justification Report* (2009b). The justification report provides substantial evidence to support the recommended thresholds and, therefore, the City of Benicia has determined they are appropriate for use in this analysis. To analyze the long-term operational impact of the Project, the estimated operational emissions for the Project were evaluated relative to the annual average Project baseline emissions (see Section 4.1.2.6, *Project Baseline*). The total Project-related net change in emissions is then compared to the BAAQMD significance thresholds to determine the significance of the impacts. The details of data, calculations, and assumptions used to determine Project-related emissions and associated public health risks that would be caused by the Project are included in Appendix E.

The analysis herein focuses on air quality impacts within the jurisdiction of the BAAQMD and to a lesser extent within the jurisdictions of air districts in the Sacramento Valley Air Basin (Sacramento Basin) that would be effected by rail emissions, including the Yolo-Solano Air Quality Management District (YSAQMD), the Sacramento Metropolitan Air Quality Management District (SMAQMD), and the Placer County Air Pollution Control District (PCAPCD). While the Project may have some air quality impacts outside these air district jurisdiction boundaries, these impacts are indirect and difficult to predict given the speculative nature of the exact rail routes that would be used to transport the crude oil to the Union Pacific's J.R. Davis Yard in Roseville (Roseville Yard), and are discussed in more general terms.

For impacts within the BAAQMD, the analysis follows the BAAQMD's 2012 "California Environmental Quality Act Air Quality Guidelines."

Project-related air quality impacts within the Sacramento Basin are addressed by air district boundary based on guidance provided by YSAQMD in "Handbook for Assessing and Mitigating Air Quality Impacts" (YSAQMD, 2007), SMAQMD in "CEQA Guide December 2009" (SMAQMD, 2014), and PCAPCD in "CEQA Air Quality Handbook" (PCAPCD, 2012).

4.1.4 Discussion of No Air Quality Impacts

For the reasons set forth below, the Project would not conflict with or obstruct implementation of the applicable air quality plan.

a) Conflict with or obstruct implementation of the applicable air quality plan.

The most recently adopted air quality plan for the San Francisco Bay Area is the *Bay Area 2010 Clean Air Plan* (2010 CAP). The 2010 CAP is an update to the BAAQMD 2005 Ozone Strategy to comply with State air quality planning requirements. The 2010 CAP also serves as a multi-pollutant air quality plan to protect public health and the climate. The 2010 CAP control strategy includes revised, updated, and new measures in the three traditional control measure categories, including stationary source measures, mobile source measures, and transportation control measures. In addition, the 2010 CAP identifies two new categories of control measures, including land use and local impact measures, and energy and climate measures (BAAQMD, 2010b).

In order to determine whether a project would conflict with, or obstruct implementation of, an air quality plan, the BAAQMD recommends that a lead agency consider three questions (BAAQMD, 2012). First, the lead agency should consider whether the project supports the three primary goals of the 2010 CAP: 1) attain air quality standards; 2) reduce population exposure and protect public health; and 3) reduce greenhouse gas emissions and protect the climate. The lead agency may consider a project to be consistent with the 2010 CAP if the project would not result in any significant and unavoidable air quality impacts (BAAQMD, 2012). Second, the lead agency should consider whether the project includes any applicable control measures set forth in the 2010 CAP. The lead agency may consider a project to be consistent with the 2010 CAP if the project incorporates all control measures that are applicable and feasible. Third, the lead agency should consider whether the project would disrupt or hinder implementation of any control measures set forth in the 2010 CAP. If not, the lead agency may consider a project to be consistent with the 2010 CAP.

With respect to the first question, as explained below, the Project's construction and operational emissions would not exceed the 2010 Thresholds; therefore, the Project would support the primary goals of the 2010 CAP. With respect to the second question, there are no 2010 CAP control measures applicable to the Project. Mitigation Measure 4.1-1 (see Impact 4.1-1a discussion, below) would ensure that BAAQMD basic construction control measures identified by BAAQMD would be implemented. With respect to the third question, the Project would not disrupt or hinder implementation of any control measures set forth in the 2010 CAP. Therefore, the Project would not conflict with, or obstruct implementation of, the 2010 CAP.

Because the crude by rail trains cross other air districts between Benicia and the Roseville rail yards, indirect emissions from Project-related locomotives were analyzed in the YSAQMD, SMAQMD, and PCAPCD. As is discussed in Section 4.1.5 b), significant impacts for NOx emissions from these locomotives were identified for both the YSAQMD and SMAQMD. Consequently, the Project would conflict with the each of these air districts air quality plans. See the Section 4.1.5 b) for additional information.

4.1.5 Discussion of Impacts and Mitigation Measures

b) Violate any air quality standard or contribute to an existing or projected air quality violation.

Impact 4.1-1a: Construction of the Project could contribute to an existing or projected air quality violation. (*Less than Significant with Mitigation*)

Based on the following, construction of the mitigated Project would not result in a violation of an air quality standard or contribute significantly to an existing or projected air quality violation. Therefore, the short-term construction impact would be less than significant with mitigation. However, long-term emissions that would be associated with the Project could contribute to air quality violations in the Sacramento Basin, which would be a significant impact.

Construction

The majority of Project-related exhaust emissions would be generated on-site due to the use of heavy-duty off-road equipment (such as excavators, graders, front loaders, dump trucks, cranes, and paving equipment) to relocate a portion of an existing spill containment berm, and to construct the proposed rail car unloading rack, unloading rail spurs, and ancillary facilities, such as an aboveground crude oil pipeline, spill containment structures, a firewater pipeline, groundwater wells, and a service road. Construction activities would occur each day with two 10-hour shifts, 7 days a week, for approximately 25 weeks. Exhaust emissions would also be generated by construction worker daily commutes and by heavy-duty diesel truck trips. It is assumed that up to 11,380 light-duty auto roundtrips would be required to transport workers to and from the site and up to 396 heavy-duty diesel truck roundtrips would be required to haul materials (e.g., concrete, asphalt) to the site over the entire construction period. Criteria pollutant and precursor exhaust emissions from construction equipment and vehicles would incrementally add to the regional atmospheric loading of these pollutants during construction of the Project.

Impacts related to the Project contributing to an existing or projected air quality violation are judged by comparing estimated direct and indirect Project exhaust emissions to the significance thresholds, which for short-term construction emissions are 54 pounds per day for reactive organic gases (ROG), nitrogen oxides (NO_X), and $PM_{2.5}$; and 82 pounds per day for PM_{10}. Only the exhaust portion of $PM_{2.5}$ and PM_{10} emissions are compared against the construction thresholds. BAAQMD recommends that analyses focus on implementation of dust control measures rather than comparing estimated levels of fugitive dust to a quantitative significance threshold. BAAQMD considers implementation of BAAQMD-recommended basic mitigation

measures for fugitive dust sufficient to ensure that construction-related fugitive dust is reduced to a less-than-significant level.

Table 4.1-3 shows the estimated total average daily exhaust emissions that would be associated with construction of the Project. As indicated in the table, the total average daily construction exhaust emissions would not exceed the BAAQMD's significance thresholds. Therefore, impacts that would be associated with construction-related exhaust emissions would be less than significant.

TABLE 4.1-3
AVERAGE DAILY CONSTRUCTION EXHAUST EMISSIONS

	Average Daily Emissions (lb/day)					
Sources	**ROG**	**CO**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Equipment Exhaust	6.96	26.6	49.7	0.06	2.56	2.35
On-site Vehicle Exhaust	0.18	1.63	0.79	0.00	3.57	0.38
Off-site Vehicle Exhaust	0.91	8.47	1.43	0.01	0.53	0.17
Fugitive ROG from Paving and Architectural Coatings	0.11	---	---	---	---	---
Total Emissions	8.17	36.7	51.9	0.08	6.65	2.91
Draft CEQA Threshold	54	None	54	None	82	54
Threshold Exceeded (Y/N)	No	---	No	---	No	No

SOURCE: ERM, 2013a, see Appendix E.1

In addition to exhaust emissions, emissions of fugitive dust would also be generated by Project construction activities associated with earth disturbance, travel on paved and unpaved roads, etc. With regard to fugitive dust emissions, the BAAQMD's *Revised Draft Options and Justification Report* recommends that lead agencies focus on implementation of dust control measures to ensure that impacts would be less than significant rather than comparing estimated levels of fugitive dust to quantitative significance thresholds. Therefore, BAAQMD basic control measures (BAAQMD, 2012), which are recommended for every construction project and contained in Mitigation Measure 4.1-1, would be implemented to ensure that impacts associated with fugitive dust emissions would be reduced to a less-than-significant level.

Mitigation Measure 4.1-1: Implement BAAQMD Basic Mitigation Measures. Valero and/or its construction contractors shall comply with the following applicable BAAQMD basic control measures during Project construction:

- All exposed dirt non-work surfaces (e.g., parking areas, staging areas, soil piles, and graded areas, and unpaved access roads) shall be watered two times a day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California Airborne Toxics Control Measure Tile 13, Section 2485 of California of Regulations). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign with the telephone number and person to contact at the City of Benicia regarding dust complaints shall be posted throughout construction. Valero and/or contractor shall respond and take corrective action within 48 hours of notification by the City. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

Significance after Mitigation: Less than significant.

Impact 4.1-1b: Operation of the Project could contribute to an existing or projected air quality violation. (*Significant and Unavoidable*)

Operations

The new unloading rack and associated piping that would be installed as part of the Project would generate fugitive ROG emissions. These emissions are the Project's only direct operational air quality emissions. The Project would also result in the generation of indirect operational emissions in the form of locomotive emissions from trains traveling to and from the Refinery. Project-related trains would generate locomotive emissions in the Bay Area Basin, the Sacramento Basin, and other locations in North America.

Direct Emissions. The equipment to be installed at the Refinery would generate approximately 1.88 tons per year of new fugitive ROG emissions from approximately 2,030 new flanges, connectors, valves, and pumps. In order to calculate the Project's *net* effect on air quality in the Bay Area Basin, however, one must take into account the reduction in maritime emissions that would occur if marine vessel trips to the Refinery were replaced with train trips. The Project would allow Valero to receive up to 70,000 barrels of crude oil per day by rail, thereby replacing delivery of the same amount by marine vessel. Using an average vessel capacity from the baseline period of 350,000 barrels, the Project would eliminate approximately 73 vessel trips per year (70,000 barrels per day x 365 days per year/350,000 capacity of one vessel). As shown in Table 4.1-5, the Project's 1.88 tons per year of new fugitive ROG emissions within the Bay Area Basin would be more than offset by reductions in maritime ROG emissions within the Bay Area Basin once crude oil deliveries by rail replace crude deliveries by ship.

The Project would not have any other direct operational impacts on air quality. The Project would not involve any physical modifications to the Refinery's existing equipment, or any changes in

Refinery throughput or the operation of the existing equipment. The Project does not involve any modifications to existing permits other than the inclusion of permits for the new equipment in the Refinery's Title V permit.

The Project would not result in any increases in emissions from crude oil processing. The Project would allow Valero to access North American crudes that, as of now, are not readily accessible in Benicia. The average weight and sulfur content of the crude oil blends processed at the Refinery, however, would remain the same. As explained above in Chapter 3, based on the optimal use of the Refinery's unique configuration, permit conditions, and operational constraints, Valero must blend crude feedstocks to a narrow range of weight and sulfur content before they can be processed into marketable products. Because the crude oil blends cannot become significantly heavier or lighter, nor contain significantly more sulfur, there would be no increase in processing emissions.

Nor would the Project cause any emissions increases from storage tanks. Currently, the Refinery stores crude oil delivered by ship and pipeline in eight existing storage tanks numbered 1701 through 1708. Crude oil delivered by rail would be stored in the same tanks. The tanks would not be modified, and would continue to be subject to the same throughput limits and other permit conditions.

Indirect Emissions. The Project would increase locomotive emissions in the Bay Area Basin, the Sacramento Basin, and other parts of North America along train routes to and from oil fields in Canada and/or the United States. These emissions would be generated by trains carrying crude oil to the Refinery, and returning to oil fields after making deliveries to the Refinery.

This analysis considers in detail Project-related locomotive emissions in the Bay Area Basin and the Sacramento Basin, and applies the relevant significance thresholds. The Bay Area Basin consists of the nine counties that surround the San Francisco Bay. Along the train route to and from the Refinery, the Bay Area Basin begins and ends at the border of Solano and Sacramento Counties. For purposes of calculating maritime emissions, this analysis assumes that the Basin extends westward to the Bar Pilot Station 11 nautical miles offshore. This approach is consistent with that taken by the BAAQMD in the past in connection with CEQA review of maritime emissions associated with other onshore projects (*See, e.g.* BAAQMD, 2011).

Impact Analysis. The analysis considers locomotive emissions in the Sacramento Basin because trains travelling to and from the Refinery would run between the BAAQMD border and the Roseville Yard. The Roseville Yard is in western Placer County, the furthest portion of the Sacramento Basin from the Refinery.

Tables 4.1-4 and 4.1-5 describe the relevant significance thresholds and the Project's net effect on air quality in the Bay Area Basin and the Sacramento Basin, respectively. The BAAQMD significance threshold for increases in ROG, NO_x, and $PM_{2.5}$ (from engine exhaust) is 10 tons per year. The BAAQMD significance threshold for increases in PM_{10} (from engine exhaust) is 15 tons per year. Significance thresholds have not been developed by BAAQMD for CO or SO_2 because the Bay Area has attained standards for these pollutants for a long period and it is not

foreseeable that land use development projects could result in exceedances of ambient air quality standards for these constituents (BAAQMD, 2009).

The applicable operational significance thresholds within the Sacramento Basin have been established by: YSAQMD for sources within Yolo County and the portion of Solano County not within the BAAQMD; SMAQMD for sources within Sacramento County, and the PCAPCD for sources within Placer County. The significance thresholds developed by these air districts were established based on substantial evidence to assess the significance of land use development projects within their respective jurisdictions. Although the land use development that would be associated with the Project would not be located within the jurisdictions of these Sacramento Basin air districts, for a conservative analysis, the City has elected to use these districts thresholds to determine the significance of the indirect emissions that would occur within their jurisdictions. The YSAQMD significance thresholds are 10 tons per year for ROG and NO_x, and 80 pounds per day for PM_{10}.The SMAQMD significance threshold for ROG and NO_x is 65 pounds per day and the PCAPCD significance threshold for ROG, NO_x, and PM_{10} is 85 pounds per day.

For impacts in both basins, the estimates of locomotive emissions assume two daily round-trips of 50-car trains traveling between the Roseville Yard and the Refinery. The estimates include emissions from three types of operations: (1) a small line haul on two miles of railroad within the Refinery with 50 rail cars per train; (2) a large line haul from Roseville to the Refinery with 50 rail cars per train. The large line haul emission estimates are based on the following approximate railroad lengths by air district, 22 miles within the BAAQMD, 32 miles within YSAQMD, 15.5 miles within the SMAQMD, and 2.5 miles within PCAPCD; and (3) switching at the Refinery and Roseville Yard with 25 rail cars per train.

Table 4.1-5 compares the Project's direct and indirect emissions within the Bay Area Basin with the Project's reduction of maritime emissions in the basin. The baseline for maritime emissions in the Bay Area Basin consists of the annual average emissions over the three-year baseline period ending in November 2012. (For additional information about the air quality baseline associated with the Project, refer to Section 4.1.2.6, *Project Baseline* and Appendix E.2.) The total amount of crude oil delivered by marine vessel during the baseline period was 93,361,985 barrels, which equates to an annual average of approximately 31,120,662 barrels.

The Project would replace most, but not all, of the maritime emissions associated with Refinery operations by eliminating the maritime delivery of up to 25,550,000 barrels of crude oil per year, or 70,000 barrels per day. Table 4.1-4 describes the total maritime emissions associated with the Refinery over the 3-year baseline period, the annual average emissions over the baseline period, and the estimated maritime emissions that would be displaced by the Project.

TABLE 4.1-4
BASELINE MARITIME EMISSIONS WITHIN THE BAY AREA AIR BASIN

Baseline Emissions	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Total Emissions over 3-Year Baseline Period (pounds)	37,882	671,162	78,161	195,822	26,172	24,849
Annual Average Emissions over Baseline Period (tons/year)	6.31	111.89	13.03	32.64	4.36	4.14
Estimated Maritime Emissions Displaced by Project (tons/year)	5.18	91.84	10.69	26.79	3.58	3.40

SOURCE: ERM, 2014a, see Appendix E.2

Taking into account the increase in locomotive emissions and the reduction in maritime emissions, the net effect of the Project would be to reduce air emissions within the Bay Area Basin. Table 4.1-5 summarizes the net emissions reductions. It should be noted that the emissions reductions presented in this table represent the maximum amount of reductions that would occur. If less than 70,000 barrels per day of crude oil would be transported by rail, an additional volume of crude oil equivalent to the difference would be delivered by marine vessel, resulting in proportionately less emissions reductions within the Bay Area Basin. Regardless, long-term operations of the Project would result in a beneficial impact to air quality in the BAAQMD as compared with the baseline. Therefore, the impact relative to the potential for the Project to contribute to an existing or projected air quality violation in the Bay Area Basin would be less than significant.

TABLE 4.1-5
ANNUAL NET OPERATIONAL EXHAUST EMISSIONS WITHIN THE BAY AREA AIR BASIN

	Project Emissions, Net Change from Baseline (tons/yr)					
Sources	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Unloading Rack and Pipeline Fugitive Components	1.88	---	---	---	---	---
Locomotives	1.70	33.04	5.6	0.02	0.83	0.81
Marine Vessels (Displaced Baseline)	-5.18	-91.84	-10.69	-26.79	-3.58	-3.40
Total Net Emissions	-1.61	-58.80	-5.09	-26.77	-2.75	-2.59
Significance Threshold	10	10	None	None	15	10
Threshold Exceeded (Y/N)	No	No	---	---	No	No

SOURCES: ERM, 2014a, 2013b, and 2013c; See Appendix Sections E.2 for baseline marine emissions, E.3 for locomotive emissions, and E.4 for unloading rack and pipeline fugitive components emissions.

With regard to emissions that would be generated within the Sacramento Basin, the Project-related increase in locomotive emissions would increase air pollutant emissions within each of the applicable air district jurisdictions. Unlike the Bay Area Basin, there are no marine vessel baseline emissions within the Sacramento Basin that would be displaced by the locomotive emissions. Table 4.1-6 summarizes the estimated locomotive emissions that would occur within the Sacramento Basin by air district. It should be noted that the emissions presented in this table

represent the maximum amount of emissions increases that would occur. If less than 70,000 barrels per day of crude oil would be transported by rail, the resultant locomotive pollutant emissions would be proportionately less. As indicated in Table 4.1-6, long-term operations of the Project would result in increased locomotive-related NO_x emissions that would exceed significance thresholds established by YSAQMD and SMAQMD. Therefore, the impact relative to the potential for the Project to contribute to an existing or projected air quality violation in these air districts is considered to be significant.

TABLE 4.1-6
ANNUAL OPERATIONAL EXHAUST EMISSIONS WITHIN THE SACRAMENTO VALLEY AIR BASIN

	Project Emissions					
Sources	**ROG**	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Yolo-Solano Air Quality Management District						
Locomotives (tons/yr)	1.48	31.16	6.14	0.02	0.83	0.81
Locomotives (lbs/day)	8.13	170.72	33.63	0.12	4.55	4.42
Significance Thresholds (tons/yr)	10	10	None	None	None	None
Significance Thresholds (lbs/yr)	None	None	None	None	80	None
Threshold Exceeded (Yes/No)	No	Yes	---	---	No	---
Sacramento Metropolitan Air Quality Management District						
Locomotives (lbs/day)	3.94	82.69	16.29	0.06	2.20	2.14
Significance Thresholds (lbs/day)	65	65	None	None	None	None
Threshold Exceeded (Yes/No)	No	Yes	---	---	No	---
Placer County Air Pollution Control District						
Locomotives (lbs/day)	3.38	57.91	8.34	0.03	1.34	1.33
Significance Thresholds (lbs/day)	82	82	None	None	82	None
Threshold Exceeded (Yes/No)	No	No	---	---	No	---

SOURCE: ESA, 2014, See Appendix E.5

Although a significant impact related to increased railroad emissions would occur in YSAQMD and SMAQMD, the locomotive activities associated with these emissions would be under the control of Union Pacific Railroad and locomotive emissions are regulated by the federal government. The City has no jurisdiction to impose any emission controls on the tanker car locomotives; therefore, there is no feasible mitigation available to reduce this significant impact to a less-than-significant level. The impact would be *significant and unavoidable*.

Mitigation Measure: None available.

Operations Outside the San Francisco Bay and Sacramento Basins

As explained above, if the Project were approved and constructed, Project-related trains would travel between oil field locations in North America and the Roseville Yard. These trains would cause an increase in locomotive emissions. These impacts can be described only in general terms,

however, because it is impossible to predict the routes that Project-related trains would take across North America with any degree of certainty. In both the short and the long term, Valero could obtain crude oil from oil fields in Louisiana, Texas, Oklahoma, North Dakota, and/or parts of western Canada. Any attempt to identify and quantify the impact of locomotive emissions associated with the Project on air quality in this vast region, without even knowing where the trains will come from, would be highly speculative.

The Project would also eliminate maritime emissions from ships traveling between the Refinery and oil field locations in Alaska, South America, the Middle East, and other parts of the world. Similarly, these emissions can be described only in general terms because it is impossible to identify and quantify emissions across the vast range of possible routes.

This analysis generally describes the net impact of the Project on air quality outside the boundaries of the Bay Area and Sacramento Basins by comparing locomotive emissions with emissions from marine vessels. First, the analysis identifies the relative rate of emissions for ships and trains, for each pollutant, based on a specified distance (1,000 miles) and a specified load (1 million barrels). The results are set forth in Table 4.1-7. For both locomotives and vessels, the emissions estimates are based on average emissions factors. Second, this analysis applies these emissions factors to a few scenarios that take into account the length of specified trips.

TABLE 4.1-7
EMISSIONS FACTORS COMPARISON FOR 1,000,000 BARRELS DELIVERED PER 1,000 MILES TRAVELLED OUTSIDE OF THE BAY AREA AND SACRAMENTO BASINS

Sources	tons per thousand miles hauled per million barrels delivered					
	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Locomotives – large line haul	0.91	19.1	3.75	0.01	0.51	0.49
Marine Vessel Main Engines	0.65	11.7	0.97	1.62	0.32	0.32

SOURCE: ESA 2014; See Appendix E.5

As Table 4.1-7 shows, locomotives generate more emissions than marine vessels per mile, per 1,000,000 barrels of crude oil delivered each year, of ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$. The reverse is true, however, for SO_x. Even with these emissions factors, there is no way to estimate with any certainty the net effect of the Project on areas outside of the Bay Area and Sacramento Basins because there is no way to predict the length of locomotive trips that could occur if the Project were approved, or the length of marine vessel trips that would occur if the Project were not approved.

For purposes of a general analysis, it is useful to consider several examples. Currently, vessels carrying crude oil from Alaska to the Refinery travel approximately 2,000 miles (from the terminus of the TransAlaska pipeline), vessels carrying crude oil from South America to the Refinery travel roughly 4,000-miles, and vessels carrying crude oil from the Middle East to the Refinery travel roughly 8,500 miles. Using a weighted-average composite distance for crude oil

delivered to the Refinery from source countries of- origin during the baseline period, Valero has estimated that the average maritime distance travelled from source to the Refinery was 7,305 miles. By comparison, a train carrying North American crude oil to the Refinery could travel roughly 1,500 miles. Based on these distances, Table 4.1-8 generally compares baseline emissions from marine vessels traveling outside of the Bay Area and Sacramento Basins with locomotive emissions from trains traveling outside of the Bay Area and Sacramento Basins.

TABLE 4.1-8
EXAMPLES OF EMISSIONS OUTSIDE OF THE BAY AREA AND SACRAMENTO BASINS

Emission Sources for Example Crude Oil Origins	Example One-Way Distance (miles)	Tons per 25,550,000 Barrels Delivered per Year					
		ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Baseline Marine Vessel Main Engines - Alaskan Origin*	2,000	66.4	1,194.6	99.6	165.9	33.2	33.2
Baseline Marine Vessel Main Engines - South American Origin	4,000	132.7	2,389.2	199.1	331.8	66.4	66.4
Baseline Marine Vessel Main Engines - Middle East Origin	8,500	282.1	5,077.0	423.1	705.1	141.0	141.0
Baseline Marine Vessel Main Engines - Composite Origin	7,305	242.4	4,363.2	363.6	606.0	121.2	121.2
Project Locomotives - large line haul from North American Origin	1,500	69.6	1,460.5	287.7	1.0	38.9	37.8
Net Emissions with Alaskan Origin Baseline	---	3.2	265.9	188.2	-164.9	5.8	-4.6
Net Emissions with South American Origin Baseline	---	-63.19	-928.71	88.63	-330.81	-27.43	-28.59
Net Emissions with Middle East Origin Baseline	---	-212.51	-3,616.52	-135.35	-704.11	-102.10	-103.25
Net Emissions with Composite Baseline Origin Baseline	---	-172.86	-2,902.76	-75.87	-604.98	-82.27	-83.43

* This estimate excludes emissions from operation of the pipeline from the North Slope to the marine terminal.

SOURCE: ESA, 2014; See Appendix E.5

As indicated in Table 4.1-8, net emissions that would be generated outside of the Bay Area and Sacramento Basins are highly dependent on the origin of the crude oil source. However, due to the uncertainty of the origins of the crude oil that would be delivered by rail as well as the origins of the crude oil that would be displaced, the Project emissions data presented in Table 4.1-8 are disclosed for comparison purposes only and cannot be relied upon as the basis for any significance determinations.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

Impact 4.1-2: The Project could result in a cumulatively considerable net increase in criteria pollutant and ozone precursor emissions. (*Significant and Unavoidable*)

Based on BAAQMD guidance, if a project would result in an increase in ROG, NO_x, PM_{10}, or $PM_{2.5}$ of more than its respective average daily mass significance thresholds, then it would also be considered to contribute considerably to a significant cumulative impact. In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable (BAAQMD, 2009b). If a project would exceed the identified significance thresholds, its emissions would be cumulatively considerable, and if a project would not exceed the significance thresholds, its emissions would not be cumulatively considerable. As presented under Impact 4.1-1a above, short-term construction and long-term operational locomotive emissions would not exceed BAAQMD significance thresholds, and implementation of Mitigation Measure 4.1-1 would ensure that impacts associated with construction-related fugitive dust emissions would be reduced to a less-than-significant level. Therefore, the Project would not be cumulatively considerable with respect to the generation of criteria pollutants and ozone precursors in the Bay Area Basin and the associated cumulative impact would be less than significant.

With regard to emissions of the Project generated within the Sacramento Basin, the YSAQMD and SMAQMD consider projects to have a significant cumulative impact if the project would result in individual emissions within their air districts that would exceed their thresholds of significance. If emissions in these districts would be below the thresholds, the Project would not be considered cumulatively considerable, and would result in a less than significant cumulative impact (YSAQMD, 2007; SMAQMD, 2014). For projects in Placer County, the PCAPCD recommends the use of a ROG and NO_x cumulative impact threshold of 10 pounds per day (PCAPCD, 2012). As discussed under Impact 4.1-1b above, Project-related emissions in the YSAQMD and SMAQMD would exceed the incremental project significance thresholds for NO_x and NO_x emissions generated in Placer County would exceed the cumulative 10 pounds per day significance threshold. Therefore, implementation of the Project would result in a cumulatively considerable increase of NO_x emissions in YSAQMD, SMAQMD, and PCAPCD, and the associated cumulative impact would be *significant and unavoidable*.

Mitigation: None available.

d) Expose sensitive receptors to substantial pollutant concentrations.

Impact 4.1-3: The Project could expose sensitive receptors to substantial pollutant concentrations. (*Less than Significant*)

The BAAQMD recommends that lead agencies assess the incremental toxic air contaminant (TAC) exposure risk to all sensitive receptors to determine the maximum exposure for the Project. Construction of the Project would generate diesel particulate matter (DPM), which is considered to be a TAC, from the use of diesel off-road equipment. For short-term construction emissions, the BAAQMD recommends that construction health risks be evaluated if there are sensitive receptors located within 1,000 feet of the construction site. All project-related construction sources would be temporary (i.e., 25 weeks) and would be over 2,000 feet from the nearest sensitive land uses, which are residences off Lansing Circle. Therefore, Project construction would not result in a significant health risk.

Long-term operations associated with the Project would generate TAC emissions including benzene, ethylbenzene, toluene, xylenes, hexane, and hydrogen sulfide from fugitive equipment leaks (rectangular area sources), DPM from locomotive idling (point sources), locomotive transit (line of volume sources), and locomotive switching (line of volume sources). The Applicant-provided detailed health risk assessment analysis for these TAC emissions and sources is summarized in Table 4.1-9. In addition to the assessment of health risks from toxics, $PM_{2.5}$, which comprises the majority of DPM, was modeled to evaluate the potential for elevated concentrations from the locomotives.

Locomotive emissions during transit were modeled over a track length of 4 miles out from the proposed unloading rack. The modeling domain around the Refinery was extended out to approximately 4 miles because this is the distance beyond where there would be minimal impacts from equipment fugitive emissions and train idling emissions. There are no residences in the immediate vicinity of the 4 miles of modeled train route, as residences in Benicia are located more than 1,000 feet away from the locomotive activity; however, in the City of Fairfield there are residences as close as approximately 50 feet from the train route. Additional modeling was conducted to evaluate the exposure from train travel to these residential receptors. In addition, Armijo High School is adjacent to the train tracks in Fairfield; a receptor was modeled there as well. The results of the modeling (Table 4.1-9 below) show that one of these residences, just south of Railroad Avenue, is the Maximum Exposed Individual Residential (MEIR).

Locomotive switching emissions were modeled over a distance equivalent to approximately two train lengths (i.e., 3,300 feet) from the unloading rack. Because the portion of the track within the Refinery would be used for both switching and transit, emissions from the two activities were added and assigned to the common volume sources. Five years of BAAQMD meteorological data from the “Valero Admin” meteorological site and digital elevation model files were reviewed to identify elevations for sources, receptors, and buildings/structures were used for the analysis in Benicia. The modeling analysis conducted to model the locomotives that would travel through Fairfield incorporated a string of volume sources the length of a 50-car train. Residences in Benicia near the Refinery are much farther away from the railroad compared to the residences in

TABLE 4.1-9
MAXIMUM CANCER AND NONCANCER RISK IN THE BAY AREA BASIN

Type of Estimated Health Impact	Cancer Risk per million (Receptor Location)	Chronic Hazard Index (Receptor Location)	Acute Hazard Index (Receptor Location)	$PM_{2.5}$ Concentration (ug/m^3) (Receptor Location)
Maximum Exposed Individual Residential (MEIR)	7.99 Worst case risk at 160 feet southeast of train tracks in Fairfield (585058E, 4234218N)	0.0003 Worst case risk at 160 feet southeast of train tracks in Fairfield (585058E, 4234218N)	0.0030 Near E. 6th Street (575694E, 4212345N)	0.0157 Worst case Conc. at 160 feet southeast of train tracks in Fair field (585058E, 4234218N)
Maximum Exposed Individual Worker (MEIW)	4.45 (576144E, 4214145N)	0.014 (576144E, 4214145N)	0.0113 (576094E, 4212895N)	N/A
Maximum Sensitive Receptor (MSR)	0.28 Day Care Center (574594E, 4212895N)	0.0005 Day Care Center (574594E, 4212895N)	0.0004 Elementary School (574900E, 4212500N)	0.00244 Day Care Center (574594E, 4212895N)
Significance Threshold	10	1	1	0.3 ug/m^3
Significant Impact?	No	No	No	No

SOURCE: ERM, 2014b and Appendix E.6

Fairfield; therefore, the MEIR was modeled in Fairfield using a five-year meteorological dataset from the Suisun Sewage Treatment Plant, adjacent to Fairfield. Risk was directly modeled using the ISCST3 dispersion model and Office of Environmental Health Hazard Assessment unit risk factors for cancer risk and reference exposure levels for non-cancer health effects, as the exposure pathway for all the toxic air contaminants emitted from the sources is inhalation only (ERM, 2014b). The above methodology is described in detail in Appendix E.6.

The dose to which receptors are exposed is the primary factor affecting health risk from exposure to TACs. Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. MEIR cancer risk is modeled for a 70-year period and multiplied by the BAAQMD-recommended age specific factor of 1.7. The maximum exposed individual worker (MEIW) was modeled using a 70-year residential cancer risk multiplied by an adjustment factor of 0.2199 to convert from residential risk to worker cancer risk. The maximum sensitive receptor (MSR) risk is the modeled 70-year residential risk multiplied by 9 years times the age specific factor of 3 and divided by 70 years. As shown in Table 4.1-9, the cancer risks at the MEIR, MEIW, and MSR are below 10 in a million. The chronic hazard index and the acute hazard index at the MEIR, MEIW, and MSR are also well below 1.0. In addition, the modeled $PM_{2.5}$ concentrations at the MEIR and MSR are well below 0.3 ug/m^3. Therefore, the impact related to exposing sensitive receptors in the Bay Area Basin to substantial pollutant concentrations would be less than significant.

A modeling assessment of risk and $PM_{2.5}$ concentrations in the Sacramento Basin near tracks along the route to and from Roseville was also conducted for residential receptors in the YSAQMD, SMAQMD, and PCAPCD. The results of the analysis are shown in Table 4.1-10, below. The analysis methodology is identical to that described for the Fairfield receptors above, except meteorological data from the Sacramento Executive Airport were used for the modeling analysis. Data from this station are more representative of the Sacramento Basin than that used for Benicia or Fairfield. As indicated in Table 4.1-10, the impacts associated with Project-related incremental risk and $PM_{2.5}$ concentrations relative to locomotive emissions at residences in these air districts would less than significant.

TABLE 4.1-10
MAXIMUM CANCER AND NONCANCER RISK IN THE SACRAMENTO BASIN

Location of Estimated Health Impact	Cancer Risk* (per million)	Chronic Hazard Index	$PM_{2.5}$ Concentration (ug/m^3)
Yolo-Solano Air Quality Management District (Dixon) 603050 E, 4256574 N	3.9	0.002	0.008
Sacramento Metropolitan Air Quality Management District (Sacramento) 643028 E, 4283130 N	4.4	0.002	0.009
Placer County Air Pollution Control District (Roseville) 648387 E, 4290123 N	4.6	0.002	0.008
Significance Threshold	10	1	0.3 ug/m^3
Significant Impact?	No	No	No

SOURCE: ERM, 2014b and Appendix E.6

Mitigation: No mitigation required.

---

e) Create objectionable odors affecting a substantial number of people.

Impact 4.1-4: The Project could generate objectionable odors affecting a substantial number of people. (*Less than Significant*)

Project construction and operations would include diesel exhaust sources, such as off-road construction equipment and generators and train locomotives that could result in the creation of objectionable odors. However, these emissions would be temporary and/or intermittent in nature and the closest sensitive receptors to the Project site are residences that would be at distances of over 2,000 feet, thus odor impacts associated with diesel combustion during Project construction activities and operations would be less than significant. This impact would be less than significant.

Mitigation: No mitigation required.

4.2 Biological Resources

4.2.1 Introduction

This section describes the biological resources occurring in the Project area, assesses the potential for the Project to affect sensitive biological resources, and proposes mitigation measures to avoid and minimize potentially significant impacts. The Project area includes the Project construction footprint as well as surrounding areas with biological resources that have the potential to experience secondary environmental impacts (e.g., noise and visual disturbance, light pollution, sediment loading, etc.). This generally limits the discussion to the Project construction footprint as the direct impact area and adjacent Sulphur Springs Creek as the indirect impact area. However, in response to public concerns over the potential biological consequences of an oil spill in the Suisun Marsh, the discussion includes an overview of biological resources in the Suisun Marsh. To differentiate among resources that occur or potentially occur in the Project construction footprint and its localized surroundings versus those that occur or potentially occur in the Suisun Marsh, the term Project Study Area is used to refer to the former and Suisun Marsh is used to refer to the latter. A brief overview of biological resources along the railroad alignment between the Suisun Marsh and the City of Roseville is also provided in Section 4.2.2.1, *Regional Setting*, but is not the focus of the section. The evaluation of biological resources is based on a site visit of the Project Study Area; interpretation of satellite imagery; a review of vegetation communities, wildlife habitats, and jurisdictional "waters of the United States" that occur or potentially occur in the Project area (CDFG, 2010; CDFG, 2011; CDFW, 2013a, 2013b, 2013c; CNPS, 2013);[1] and a review of published environmental documents for the vicinity (City of Benicia, 2002; Monk and Associates, 2013).

4.2.2 Setting

4.2.2.1 Regional Setting

The Refinery is located in southern Solano County, in a low range of coastal hills along the northern edge of the Suisun Bay, within the Bay Area-Delta Bioregion (Welsh, 1994). This bioregion extends from the Pacific Ocean east to the central valley then roughly south to San Joaquin County and north to Mendocino County, and includes the Suisun Marsh. Much of the railroad alignment from the city of Sacramento to the Refinery also occurs within the Bay-Delta Bioregion. The railroad alignment between the cities of Sacramento and Roseville is within the Sacramento Valley Bioregion, differing from the Bay Area-Delta Bioregion in having less rainfall, different soils, and wetlands as a secondary, rather than primary, vegetation community, among other differences. Additionally, while some plant and animal species occur across bioregions, each bioregion supports its own suite of special-status species.[2]

---

1 The California Department of Fish and Game (CDFG) changed its name on January 1, 2013 to the California Department of Fish and Wildlife (CDFW). In this document, references to literature published by CDFW prior to Jan. 1, 2013 are cited as 'CDFG, [year]'. The agency is otherwise referred to by its new name, CDFW.

2 For the purposes of this analysis, the term "special-status" species includes those species that are listed or proposed for listing by the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and/or the

Dominant vegetation communities in the Bay-Delta Bioregion are tule marsh, California prairie, riparian forest, coastal prairie-scrub mosaic, and coastal salt marsh (Welsh, 1994) corresponding to the wildlife habitat types[3] of fresh[water] emergent wetland, perennial grassland, saline emergent wetland, coastal scrub, valley oak woodland, coastal oak woodland, annual grassland, and estuarine. Examples of wildlife species in this bioregion are Pacific sturgeon (*Acipenser transmontanus*), striped bass (*Morone saxatilis*), Delta smelt (*Hypomesus transpacificus*), California red-legged frog (*Rana draytonii*), giant garter snake (*Thamnophis gigas*), silvery legless lizard (*Anniella pulchra pulchra*), California black rail (*Laterallus jamaicensis coturniculus*), California clapper rail (*Rallus longirostris obsoletus*), western meadowlark (*Sturnella neglecta*), loggerhead shrike (*Lanius ludovicianus*), salt marsh harvest mouse (*Reithrodontomys raviventris*), mink (*Neovision vison*), river otter (*Lontra canadensis*), and beaver (*Castor canadensis*).

Dominant vegetation communities in the Sacramento Valley Bioregion are California prairie, blue oak/gray pine forest, and riparian forest (Welsh, 1994) corresponding to the wildlife habitat types of annual grassland, blue oak/gray pine, valley oak woodland, and valley foothill riparian. Examples of wildlife species in this bioregion are California red-legged frog, foothill yellow-legged frog (*Rana boylii*), giant garter snake, yellow-billed magpie (*Pica nuttallii*), tricolored blackbird (*Agelaius tricolor*), yellow-billed cuckoo (*Coccyzus americanus*), California kangaroo rat (*Dipodomys californicus*), and beaver.

Suisun Marsh

Suisun Marsh is located in southern Solano County within an area bounded by the Sacramento-San Joaquin Delta on the east, Suisun Bay on the south, Interstate 680 on the west, and State Route 12 on the north. Suisun Marsh is the largest contiguous brackish water marsh remaining on the west coast of North America and is a critical part of the San Francisco Bay-Delta estuary ecosystem (DWR, 2013): it is 116,000 acres in size and comprises 52,000 acres of managed wetlands, 27,700 acres of upland grasses, 6,300 acres of tidal wetlands, and 30,000 acres of bays and sloughs. Suisun Marsh encompasses more than 10% of California's remaining natural wetlands and serves as the resting and feeding ground for thousands of waterfowl migrating on the Pacific Flyway. Additionally, the Marsh provides essential habitat for more than 221 bird species, 45 animal species, 16 different reptilian and amphibian species, and more than 40 fish species. Suisun Marsh supports 80% of the state's commercial salmon fishery by providing important tidal rearing areas for juvenile fish. The Marsh contains the Grizzly Island Wildlife Area.

California Department of Fish and Wildlife (CDFW) and receive specific protection defined in federal or state endangered species legislation, as well as species that are not formally listed as Threatened or Endangered but are designated as "Rare" or "Sensitive" on the basis of adopted policies and expertise of State resource agencies or organizations, or local agencies such as counties, cities, and special districts and protected under Section 15380(b) of the California Environmental Quality Act (CEQA) Guidelines. Principal sources for these designations are CDFW's Special Plant and Animal Lists (CDFG, 2010; CDFG, 2011; CDFW, 2013a; CDFW, 2013b; CDFW 2013c) and NMFS Southwest Regional Office's Protected Resources information (NMFS, 2013).

3 California Wildlife Habitat Relationships (CWHR) is a comprehensive information system for terrestrial vertebrates and their habitats in California, which uses a standardized habitat classification scheme for California containing 59 habitat types developed by Mayer and Laudenslayer (1988).

Activities and resource uses in the Suisun Marsh are guided by a variety of land use plans described in Section 4.2.2.3, Regulatory Setting, and in Section 4.9, *Land Use*.

4.2.2.2 Project Setting

Refinery Property

The Refinery property is approximately 880 acres. The property is heavily developed on the eastern half with the Refinery's operational facilities. The western half is mostly undeveloped, totaling approximately 550 acres and supporting annual grasslands, a lesser amount of coyote brush scrub, and a small amount of freshwater emergent wetlands and riparian corridors. Sulphur Springs Creek flows adjacent to the eastern boundary but is not part of the Refinery property. A Refinery wastewater treatment plant outfall connects the Refinery to the Suisun Bay. The following vegetation communities occur on the Refinery property (annual grasslands, coyote brush scrub, freshwater emergent wetlands, or riparian corridors), though no elements of the Project are proposed within these vegetation communities, and no Project elements involve the treatment plant outfall that connects the Refinery to Suisun Bay.

Annual Grasslands

Annual grasslands within the Refinery property are dominated by wild oats (*Avena* sp.), brome (*Bromus* sp.), and fescues (*Festuca* sp.), while forbs such as Italian thistle (*Carduus pycnocephalus*), wild radish (*Raphanus sativus*), and anise (*Anethum graveolens*) are intermixed (City of Benicia, 2002). Other ruderal and aggressive invasive species present are fennel (*Foeniculum vulgare*) and French broom (*Genista monspessulana*), while native species observed in the grasslands include lupine (*Lupinus* sp.), blue dick (*Brodiaea pulchella*) and California poppy (*Eschscholzia californica*) (City of Benicia, 2002). Annual grasslands would not be affected by the Project.

Coyote Brush Scrub

Coyote brush scrub was not described in previous environmental documents but can be observed in satellite imagery on north-facing hillslopes within the Refinery property. Some coyote brush associations are of high priority for inventory by the California Department of Fish and Wildlife (CDFW) (CDFG, 2010). Species that may use coyote brush scrub within the Refinery property are northern alligator lizard (*Elgaria coerulea*), California quail (*Callipepla californica*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), brush rabbit (*Sylvilagus bachmani*), and gray fox (*Urocyon cinereoargenteus*). Coyote brush scrub would not be impacted by the Project.

Freshwater Emergent Wetlands

Freshwater emergent wetlands can occur in or adjacent to the streambeds of several ephemeral or intermittent creeks traversing the Refinery property, and in conjunction with Sulphur Springs Creek, which supports the growth of sedges (*Carex* sp.) and rushes common to slow-moving waterways. Species that may use freshwater emergent wetlands within the Refinery property are California toad (*Anaxyrus boreas halophilus*), California red-legged frog, Sierran treefrog (*Pseudacris sierra*), western (=Pacific) pond turtle (*Actinemys marmorata*), and common garter

snake (*Thamnophis sirtalis*). Suisun song sparrow (*Melospiza melodia maxillaris*), San Pablo song sparrow (*M. m. samuelis*), and other marsh birds may forage or nest in freshwater emergent vegetation. Freshwater emergent wetlands would not be impacted by the Project.

Riparian

Riparian zones include Sulphur Springs Creek and other drainage swales within the Refinery with riparian overstory trees including coast live oak (*Quercus agrifolia*), willow (*Salix* spp.), and coyote brush (*Baccharis pilularis*), with an understory of poison oak (*Toxicodendron diversiloba*) and blackberry (*Rubus* sp.). Wildlife species that may use the Sulphur Springs Creek riparian corridor include California toad, California red-legged frog, Sierran treefrog, western (=Pacific) pond turtle, common garter snake, Suisun and San Pablo song sparrows and a variety of more common birds, opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), gray fox, and red fox (*Vulpes vulpes*). Nesting birds may use the riparian corridor during the breeding season. Riparian zones would not be impacted by the Project, though potential secondary impacts to wildlife species using the Sulphur Springs Creek riparian zone as a movement corridor or nesting area are assessed in the species impact discussion.

Project Construction Footprint

Developed

The Project construction footprint is entirely contained within developed areas of the existing Refinery. These areas lack vegetation and consist only of industrial structures, paved roadways, and compacted dirt and graveled surfaces. The area has little biological value and provides no food or cover for most species. Pallid bats (*Antrozous pallidus*), Townsend's big-eared bats (*Corynorhinus townsendii*), big brown bats (*Eptesicus fuscus*), California myotis (*Myotis californicus*), and a few other bat species will sometimes roost in industrial buildings; raptors such as barn owls (*Tytus alba*) and peregrine falcon (*Falco peregrinus*) will sometimes nest inside or on the exterior ledges of industrial buildings; and ground-nesting birds such as killdeer (*Charadrius vociferous*) will sometimes nest on the margins of industrial roads, especially where the roads are graveled and infrequently traveled. Operational traffic volume on Refinery roads is likely to deter any potential use by ground-nesting birds. No raptors or bats are known to use Refinery structures, and the Project would not impact Refinery structures.

Special-Status Species

A variety of special-status natural communities, plants, and wildlife species have recently or historically occurred in the Project Study Area and Suisun Marsh. Table 4.2-1 lists all the plants and animals documented by the California Natural Diversity Database (CNDDB) (CDFW, 2013) and California Native Plant Society (CNPS) (CNPS, 2013) in the Benicia U.S. Geological Survey 7.5-minute quadrangle where the Refinery is located or in the surrounding eight quadrangles

TABLE 4.2-1
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
FEDERAL AND STATE LISTED OR PROPOSED FOR LISTING			
ANIMALS			
Invertebrates			
Conservancy fairy shrimp *Branchinecta conservatio*	FE/ --	Vernal pools and swales.	Project Study Area: Absent. Suisun Marsh: Present. Occurs at two locations in northeast Suisun Marsh, at least 13 miles from the Project Study Area and 3 miles from the railroad.
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/ --	Vernal pools and swales, seasonal depressions.	Project Study Area: Absent. Suisun Marsh: Present. Occurs at two locations in northeast Suisun Marsh, at least 13 miles from the Project Study Area and 3 miles from the railroad.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT/ --	Host plant is the elderberry (*Sambucus* species), which usually grows in riparian areas but sometimes in grasslands.	Project Study Area: Absent. Suisun Marsh: Absent. There is only 1 record in the surrounding 10 quads, 11 miles northeast of the Project Study Area near Rockville.
Delta green ground beetle *Elaphrus viridis*	FT/ --	Vernal pools, seasonal wetlands.	Project Study Area: Absent. Suisun Marsh: Absent. Occurs only in Solano County. Only 2 records in surrounding 10 quads, in grasslands northeast of Suisun Marsh, at least 18 miles from the Project Study Area and 5 miles from the railroad.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE/ --	Vernal pools and swales.	Project Study Area: Absent. Suisun Marsh: Present. Occurs at four locations in northeast Suisun Marsh and beyond, at least 13 miles from the Project Study Area and 3 miles from the railroad.
Callippe silverspot butterfly *Speyeria callippe callippe*	FE/ --	Host plant is the yellow pansy (*Viola pedunculata*), which grows in grasslands.	Project Study Area: Absent. Suisun Marsh: Unlikely. Only 1 record in surrounding 10 quads, from the Cordelia Hills.
California freshwater shrimp *Syncaris pacifica*	FE/ SE	Low-elevation, low-gradient perennial freshwater streams in Sonoma, Marin, and Napa Counties.	Project Study Area: Absent. Suisun Marsh: Absent. Does not occur in Solano County. Its range is limited to Marin, Sonoma, and Napa counties.

[4] Statements regarding the potential for species to occur in Sulphur Springs Creek (a component of the Project Study Area) do not extend to plants because they would not experience secondary disturbance-related impacts (e.g., noise, visual) from the project.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
FEDERAL AND STATE LISTED OR PROPOSED FOR LISTING (cont.)			
Fish			
Delta smelt *Hypomesus transpacificus*	FT/ SE	Freshwater-saltwater mixing zone. Tolerant of a wide range of salinity but sensitive to other environmental changes.	Project Study Area: Absent. Suisun Marsh: Present. Distributed from San Francisco Estuary in the west, to the confluence of the Sacramento and Feather Rivers in the north, and to the disjunction of Old and San Joaquin rivers in the south. Found seasonally throughout Suisun marsh in small numbers.
Steelhead, Central Valley DPS *Oncorhynchus mykiss irideus*	FT/ --	Larger rivers serve as migration pathways for adults; juveniles rear in smaller tributaries.	Project Study Area: Absent. Suisun Marsh: Present. Adults migrate through Suisun Bay. Juveniles enter Suisun Marsh at a smolt stage and likely utilize the marsh for foraging, rearing, and migration.
Steelhead, Central California Coast DPS *Oncorhynchus mykissirideus*	FT/ --	Larger rivers serve as migration pathways for adults; juveniles rear in smaller tributaries.	Project Study Area: Absent. Suisun Marsh: Present. The Suisun Marsh is the easternmost extent of this DPS's range. Spawns in tributary streams including Suisun Creek, Green Valley Creek, and Red Top Creek.
Longfin smelt *Spirinchus thaleichthys*	FT/ --	Estuaries and near-coastal waters from Monterey Bay to the Smith River.	Project Study Area: Absent. Suisun Marsh: Present. Can occur in Suisun Marsh year-round, but use it mostly during the larval stage when brackish waters serve as nurseries.
Amphibians			
California tiger salamander *Ambystoma californiense*	FT/ ST	Aestivation sites occur in grasslands; breed in fresh emergent and seasonal wetlands, and slow-moving or receding streams. Needs 3-6 month hydroperiod to complete metamorphosis.	Project Study Area: Absent. Suisun Marsh: Present. Present in northeast Suisun Marsh (Portrero Hills), at least 15 miles from the Project Study Area and 3 miles from the railroad.
California red-legged frog *Rana draytonii*	FT/SSC	Breeds in fresh emergent and seasonal wetlands, and slow-moving streams. Aestivation habitat includes oak woodlands and grasslands.	Project Study Area: Unlikely. Suisun Marsh: Absent. This species occurs in grasslands in Solano County, but no suitable habitat is present in the project construction footprint. Sulphur Springs Creek and small tributaries through other areas of the Refinery could potentially provide movement corridors for the species.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
FEDERAL AND STATE LISTED OR PROPOSED FOR LISTING (cont.)			
Reptiles			
Alameda whipsnake *Masticophis lateralis euryxanthus*	FT/ ST	Primarily associated with scrub and chapparal habitat. Require open areas to maintain optimal body temperature.	Project Study Area: Absent. Suisun Marsh: Absent. The species does not occur in Solano County. Its range is limited to Contra Costa and Alameda Counties.
Birds			
Swainson's hawk *Buteo swainsoni*	--/CT	Breeds in grasslands with scattered trees, in riparian areas, and savannahs.	Project Study Area: Absent. Suisun Marsh: Low to moderate. Only 1 nest location is documented in Solano County, at least 9 miles from the Project Study Area and 3 miles from the railroad. Nest locations could occur in suitable habitat along the railroad.
Western snowy plover *Charadrius alexandrinus nivosus*	FT/--	Inland nests occur on salt pond levees and other open areas with sandy substrate and sparse vegetation.	Project Study Area: Absent. Suisun Marsh: Absent. No documented occurrences in Solano County, the Suisun Marsh, or along the railroad. Only records in the surrounding 10 quads are in the Napa Salt Marsh Restoration Area, at least 13 miles west of the Project Study Area.
Bald eagle *Haliaeetus leucocephalus*	--/ SE	Breeds near aquatic features such as coastlines, rivers, and lake. Typically requires mature trees for nesting.	Project Study Area: Absent. Suisun Marsh: Unlikely. No nests are documented in the surrounding 10 quads, except at San Pablo Reservoir in Contra Costa County.
California black rail *Laterallus jamaicensis coturniculus*	--/ ST	Nests and forages in tidal emergent wetland with pickleweed.	Project Study Area: Absent. Suisun Marsh: Present. Multiple records from salt marshes in North San Pablo and Suisun Bays, where the breeding population occurs. Documented from marshes along the Suisun Bay approximately 1.5 miles from the Project Study Area. Also occurs in Suisun Marsh.
California clapper rail *Rallus longirostris obsoletus*	FE/ SE	Nests and forages in emergent wetlands with pickleweed, cordgrass, and bulrush.	Project Study Area: Absent. Suisun Marsh: Present. Multiple records from salt marshes in North San Pablo and Suisun Bays. Documented from marshes along the Suisun Bay approximately 1.5 miles from the Project Study Area. Also occurs in Suisun Marsh.
Bank swallow *Riparia riparia*	--/ ST	Low areas along lakes, rivers, streams, coastlines. Bluffs or eroding banks, sand and gravel quarries, road cuts.	Project Study Area: Absent. Suisun Marsh: Unlikely. There is only 1 documented occurrence in the surrounding 10 quads, along Sonoma Creek in the town of Napa at least 17 miles from the Project Study Area.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
FEDERAL AND STATE LISTED OR PROPOSED FOR LISTING (cont.)			
Mammals			
Salt marsh harvest mouse *Reithrodontomys raviventris*	FE/ SE	Saline emergent marshlands with dense pickleweed. Will forage in adjacent grasslands.	Project Study Area: Absent. Suisun Marsh: Present. Multiple records from salt marshes in North San Pablo and Suisun Bays. Documented from marshes along the Suisun Bay approximately 1.5 miles from the Project Study Area. Also occurs in Suisun Marsh.
Plants			
Pallid manzanita *Arctostaphylos pallida*	FT/ SE/ 1B.1	Shale, sandy, or gravelly substrate; forests, chaparral, cismontane woodland, and coastal scrub.	Project Study Area: Absent. Suisun Marsh: Absent. Range is limited to hills just east of San Francisco Bay.
Tiburon paintbrush *Catilleja affinis* var. *neglecta*	FE/ ST/ 1B.2	Valley and foothill grassland in serpentine soils. Rocky serpentine endemic.	Project Study Area: Absent. Suisun Marsh: Absent. Known from only 9 occurrences in Marin, Napa, and Santa Clara Counties. Documented in American Canyon at least 7.5 miles northwest from Project Study Area.
Soft bird's beak *Chloropyron molle* spp. *molle*	FE/ Rare/ 1B.2	Heavy clay soils of coastal salt or brackish marshes of northern San Francisco Bay.	Project Study Area: Absent. Suisun Marsh: Present. Documented in north Suisun Marsh at least 10 miles from the Project Study Area and 2 miles from the railroad.
Suisun thistle *Cirsium hydrophilum* var. *hydrophilum*	FE/--/ 1B.1	Salt marshes and swamps.	Project Study Area: Absent. Suisun Marsh: Present. Documented from central and northern Suisun Marsh at least 10 miles from the Project Study Area. Nearest record in Suisun Marsh is 0.2 mile east of railroad near Ledgewood Creek and Paytonia Slough.
Santa Cruz tarplant *Holocarpha macradenia*	FT/ SE/ 1B.1	Heavy soils on grassy coastal flats in Marin, Alameda, and Santa Cruz counties.	Project Study Area: Absent. Suisun Marsh: Absent. Not documented in Solano County, the Suisun Marsh, or along the railroad. North of San Francisco Bay, the known distribution is limited to Marin County.
Contra Costa goldfields *Lasthenia conjugens*	FE/--	Low-elevation sunny flats and perimeters of drying vernal pool in dry, inner Coast Range valleys.	Project Study Area: Absent. Suisun Marsh: Present. Documented by CNDDB in northwestern Suisun Marsh at least 10 miles from the Project Study Area. Nearest record in Suisun Marsh is 0.5 miles west of railroad near Ledgewood Creek and Cordelia Road. CNPS documents the species in the Benicia quad, which encompasses land areas north and south of Suisun Bay.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
FEDERAL AND STATE LISTED OR PROPOSED FOR LISTING (cont.)			
Plants (cont.)			
Antioch Dunes evening primrose *Oenothera deltoides* ssp. *howellii*	FE/ SE/ 1B.1	Inland dunes.	Project Study Area: Absent. Suisun Marsh: Absent. In the surrounding 10 quads, known only from the Lime Ridge Open Space in Contra Costa County.
Keck's checkerbloom *Sidalcea keckii*	FE/--/ 1B.1	Serpentinite and clay soils in cismonate woodland and valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Low. In the surrounding 10 quads, known from only one location at the southeastern edge of Suisun Marsh in the Montezuma Hills.
California seablite *Suaeda californica*	FE/-- /1B.1	Coastal salt marshes and swamps.	Project Study Area: Absent. Suisun Marsh: Absent. Does not occur in Solano County, in Suisun marsh, or along the railroad. Reintroductions have occurred in San Francisco at Pier 94 and Eastshore State Park.
Showy rancheria clover *Trifolium amoenum*	FE/--/ 1B.1	Coastal bluff scrub, valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Absent. In the surrounding 10 quads, only documented from 2 locations in Napa County greater than 9 miles west from the Project Study Area.
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES			
Fish			
Sacramento perch *Archoplites interruptus*	--/SSC	Slow, vegetated waters of lakes and sloughs. Native to the Sacramento River.	Project Study Area: Absent. Suisun Marsh: Reintroduction efforts. Once abundant but now extirpated from most former habitats throughout the Delta.
Sacramento splittail *Pogonichthys macrolepidotus*	--/SSC	Open-water floodplains and vegetated tidal channels, sloughs and backwaters of larger watersheds, and smaller tidal tributaries to the Bay.	Project Study Area: Absent. Suisun Marsh: Present. Juveniles and adults inhabit tidal fresh and brackish water in the Suisun Marsh. The core of adult splittail summer distribution is between Suisun Bay and the west Delta.
Reptiles			
Western pond turtle *Actinemys marmorata*	--/SSC	Lakes, ponds, reservoirs, and slow-moving streams and rivers, primarily in foothills and lowlands.	Project Study Area: Absent. Suisun Marsh: Present. Documented to occur in Suisun Marsh. Western pond turtle may be infrequently encountered in ponds, drainages, riparian areas, brackish wetlands, and uplands.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Birds			
Tricolored blackbird *Agelaius tricolor*	--/SSC	Nests in freshwater marshes with dense stands of cattails or bulrushes, occasionally in willows, thistles, mustard, blackberry brambles, and dense shrubs and grains.	Project Study Area: Absent. Suisun Marsh: Present. Documented to occur in marshes associated with Lake Herman approx. 1 mile north of the Project Study Area and in the Suisun Marsh.
Golden eagle *Aquila chrysaetos*	--/ fully protected	Large trees in open areas and cliff-walled canyons provide nesting habitat. Forage in rolling foothills, mountain areas, flats, and deserts.	Project Study Area: Absent. Suisun Marsh: Present. Documented to occur in grasslands north of Lake Herman approx. 1 mile north of the Project Study Area and in the Suisun Marsh. May occur in suitable habitat along the railroad.
Short-eared owl *Asio flammeus*	--/SSC	Nests and forages in grasslands and marshes. Nests in on dry ground in depression concealed by vegetation.	Project Study Area: Absent. Suisun Marsh: Present. Documented to occur in the Suisun Marsh. May occur in suitable habitat along the railroad alignment.
Burrowing owl *Athene cunicularia*	--/SSC	Nests and forages in low-growing grasslands that support burrowing mammals.	Project Study Area: Absent. Suisun Marsh: Present. Documented to occur in the Suisun Marsh. The nearest record is located adjacent to the railroad alignment near Highway 12 and Cordelia Road. May occur in suitable habitat along the railroad.
Northern harrier *Circus cyaneus*	--/SSC	Nests in coastal freshwater and saltwater marshes, nest and forages in grasslands.	Project Study Area: Absent. Suisun Marsh: Present. Documented from coastal marsh in Benicia State Park and from Suisun Marsh. Nearest record is 2 miles west of the railroad near Cutoff Slough. May occur in suitable habitat along the railroad.
White-tailed kite *Elanus leucurus*	--/ fully protected	Nests near wet meadows and open grasslands in dense oak, willow or other large tree stands.	Project Study Area: Absent. Suisun Marsh: Low to moderate. Documented from grasslands in Solano County greater than 5 miles from the Project Study Area and 2 miles from the railroad.
American peregrine falcon *Falco peregrinus anatum*	--/ fully protected	Breeds near water with nearby vertical structure such as niches in steep banks and ledges to serve as nesting sites.	Project Study Area: Absent. Suisun Marsh: Low to moderate. From surrounding 10 quads, there is 1 documented occurrence in Solano County. Record details are suppressed. May occur in suitable habitat along the railroad.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Birds (cont.)			
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	--/SSC	Breeds in moist saltmarsh habitats with dense, low cover.	Project Study Area: Absent. Suisun Marsh: Present. Documented from coastal marshes along Suisun Bay approx. 2 miles east of the Project Study Area and from Suisun Marsh. Nearest record mapped along the railroad is in the vicinity of Sheldrake Slough.
Suisun song sparrow *Melospiza melodia maxillaris*	--/SSC	Endemic to Suisun Bay. Inhabits brackish marshes, perching and nesting in stands of bulrush along tidal channels, distribution ditches and permanent ponds where brackish conditions exist and foraging in bulrush and on exposed tidal mudflats.	Project Study Area: Absent. Suisun Marsh: Present. Documented to occur in brackish coastal marsh associated with lower Sulphur Springs Creek, including on the Refinery property. Documented throughout the Suisun Bay shoreline and the Suisun Marsh. May occur in adjacent Sulphur Springs Creek and in suitable habitat along the railroad.
Alameda song sparrow *Melospiza melodia pusillula*	--/SSC	Inhabits brackish marshes of east San Francisco Bay, perching and nesting in dense vegetation along tidal channels.	Project Study Area: Absent. Suisun Marsh: Absent. This subspecies does not occur in Solano County, but rather in marshes south of the Project Study Area, Suisun Marsh, and the railroad.
San Pablo song sparrow *Melospiza melodia samuelis*	--/SSC	Inhabits brackish marshes of San Pablo Bay, perching and nesting in dense vegetation along tidal channels. Particularly in areas of pickleweed, and gumplant.	Project Study Area: Absent. Suisun Marsh: Absent. This subspecies does not occur in Solano County, but rather marshes west of the Project Study Area, Suisun Marsh, and the railroad.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	--/SSC	Occasionally nests in wet meadows with tall emergent vegetation such as tules or cattails, and with adequate water to discourage predators.	Project Study Area: Absent. Suisun Marsh: Unlikely. In the surrounding 10 quads, there is only 1 historic record near Hercules in Contra Costa County. May occur in suitable habitat along the railroad.
Mammals			
Pallid bat *Antrozous pallidus*	--/SSC	Day roosts are in bridges, caves, crevices and mines; also found in buildings and under bark. Forages in open lowland areas.	Project Study Area: Absent. Suisun Marsh: Low. In the surrounding 10 quads, all occurrences are documented in west Contra Costa County. May occur in suitable habitat along the railroad.
Western red bat *Lasiurus blossevillii*	--/SSC	Forages in open lowland areas. Roosts in tall bridges.	Project Study Area: Absent. Suisun Marsh: Present. Usually roosts in tall bridges (e.g. 100 feet). Documented from a narrow riparian strip near Grizzly Island in the Suisun Marsh, approx. 6 miles east of the railroad.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Mammals (cont.)			
San Pablo vole *Microtus californicus sanpabloensis*	--/SSC	Grassy habitats associated with salt marshes.	Project Study Area: Absent. Suisun Marsh: Absent. Known only from the salt marshes of San Pablo Creek in Contra Costa County, on the south shore of San Pablo Bay.
Big free-tailed bat *Nyctinomops macrotis*	--/SSC	Rugged, rocky habitats in arid landscapes; lowlands; occurs in desert shrub, woodlands, and forests. Roosts in buildings, caves, outcrops, trees.	Project Study Area: Absent. Suisun Marsh: Low. Rare in California, and not believed to breed in the state. Two records from 1916 and 1971, located near Berkeley and Martinez respectively.
Suisun shrew *Sorex ornatus sinuosus*	--/SSC	Upper edges of tidal marshes within northern shores of San Pablo and Suisun Bays.	Project Study Area: Absent. Suisun Marsh: Present. Documented from coastal marshes along San Pablo Bay, Benicia State Park, and Suisun Marsh. The nearest record is from 1952, mapped on both sides of the railroad at downtown Suisun City marsh.
Salt marsh wandering shrew *Sorex vagrans halicoetes*	--/SSC	Salt marsh habitat 6-8 feet above sea level, with abundant pickleweed and driftwood.	Project Study Area: Absent. Suisun Marsh: Absent. Present distribution is confined to San Mateo, Santa Clara, Alameda, and Contra Costa Counties.
American badger *Taxidea taxus*	--/SSC	Grasslands, savannas, deserts, timberline mountain meadows.	Project Study Area: Absent. Suisun Marsh: Low. In the surrounding 10 quads, documented from 2 records located in Napa and Contra Costa Counties. May occur in suitable habitat along the railroad alignment.
Plants			
Bent-flowered fiddleneck *Amsinckia lunaris*	--/--/ 1B.2	Cismontane woodland, valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Low. There are no records from Solano County or Suisun Marsh. North of San Francisco Bay, specimens have been collected from Sonoma, Marin, Napa, Colusa, Yolo, and Lake Counties.
Slender silver moss *Anomobryum julaceum*	--/--/ 2B.2	Damp rock and soil on outcrops, usually on roadcuts through forests.	Project Study Area: Absent. Suisun Marsh: Absent. No suitable habitat occurs in the project area. Nearest occurrence is east Contra Costa County. The species has not been collected from Solano County. There are no records in Solano County, Suisun Marsh, or along the railroad.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Plants (cont.)			
Alkali milkvetch *Astragalus tener* var. *tener*	--/--/ 1B.2	Grows in playas, valley and foothill grasslands in adobe clay, and vernal pools in alkaline soils.	Project Study Area: Absent. Suisun Marsh: Present. Documented to occur in the northern Suisun Marsh. The nearest record is located 0.5 mile west from the railroad, along Cordelia Rd. between Ledgewood Creek and Pennsylvania Ave.
Heartscale *Atriplex cordulata* var. *cordulata*	--/--/ 1B.2	Saline or alkaline soils in chenopod scrub, meadows, and seeps; sandy soils in valley and foothill grasslands.	Project Study Area: Absent. Suisun Marsh: Present. In the surrounding 10 quads, documented from only 1 location in the northern Suisun Marsh, approx. 3.5 miles east of the railroad.
Brittlescale *Atriplex depressa*	--/--/ 1B.2	Alkaline or clay soils in chenopod scrub, meadows and seeps, playas, vernal pools, and valley and foothill grasslands.	Project Study Area: Absent. Suisun Marsh: Present. Documented at the northern boundary of Suisun Marsh and beyond. The nearest record is located approx. 3.5 miles east of the railroad.
San Joaquin spearscale *Atriplex joaquiniana*	--/--/ 1B.2	Grows in alkaline soils in chenopod scrub, meadows and seeps, playas, and valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Present. Documented from grasslands in Solano County and in the northeastern Suisun Marsh. The nearest record is located approx. 1.7 miles west of the railroad near Chadbourne Slough.
Vernal pool smallscale *Atriplex persistens*	--/--/ 1B.2	Alkaline soils in vernal pools.	Project Study Area: Absent. Suisun Marsh: Present. Documented from northwestern Suisun Marsh. This single record is located approx. 0.6 mile west of the railroad near Ledgewood Creek and Cordelia Road.
Big-scale balsamroot *Balsamorhiza macrolepis*	--/--/ 1B.2	Valley and foothill grassland, cismontane woodland.	Project Study Area: Absent. Suisun Marsh: Low. Documented from the American Canyon 7.5 miles northwest of the Project Study Area. Limited suitable habitat along the railroad.
Big tarplant *Blepharizonia plumosa*	--/--/ 1B.1	Clay soils in valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Low. An historic record is mapped very generally to include lands west of the Refinery; this population is believed to be possible extirpated. There are no other records in Solano County or the Suisun Marsh.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Plants (cont.)			
Round-leaved filaree *California macrophylla*	--/--/ 1B.1	Grows in clay soils in cismontane woodland and valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Low. In the surrounding 10 quads, there is only 1 record in Contra Costa County. May occur in suitable habitat along the railroad.
Mt. Diablo fairy lantern *Calochortus pulchellus*	--/--/ 1B.2	Chaparral, cismontane and riparian woodland, valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Low. Specimens have been collected from Solano, Napa, Sonoma, Alameda, Contra Costa, and Humboldt Counties. May occur in suitable habitat along the railroad.
Coastal bluff morning glory *Calystegia purpurata* ssp. *saxicola*	--/--/ 1B.2	Coastal bluff scrub, dunes, and coniferous forest.	Project Study Area: Absent. Suisun Marsh: Absent. The species has not been collected from Solano County. Known occurrences are in Contra Costa, Marin, Sonoma, Lake, and Mendocino Counties.
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	--/--/ 1B.1	Valley and foothill grassland (alkaline soils).	Project Study Area: Absent. Suisun Marsh: Present. An historic record for an extirpated population occurs in Benicia west of the Project Study Area. The species is also documented from the northeastern Suisun Marsh, with a single record approx. 6 miles east of the railroad. May occur in suitable habitat along the railroad.
Pappose tarplant *Centromadia parryi* ssp. *parryi*	--/--/ 1B.2	Coastal prairie, meadows and seeps, coastal salt marsh, valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Present. Documented from grasslands in Solano County and from Suisun Marsh. The nearest record is located approx. 0.75 mile west of the railroad, near Ledgewood Creek and Cordelia Road.
Point Reyes bird's beak *Chloropyron maritimum* ssp. *palustre*	--/--/ 1B.2	Coastal salt marsh.	Project Study Area: Absent. Suisun Marsh: Absent. The species is not documented to occur in Solano County, the Suisun Marsh, or along the railroad. Specimens have been collected from Marin, Sonoma, Contra Costa, Santa Clara, San Mateo, San Francisco, Alameda, and Humboldt Counties.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Plants (cont.)			
Hispid bird's beak *Chloropyron molle* ssp. *hispidum*	--/--/ 1B.1	Alkaline soils in meadows and seeps, playas, and valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Present. CNPS documents occurrence in the Denverton quad (eastern Suisun Marsh). In the CNDDB, from the surrounding 10 quads, the species is documented from 1 location near Travis Air Force Base more than 5 miles from the railroad.
Bolander's water hemlock *Cicuta maculata* var. *bolanderi*	--/--/ 2B.1	Fresh, brackish, and coastal marshes and swamps.	Project Study Area: Absent. Suisun Marsh: Present. There is an historic record in Benicia west of the Refinery, two older (1970s) records in the Suisun Marsh along the railroad, and one extant occurrence in the Suisun Slough near Deadman's Island approx. 1.3 miles west of the railroad.
Franciscan thistle *Cirsium andrewsii*	--/--/ 1B.2	Mesic, sometimes serpentinite soils in broadleafed forest and coastal bluff scrub and prairie.	Project Study Area: Absent. Suisun Marsh: Absent. The species is not documented from Solano County, the Suisun Marsh, or along the railroad. Specimens have been collected from Marin, Sonoma, Contra Costa, San Francisco, and San Mateo Counties.
Western leatherwood *Dirca occidentalis*	--/--/ 1B.2	Mesic soils in upland and coniferous forest, chaparral, cismontane woodland, and riparian forest and woodland.	Project Study Area: Absent. Suisun Marsh: Absent. The species is not documented from Solano County, the Suisun Marsh, or along the railroad. Specimens have been collected from Marin, Sonoma, Alameda, Contra Costa, Santa Clara, and San Mateo Counties.
Dwarf downingia *Downingia pusilla*	--/--/ 2B.2	Mesic grasslands, vernal pools.	Project Study Area: Absent. Suisun Marsh: Present. There is a single 1961 record, presumed extant, in the northeastern Suisun Marsh located approx. 6.5 miles east of the railroad. The species has been collected from Solano and Sacramento Counties, among others.
Mt. Diablo buckwheat *Eriogonum truncatum*	--/--/ 1B.1	Sandy soils in chaparral, costal scrub, and valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Absent. The Solano County population is presumed extirpated; it is an 1888 record along the railroad alignment near downtown Fairfield. The species has also been collected in Contra Costa and Alameda Counties.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Plants (cont.)			
Fragrant fritillary *Fritillaria liliacea*	--/--/ 1B.2	Loamy clay soils of open grassland, rocky soils, coastal scrub.	Project Study Area: Absent. Suisun Marsh: Low. The species is documented to occur in the Jepson Prairie Preserve northeast of the Suisun Marsh. It has broad distribution across California, and has been collected in Solano, Yolo, and Sacramento Counties, among others.
Diablo helianthella *Helianthella castanea*	--/--/ 1B.2	Broadleaf forest, chaparral, coastak scrub, cismontane and riparian woodland, and valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Unlikely. All CNDDB records occur south of Suisun Bay; CNPS documents the species north of Suisun Bay only in Marin County, but maps the species as extant in the Benicia and Cordelia quads. However, the species is not otherwise documented to occur east of Fairfield. May occur in suitable habitat along the railroad but not likely at low elevations near the Bay.
Loma Prieta hoita *Hoita strobilina*	--/--/ 1B.1	Mesic, usually serpentinite soils in chaparral and cismontane and riparian woodland.	Project Study Area: Absent. Suisun Marsh: Absent. The species does not occur in Solano County or in any location north of Contra Costa County.
Carquinez goldenbush *Isocoma arguta*	--/--/ 1B.1	Found along the Carquinez Straits in Solano and Contra Costa counties in alkaline soils, flats, and on lower hills.	Project Study Area: Absent. Suisun Marsh: Present. The species historically occurred on both sides of the Carquinez Strait and is currently documented to occur at the eastern edge of the Suisun Marsh. The nearest record is located approx. 5.6 miles west of the railroad near Highway 12 and Nurse Slough Road.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	--/--/ 1B.2	Natural edges of estuarine marshes, sloughs, and rivers in the Sacramento – San Joaquin Delta.	Project Study Area: Absent. Suisun Marsh: Present. Documented throughout the Suisun Marsh and along shorelines of Suisun Bay. The nearest record to the Project Study Area is located approx. 1.8 miles east of the Refinery near Lake Herman Road along the Suisun Bay shoreline. Multiple records are mapped adjacent to the railroad.
Legenere *Legenere limosa*	--/--/ 1B.1	Vernal pools.	Project Study Area: Absent. Suisun Marsh: Present. CNPS documents the species in the Denverton quad encompassing eastern Suisun Marsh. The species is documented in CNDDB to occur at the Jepson Prairie Preserve approximately 7 miles east of the railroad. Other Fairfield and Vacaville occurrences are extirpated. There are no records in Benicia or along the railroad.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Plants (cont.)			
Mason's lilaeopsis *Lilaeopsis masonii*	--/--/ 1B.1	Brackish and freshwater marshes.	Project Study Area: Absent. Suisun Marsh: Present. Documented throughout Suisun Marsh and some shoreline marshes around Suisun Bay. One occurrence in Benicia at west end of "E" Street, approximately 1.4 mile west of the Refinery. The nearest record to the railroad shares a boundary with the eastern berm where Ledgewood Creek joins Suisun Slough.
Delta mudwort *Limosella australis*	--/--/ 2B.1	Mud banks of freshwater or brackish marshes and swamps, riparian scrub.	Project Study Area: Absent. Suisun Marsh: Present. Documented in the CNDDB from Ryer Island in Suisun Bay approximately 7 miles east of the Refinery, and from Jepson Prairie Preserve northeast of Suisun Marsh. Documented by CNPS in the Vine Hill quad, which encompasses land north and south of Suisun Bay and could include areas of southwestern Suisun Marsh, such as the Grizzly Island Wildlife Area.
Hall's bush-mallow *Malacothamnus hallii*	--/--/ 1B.2	Chaparral and costal scrub.	Project Study Area: Absent. Suisun Marsh: Absent. With the exception of Lake and Mendocino Counties, the species has not been collected north of Contra Costa County.
Oregon meconella *Meconella oregana*	--/--/ 1B.1	Coastal prairie and scrub.	Project Study Area: Absent. Suisun Marsh: Absent. Known from only five locations in Contra Costa and Santa Clara Counties. Suitable habitat is absent.
Baker's navarretia *Navarretia leucocephala* ssp. *bakeri*	--/--/ 1B.1	Mesic soils in cismontane woodland, coniferous forest, meadows and seeps, vernal pools, and valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Low. Documented in the CNDDB to occur at Jepson Prairie Preserve and reported from other locations in Solano County north and east of Fairfield. Documented by CNPS to occur in the Denverton quad, which encompasses eastern Suisun Marsh.
Bearded popcornflower *Plagiobothrys hystriculus*	--/--/ 1B.1	Vernal swales, vernal pool margins, and valley and foothill grassland.	Project Study Area: Absent. Suisun Marsh: Absent. Known only from the Montezuma Hills east of Suisun Marsh.

TABLE 4.2-1 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE PROPOSED PROJECT

Common Name *Scientific Name*	Listing Status USFWS/ CDFW/CRPR	General Habitat Requirements	Potential for Species Occurrence[4]
STATE SPECIES OF SPECIAL CONCERN OR LOCALLY RARE SPECIES (cont.)			
Plants (cont.)			
Chaparral ragwort *Senecio aphanactis*	--/--/ 2B.2	Alkaline soils in chaparral, cismontane woodland, and coastal scrub.	Project Study Area: Absent. Suisun Marsh: Low. Distributed from Contra Costa south to Tijuana. There is an historic record from Mare Island in Solano County, but no other records north of Contra Costa County.
Slender-leaved pondweed *Stuckenia filiformis* ssp. *alpine*	--/--/ 2B.2	Shallow, freshwater marshes and swamps.	Project Study Area: Absent. Suisun Marsh: Moderate. Fairly broad distribution across northern California. Not documented from the Suisun Marsh or along railroad. Recorded from the Fairfield North quad located north of Fairfield.
Suisun Marsh aster *Symphyotrichum lentum*	--/--/ 1B.2	Occurs along levees of rivers and sloughs in Suisun and Napa marshes and around Delta islands.	Project Study Area: Absent. Suisun Marsh: Present. Documented throughout Suisun Marsh and the Suisun Bay shoreline. The nearest record to the Project Study Area is located 1.5 mile east, along both sides of the Southern Pacific Railroad Tracks, and it also occurs in Suisun Marsh near Ledgewood Creek and Cordelia Road.
Saline clover *Trifolium hydrophilum*	--/--/ 1B.2	Grows in marshes and swamps, valley and foothill grassland in mesic and alkaline soils, and in vernal pools.	Project Study Area: Absent. Suisun Marsh: Present. There is an historic record along Interstate 680 between Benicia and Cordelia. Extant populations are reported from northwest Suisun Marsh near Ledgewood Creek and Cordelia Road.
Oval-leaved viburnum *Viburnum ellipticum*	--/--/ 2B.3	Openings in chaparral, cismontane woodland, lower montane coniferous forest.	Project Study Area: Absent. Suisun Marsh: Absent. Distributed fairly broadly across lower mountains of northern California; absent from the Central Valley. Reported from Solano County north of Fairfield. Suitable habitat is absent along the railroad.

STATUS CODES:

FEDERAL: (U.S. Fish and Wildlife Service)
- FE = Listed as Endangered (in danger of extinction) by the Federal Government.
- FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
- FC = Candidate to become a *proposed* species.
- FSC = Federal Species of Concern. May be Endangered or Threatened, but not enough biological information has been gathered to support listing at this time.

STATE: (California Department of Fish and Wildlife)
- SE = Listed as Endangered by the State of California
- ST = Listed as Threatened by the State of California
- SSC = California Species of Special Concern

SOURCE: CDFW, 2013; CNPS, 2013; USFWS, 2013; CNPS, 2014; CDFG, 2011

(quads, collectively: Cuttings Wharf, Cordelia, Fairfield South, Mare Island, Vine Hill, Richmond, Briones Valley, Walnut Creek). A tenth quad (Denverton) was added because its geographic area encompasses the eastern half of Suisun Marsh and could include additional species along the railroad. The construction footprint lacks suitable habitat for the species identified in Table 4.2-1. The localized area surrounding the construction footprint that is subject to secondary impacts (e.g., noise, visual, and lighting disturbance) contains limited habitat that could support some special-status species. This limited habitat is a 3,839 linear feet (approximately 0.7 miles) segment of the Sulphur Springs Creek riparian corridor, which occurs outside of the Refinery property but adjacent to the northeastern Project boundary. Special-status species potentially occurring in the Sulphur Springs Creek riparian corridor are California red-legged frog (*Rana draytonii*), western pond turtle (*Actinemys marmorata*), and nesting birds. The remainder of special-status species occur in the Suisun Marsh and would only be potentially impacted by the Project through disturbance from an increased frequency of railcars or from an accidental oil spill.

Special Status Natural Communities

Special Status Natural Communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special status species or their habitat. CDFW's List of California Terrestrial Natural Communities (2010) indicates which natural communities are of special status.[5] The Project Study Area does not support Special Status Natural Communities, but they are present in the Refinery vicinity or along the railroad alignment through Suisun Marsh. Northern Coastal Salt Marsh and Valley Needlegrass Grassland are not documented to occur along the railroad and would not be impacted by the Project. Coastal Brackish Marsh and Northern Claypan Vernal Pool have the potential to be impacted by the Project only if there were an oil spill in the Suisun Marsh.

Coastal Brackish Marsh

Coastal Brackish Marsh is dominated by perennial, emergent monocots forming dense cover. Water is brackish from freshwater input, and salinity may vary widely based on tides or seasons. This vegetation community usually intergrades with coastal salt marshes toward the ocean and with freshwater marshes in the Sacramento-San Joaquin Delta, and is distributed among the interior margins of coastal bays, lagoons, and estuaries. In California, it is most extensively developed around Suisun Bay at the mouth of the Delta. Coastal Brackish Marsh periodic tidal-influenced wetland can be found at the southeastern edge of the Refinery property where Sulphur Springs Creek nears Suisun Bay, and is mapped by the CNDDB along the railroad near downtown Suisun City.

Northern Claypan Vernal Pool

Northern Claypan Vernal Pool is an amphibious, herbaceous community of annual herbs and grasses that germinates with the onset of winter rains. Rising air temperatures in the spring raise water temperatures and evaporate the pools, leaving concentric bands of vegetation around the drying pool. Pools may be as small as a few square meters or as large as several hectares.

[5] Detailed plant information was not necessarily available to determine whether the natural communities could be assigned to the newer (2010) classification system or would be considered special-status under the 2010 classification system.

Microrelief is minimal, and plant cover is often reduced compared to other types of vernal pools. Northern claypan vernal pools are mapped by the CNDDB on both sides of the railroad west of Suisun City.

Northern Coastal Salt Marsh

Northern Coastal Salt Marsh is formed by salt-tolerant plants forming dense cover. Plants grow vigorously in the summer and typically go dormant in the winter. Hydric soils are subject to regular tidal inundation for at least part of the year. This vegetation community is found along sheltered inland margins of bays, lagoons, and estuaries, and is distributed extensively in the San Francisco Bay Area. It is mapped in the CNDDB west of the City of Benicia at Benicia State Park, across Suisun Bay along the City of Martinez shoreline, and at other shoreline areas in San Pablo Bay.

Valley Needlegrass Grassland

Valley Needlegrass Grassland is a mid-height grassland community dominated by the perennial growth of the bunchgrass *Nassella pulchra*. Native and introduced annuals may also grow between needlegrass tussocks. This vegetation community usually occurs on fine-textured (e.g., clay) soils that are moist, even waterlogged, during winter but extremely dry during summer. It often intergrades with oak woodlands. Valley Needlegrass Grassland is mapped in the CNDDB just northeast of Suisun Marsh at Jepson Prairie.

4.2.2.3 Regulatory Setting

This section describes federal, state and local regulations, permits, and policies pertaining to biological resources and wetlands as they apply to the Project.

Federal Regulations

Endangered Species Act

The United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) have jurisdiction over species listed as threatened or endangered under Section 9 of the federal Endangered Species Act (ESA). In the Project area, NMFS would be responsible for protection of anadramous fish and USFWS would be responsible for the protection of other listed species. The federal ESA protects listed species from “take,” which is defined broadly as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.”

If a listed species or its habitat would be affected by the project, and the project involves a federal agency, that agency must consult with USFWS in accordance with ESA Section 7. More specifically, if another federal approval is required, ESA Section 7 consultation and issuance of a Biological Opinion (BO), and potentially also an Incidental Take Statement, would be necessary. The Endangered Species Act (16 USC § 1531 et seq.) requires federal agencies to consult with USFWS or NMFS, as appropriate, to ensure that any undertaking or action they take, including permit issuance, is not likely to jeopardize the continued existence of a listed species (plant or animal) or result in the destruction or modification of critical habitat (50 CFR § 402.01(a)).

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits the killing, possessing, or trading of migratory birds, bird parts, eggs and nests. If a project could have a negative impact on migratory birds, then Executive Order 13186 instructs federal agencies to coordinate with the USFWS in developing a Memorandum of Understanding to conserve migratory bird populations. Migratory Bird Permit Memorandum (MBPM-2) dated April 15, 2003, clarifies that destruction of most unoccupied bird nests is permissible under the MBTA, except for the nests of federally threatened or endangered migratory birds, bald eagles, and golden eagles. Most Project-area bird species and their occupied nests are protected under the MBTA.

Oil Pollution Act

Enacted in 1990, this Act (Public Law No. 101-380) amends the Clean Water Act to create a comprehensive oil spill and prevention response scheme. Spill Prevention Control and Countermeasure Plans must be prepared by owners or operators of facilities that have or could reasonably be expected to discharge a certain amount of oil. These plans should contain preventative (failsafe) and contingency (cleanup) plans for controlling accidental discharges, and for minimizing the effect of such events.

State Regulations

California Environmental Quality Act

The California Environmental Quality Act (CEQA) is the regulatory framework by which California public agencies identify and mitigate significant environmental impacts. In addition to threatened and endangered species, a species not listed under the federal or state endangered species act may be considered rare or endangered if the species meets the criteria identified in CEQA Guidelines Section 15380(b)(2).

California Endangered Species Act

The California Endangered Species Act regulates the listing and “take” of state-listed threatened and endangered species. In California, “take” is defined as “hunt, pursue, catch, capture, or kill” or to attempt to do these things. The California Department of Fish and Wildlife (CDFW) may allow take of a listed species through special permit issuance, except for fully protected species.

California Fish and Game Code

Fully Protected Species. CDFG code sections 3511, 4700, 5050, and 5515 designate fully protected species and protection measures. Fully protected species may not be taken or possessed at any time, and no licenses or permits may be issued for their take except when collecting these species is necessary for scientific research or relocation of birds is necessary for livestock protection.

Protection of Nesting Birds. Nesting birds are protected under CDFG code sections 3503 and 3503.5, which make it (1) unlawful to take, possess, or destroy the nests or eggs or any such bird of prey except as otherwise provided by the code; and (2) protect the active nests of all other birds (except house sparrow (*Passer domesticus*) and European starling (*Sturnus vulgaris*)).

Disturbance that causes nest abandonment and/or reproductive failure is considered a take. No take permits are issued under these statutes.

Wetlands

There are no wetlands in the Project area that would be impacted by the Project. However, scoping comments identified that a potential oil spill resulting from tank car derailment in the Suisun Marsh is a public concern. Therefore, a discussion is provided of agencies with regulatory jurisdiction over wetlands as they relate to the potential for oil spills in the Suisun Marsh.

U.S. Environmental Protection Agency

Under the legal authority of the Clean Water Act (Act), including subsequent amendment to the Act by the Oil Pollution Act of 1990, the Discharge of Oil regulation (the "sheen rule") provides the framework for determining whether an oil spill to inland or coastal waters and/or their adjoining shorelines should be reported to the federal government. Discharges that cause a sheen or discoloration on the water surface, violate applicable water quality standards, or cause a sludge or emulsion to be deposited beneath the surface of the water or on adjoining shorelines must be reported. A person in charge of a vessel, with knowledge of any discharge of oil from such vessel in violation of the Act, must immediately report the spill to the National Response Center in Washington, D.C.

U.S. Army Corps of Engineers

Within the U.S. Environmental Protection Agency's National Response System, the U.S. Army Corps of Engineers (Corps) has been designated as a supporting agency for oil and hazardous pollution incidents occurring within the U.S. The Corps can provide specialized equipment and personnel, design services, construction activities, and contract services for other federal agencies. The Corps conducts its emergency response activities under the Flood Control and Coastal Emergency Act, and the Stafford Disaster and Emergency Assistance Act. Under the Flood Control and Coastal Emergency Act, the Corps provides disaster preparedness services and advanced planning measures designed to reduce the amount of damage caused by an impending disaster. Under the Stafford Act, the Corps supports the Department of Homeland Security and Federal Emergency Management Agency (FEMA) in carrying out the National Response Plan.

State and Regional Water Quality Control Boards

State and Regional Water Quality Control Boards are not directly responsible for hazardous waste spills. Spills are handled by the State Office of Emergency Services. However, California Government Code Section 8589.7 requires the California Emergency Management Agency to, upon receipt of a report concerning an oil spill in the Suisun Marsh, immediately inform the Regional Water Quality Control Board. The San Francisco Regional Water Quality Control Board states in their Water Quality Control Plan (Basin Plan) for the San Francisco Bay Region (1995, 2013), Section 4.24 Oil Spills, that oil transfer operations are the step in petroleum handling where spills are most likely to occur. It further states that the petroleum industry has been improving its safety record in oil transfer operations. This improvement has been attributed to:

- U.S. Coast Guard regulations for oil transfer operations;

- State Lands Commission guidelines for petroleum facility operations manuals;
- High clean-up costs and public concern associated with oil spills
- Water Board, California Department of Fish and Game, and U.S. Coast Guard enforcement actions against parties responsible for spills

As of the July 2013 publication, the Water Board recognizes that additional regulation is unnecessary if the petroleum industry maintains its improved record.

Bay Conservation and Development Commission

The Bay Conservation and Development Commission (BCDC) has planning and regulatory authority over Suisun Marsh. The Suisun Marsh Protection Plan (BCDC, 1976) identifies Findings and Policies concerning hazardous spills in Suisun Marsh. This Plan is discussed in more detail in *Local Regulations*, below. Other BCDC land use plans are described in Section 4.9, *Land Use*.

Local Regulations

City of Benicia General Plan (1999)

The General Plan, adopted in 1999, includes specific policies to preserve and enhance existing development and to provide for orderly and appropriate new development of the City of Benicia until approximately the year 2020.

Specifically, the Open Space and Conservation of Resources provisions of the General Plan include the following goals and policies:

Goal 3.19: Preserve and enhance habitat for special-status plants and animals.

***Policy 3.19.1*:** Protect essential habitat of special-status plants and animal species.

Goal 3.20: Protect and enhance native vegetation and habitats.

***Policy 3.20.1*:** Protect native grasslands, oak woodlands and riparian habitats.

***Policy 3.20.2*:** Restore native vegetation, such as birch grasses and oaks, whenever possible for open spaces of existing developed areas.

***Policy 3.20.4*:** Require protection of movement corridors.

Goal 3.21: Permanently protect and enhance wetlands so that there is no net loss of wetlands within the Benicia Planning Area.

***Policy 3.21.1*:** Encourage avoidance and enhancement of sensitive wetlands as part of future development.

Solano County General Plan (2008).

The General Plan was adopted in 2008 and provides actions Solano County can take to maintain, protect, and preserve a wide range of species and natural communities found in the county, and the habitats that support them. Specifically, the Biological Resources chapter of the General Plan includes the following policies:

> **RS.P-1:** Protect and enhance the county's natural habitats and diverse plant and animal communities, particularly occurrences of special-status species, wetlands, sensitive natural communities, and habitat connections.
>
> **RS.P-2:** Manage the habitat found in natural areas and ensure its ecological health and ability to sustain diverse flora and fauna.
>
> **RS.P-3:** Focus conservation and protection efforts on high-priority habitat areas (depicted on General Plan Figure RS-1).
>
> **RS.P-4:** Together with property owners and federal and state agencies, identify feasible and economically viable methods of protecting and enhancing natural habitats and biological resources.
>
> **RS.P-5:** Protect and enhance wildlife movement corridors to ensure the health and long-term survival of local animal and plant populations. Preserve contiguous habitat areas to increase habitat value and to lower land management costs.

More detailed policies directly affecting the Suisun Marsh are described in the 2008 General Plan Appendix C, Suisun Marsh Policy Addendum. These policies have been incorporated into the Solano County component of the Suisun Marsh Local Protection Program certified by the Bay Conservation and Development Commission (BCDC) and include the following policy regarding hazardous materials:

> **P-14:** The development of industrial facilities in, adjacent to or upstream from the Marsh should be planned to eliminate significant adverse environmental impacts on the water quality of the Suisun Marsh. Activities that could significantly alter the temperature, salinity, or turbidity of the water should be prohibited. Industrial facilities that will increase the potential for spills of toxic and hazardous materials should not be permitted unless it is established that spills of such materials will not represent a significant threat to the Marsh.

Bay Conservation and Development Commission Plans

The BCDC is a state agency with permit authority over the Bay and its shoreline. Their regulatory authority and relevant provisions are presented in several land use plans, including the *San Francisco Bay Plan*, *Benicia Waterfront Special Area Plan*, *Bay Area Seaport Plan*, and the *Suisun Marsh Protection Plan*. These plans and their applicability to the Project are described in Section 4.9, *Land Use*. Their consideration of the transport of hazardous cargo through the Suisun Marsh is described above as part of the *Solano County General Plan*, Appendix C.

Suisun Marsh Habitat Management, Preservation, and Restoration Plan

The *Suisun Marsh Habitat Management, Preservation, and Restoration Plan* (DOI, 2011) is a 30-year plan developed by the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), National Marine Fisheries Service (NMFS), California Department of Water Resources, and the Suisun Resource Conservation District to balance the benefits of tidal wetland restoration with other habitat uses. The Marsh relies on levees to protect diked managed wetlands, roads, and other infrastructure from flooding, and levees also serve as important local transportation corridors including Union Pacific Railroad, Amtrak Capitol Corridor, petroleum pipelines to Travis Air Force Base and other locations, State Route 12, natural gas production wells and transmission lines, electrical

transmission lines, and water conveyance facilities. According to the plan, Suisun Marsh Region 1 consists of the western and northwestern portions of the marsh that are primarily west of or adjacent to the Union Pacific Railroad line that carries freight cars from the J.R. Davis Yard in Roseville to Bay Area ports, including the Refinery. The plan considers the potential for hazardous materials spills in the Suisun Marsh and describes the agencies and some of the procedures in place under approved emergency response and evacuation plans.

Solano County Habitat Conservation Plan

The Solano County Habitat Conservation Plan has not been formally adopted by its participants, but upon adoption it will streamline biological permitting associated with the development of future flood control, irrigation facilities, and public infrastructure projects in the Suisun Marsh. Section 4.9, *Land Use*, provides additional background information on the Solano County Habitat Conservation Plan. The City of Benicia and the unincorporated areas of Solano County outside the plan's service area have elected not to participate in the plan. While the railroad crosses portions of the plan area, and the plan discusses levee maintenance as a covered activity, railcar transport through the Suisun Marsh is not the focus of the plan's covered activities and the plan would have limited, if any, applicability to the Project.

Yolo County Natural Community Conservation Plan/Habitat Conservation Plan

The Yolo County Habitat Conservation Plan has not been formally adopted by its participants, but upon adoption it will streamline biological permitting associated with development in Yolo County. Section 4.9, Land Use, provides additional background information on the Yolo County Habitat Conservation Plan. The railroad crosses Yolo County near Sacramento, and railroad maintenance and the cleanup of hazardous materials are covered activities under the plan. The plan may have limited applicability to the Project along the railroad segment through Yolo County.

Delta Plan

The Delta Plan, authorized under the Sacramento-San Joaquin Delta Reform Act of 2009, is a comprehensive management plan for the Sacramento-San Joaquin River Delta and Suisun Marsh. The Suisun Marsh is considered a secondary management area of the Delta Plan (Delta Stewardship Council, 2013). Section 4.9, *Land Use*, provides additional background information on the Delta Plan. While levee maintenance and emergency preparedness and response policies and recommendations are included in the Delta Plan, they are focused on flood control activities and do not specifically address hazardous materials.

Draft Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California

Administered by the U.S. Fish and Wildlife Service, this voluntary plan identifies threats to seven endangered species associated with San Francisco Bay tidal marshes and elaborates implementation measures, including habitat restoration, to facilitate species recovery. Specifically, this Plan addresses the Suisun Bay Area Recovery Unit, Segments A and B, Zones 1 and 2. Railroad transport of hazardous materials is not considered in the plan.

Baylands Ecosystem Habitat Goals Project

The Goals Project was undertaken in June 1995 to establish a long-term vision for a healthy and sustainable baylands ecosystem. The final report, published in 1999 (Goals Project 1999) enumerated a series of non-binding recommendations for habitat protection and restoration in the Suisun Marsh. Railroad transport of hazardous materials is not considered in the plan.

CALFED Ecosystem Recovery Program

The CALFED program of state and federal cooperation in water use was formalized in June 1994 with the signing of a Framework Agreement by the state and federal agencies with management and regulatory responsibility in the Bay-Delta Estuary. The Framework Agreement pledged that the state and federal agencies would work together in water quality standards formulation, coordination of State Water Project and Central Valley Project operations, and long-term solutions to problems in the Bay-Delta Estuary. Railroad transport of hazardous materials is not considered in the plan.

San Francisco Bay Subtidal Habitat 50-Year Conservation Plan

The San Francisco Bay Subtidal Habitat 50-Year Conservation Plan is a guide for restoring and improving subtidal habitat, including all submerged areas of Suisun Bay upstream to Sherman Island. The voluntary plan was developed by California State Coastal Conservancy and Ocean Protection Council, National Marine Fisheries Service and Restoration Center, San Francisco Bay Conservation and Development Commission, and the San Francisco Estuary Partnership to provide basic information in support of conservation, restoration, research, and protection activities in the Bay. Railroad transport of hazardous materials is not considered in the plan.

Strategic Plan for the Restoration of Wetlands and Wildlife in the San Francisco Bay Area

This voluntary plan outlines habitat restoration and enhancement goals identified by the San Francisco Bay Joint Venture partnership, including habitat goals for the Suisun Bay subregion. The plan outlines a framework for collaborative action in preserving wetlands. While oil refining and clean water programs are briefly discussed in the plan, railroad transport of hazardous materials is not considered.

4.2.2.4 Project Baseline

Baseline conditions reflect the current setting of the Project Area, as described above in Section 4.2.2, *Project Setting*. This includes the existing developed habitats of the Refinery and the special-status plant and animal species listed in Table 4.4-1 with the potential to occur in or near these habitats and that may be affected by Project activities.

4.2.3 Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause significant adverse impacts to biological resources if it would:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional

plans, policies, or regulations, or by the California Department of Fish and Wildlife, the National Marine Fisheries Service, or U.S. Fish and Wildlife Service;

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

4.2.4 Discussion of Impacts and Mitigation Measures

4.2.4.1 Project Study Area

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, the National Marine Fisheries Service, or U.S. Fish and Wildlife Service.

The Project construction footprint lacks habitat for special-status species. However, a localized area surrounding the construction footprint has the potential for secondary Project-related disturbance (e.g., noise and vibrations) that could affect species present in the adjacent Sulphur Springs Creek riparian corridor. Sulphur Springs Creek is outside of the Refinery property but is adjacent to the northeastern Project boundary, and the riparian canopy extends to the property line. The creek is separated from the Refinery by a tall chain link fence. The vegetated bank extends approximately 65 feet before reaching the channel. Sulphur Springs Creek and its associated riparian corridor and in-stream marshes provide potentially suitable habitat for the following special-status species: California red-legged frog, western pond turtle, tri-colored blackbird, yellow-headed blackbird, Suisun song sparrow, Samuel's song sparrow, grasshopper sparrow, loggerhead shrike, yellow-breasted chat, San Francisco common yellowthroat, and short-eared owl.

California red-legged frog could use the Sulphur Springs riparian zone as a movement corridor. Breeding is unlikely due to urban runoff and high storm flows, and any individuals are likely to be transients that would not be disturbed by construction and operation of the Project. Western pond turtle may occur as a resident or transient in Sulphur Springs Creek, but breeding areas are more likely to occur upstream of the Project area where adjacent terraces and/or grasslands provide sandy egg-laying substrate. Like California red-legged frog, western pond turtle is

unlikely to be disturbed by construction and operation of the Project. Although the chain link fence is permeable to these species, there is no habitat in the Project area and no protective cover.

Suisun song sparrow is documented within coastal brackish marsh associated with downstream reaches of Sulphur Springs Creek and could occur (nest) in upstream Sulphur Springs Creek near the Project, as could Samuel's song sparrow, grasshopper sparrow, loggerhead shrike, yellow-breasted chat, and San Francisco common yellowthroat. Short-eared owls typically nest in grasslands and may forage in the riparian corridor but are not likely to nest there. Though brackish and salt marshes at the mouth of Sulphur Springs Creek provide habitat occupied by California black rail, California clapper rail, and salt marsh harvest mouse (CDFW, 2013a), only California black rail has the potential to occur in freshwater marshes of upstream Sulphur Springs Creek; this would be unlikely due to the small patch sizes of creek marshes and the industrial surroundings. Aside from the riparian corridor, nesting bird habitat would be limited to industrial areas. Peregrine falcons often nest on tall buildings, and their nests could occur on industrial buildings or rock outcrops associated with surrounding grasslands. American peregrine falcon is documented from undisclosed areas of Benicia (CDFW, 2013), but nests are not known to occur on Refinery structures. Thus, of the special-status species potentially present in the adjacent Sulphur Springs Creek riparian corridor, Project construction and operation is only likely to affect nesting birds, indirectly, as described below.

Impact 4.2-1: The Project could have a substantial adverse effect on nesting birds in the Sulphur Springs Creek riparian corridor. (*Less than Significant with Mitigation*)

The Project could have a substantial adverse indirect effect on nesting birds. The noise, vibrations, visual disturbance, and increased human activity associated with Project construction could result in nest failure (disturbance, avoidance, or abandonment that leads to unsuccessful reproduction), or cause flight behavior that exposes an adult or its young to predators such as Cooper's hawks *(Accipiter cooperii*). Nest failure is a possible but unlikely outcome of construction activities, since the baseline noise and activity levels at the Refinery would not be significantly increased by construction activities. However, if it were to occur, nest failure would be a significant effect under CEQA and a violation of California Fish and Game Code Sections 3503-3513 and the federal Migratory Bird Treaty Act. During operation, the noise, vibrations, visual disturbance, and increased human activity associated with the Project become part of the ambient environment, so any birds that subsequently nest nearby are presumed to be tolerant of the disturbance. Implementation of the following mitigation measure would reduce potentially significant construction-related effects on nesting birds to a less-than-significant level.

> **Mitigation Measure 4.2-1:** Project construction activities should avoid the nesting season of February 15 through August 31, if feasible. If seasonal avoidance is not possible then no sooner than 30 days prior to the start of any Project activity a biologist experienced in conducting nesting bird surveys shall survey the Project area and all accessible areas within 500 feet. If nesting birds are identified, the biologist shall implement a suitable protective buffer around the nest and no activities shall occur within this buffered area. Typical buffers are 250 feet for songbirds and 500 feet for raptors, but may be increased or decreased according to site-specific, Project-specific, activity-specific considerations such as visual barriers between the nest and the activity, decibel levels associated with the activity, and the

species of nesting bird and its tolerance of the activity. Construction activities that are conducted within a reduced buffer shall be conducted in the presence of a qualified full-time biological monitor.

Significance after Mitigation: Less than significant.

---

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

Impact 4.2-2: The Project could have a substantial adverse effect on the Sulphur Springs Creek riparian corridor. (*Less than Significant with Mitigation*)

The Sulphur Springs Creek riparian corridor and downstream coastal brackish marshes could potentially experience adverse effects from Project construction, resulting from excessive sediment loads generated by grading and other soil-disturbing activities adjacent to Sulphur Springs Creek that are carried into the stream. However, Project construction would be restricted to active work areas within the Refinery property and indirect impacts to Sulphur Springs Creek would be prevented through implementation of appropriate mitigation. Proposed Project construction would occur primarily during the low-flow period of April 15 through October 15 when rainfall is not anticipated and the transport of sediments by surface flow would be unlikely. Additionally, the Project would implement construction Best Management Practices and Storm Water Pollution Prevention measures identified in Section 4.8, *Hydrology and Water Quality*. Implementation of Mitigation Measure 4.8-1 would reduce potential construction-related impacts on riparian habitat and downstream costal brackish marshes to a less-than-significant level. No additional mitigation is required.

Significance after Mitigation: Less than significant.

---

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Impact 4.2-3: The Project could have a substantial adverse effect on federally protected wetlands. (*Less than Significant with Mitigation*)

No wetlands or waters occur in the Project construction footprint. Sulphur Springs Creek is outside the Refinery property but adjacent to the northeast Project boundary. Sulphur Springs Creek is a federally protected waters, and downstream coastal brackish marshes are federally protected wetlands. Without mitigation, these waters could potentially experience indirect adverse effects resulting from Project construction such as sediment loading during grading activities or soil stockpiling. However, the implementation of Mitigation Measure 4.8-1 would reduce potential indirect impacts on federally protected wetlands to a less-than-significant level. Project operation would not significantly increase surface runoff, but operational water quality impacts

would be addressed through the preparation and implementation of drainage improvements and stormwater capture and treatment systems described in Section 4.8, *Hydrology and Water Quality*. No additional mitigation is required.

---

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

Impact 4.2-4: The Project could interfere with wildlife movement in the Sulphur Spring Creek riparian corridor. (*Less than Significant*)

The Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. No nursery sites such as monarch butterfly roosting groves, heron rookeries, or bat roosts are known to occur in the Project Study Area and migratory fish such as steelhead are not documented to occur in Sulphur Springs Creek. The Sulphur Springs Creek riparian zone is a likely movement corridor for wildlife, and could be adversely affected during Project construction and operation by the use of nighttime lighting, which could deter use of the corridor. However, the downward orientation of Project lighting, away from the riparian corridor, should result in a less-than-significant impact on wildlife movement, not substantially affecting movement relative to the current Project baseline.

Mitigation: None required.

---

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

Impact 4.2-5: The Project may not be in conformance with applicable habitat conservation plans. (*No Impact*)

The Project would be constructed within an active industrial area inside the existing Refinery boundary and would not conflict with the programs and policies of the *City of Benicia General Plan* (City of Benicia, 1999) or the *Solano County General Plan* (Solano County, 2008). Other area plans described in Section 4.2.2.3, Regulatory Setting, including the *Solano County Habitat Conservation Plan*, are not applicable to the Refinery. Therefore, the Project is in conformance with applicable habitat conservation plans, and there is no impact.

Mitigation: None required.

4.2.4.2 Suisun Marsh

In addition to impacts to the Project Study Area above, the Suisun Marsh located south and east of the Refinery is crossed by UPRR mainline railroad tracks which would be used to transport crude feedstocks to the Project. The following considers the potential indirect impacts of accidental releases related to this proposed new transport on the Marsh. Note that these impacts also may apply to other sensitive areas anywhere along the railroad tracks used to transport crude feedstocks.

Under existing conditions, the marine vessels that transport crude oil to local Refineries utilize open waterways that are adjacent to Suisun Marsh. Thus, there is a finite risk that crude oil would be released into the waters of the Carquinez Strait and a subsequent risk that tidal or wind action could drive the release and cause an adverse effect on the Marsh. The risk of such a release is discussed in Section 4.7, *Hazards and Hazardous Materials*. Whatever the current total risk from all such ship traffic, operation of the Project along with the reduction in of up to 82% of marine vessel trips, would decrease the risk of release and also decrease the risk of adverse effect to the Marsh. (See Section 3.1.1.2 for a discussion of the decrease in crude oil delivered by marine vessel and the discussion of Impact 4.7-2 in Section 4.7, *Hazardous and Hazardous Materials*).

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, the National Marine Fisheries Service, or U.S. Fish and Wildlife Service.

The Suisun Marsh supports the special-status natural communities Coastal Brackish Marsh, Northern Claypan Vernal Pool, and Valley Needlegrass Grassland, and a wide variety of special-status animals and plants including fairy shrimp, smelt, steelhead, California tiger salamander, California red-legged frog, California black rail, California clapper rail, salt marsh harvest mouse, soft bird’s beak, Suisun thistle, Contra Costa goldfields, and many others. Construction of the Project would not impact these species, as existing railroad tracks would be used to transport crude oil between Roseville and the Refinery. However, the following impacts could occur.

Impact 4.2-6: The Project could have a substantial adverse effect on special-status wildlife species in the Suisun Marsh disturbed by an increased frequency (high traffic volumes) of railcars through the marsh. (*Less than Significant*)

Project operation could impact species by increasing the volume (number or duration) of railcars travelling through the marsh, causing increased noise and vibration. Noise pollution is a concern to wildlife conservation. In humans, long-term exposure to noise can induce psychological stress and lead to physiological disorder (Job, 1996; Stansfeld et al., 1993; Lines et al., 1994; Job, 1996; and Babisch et al., 1999 *in* Seiler, 2001). Whether wildlife is similarly stressed by noise is questionable but some species may perceive railroad noise as a token for human presence and consequently avoid these areas (Klein, 1971; Rost and Bailey, 1979; Curatolo and Murphy, 1986; McLellan and Schackleton, 1988; and Mace et al.,1996 *in* Seiler, 2001). The effects of train noise on wildlife have not been studied, and have not been studied across a range of taxa (e.g., insect

pollinators, amphibians, birds, mammals). Birds may be especially sensitive to noise, as it directly interferes with their vocal communication and affects territorial behavior and mating success.

Rail traffic causes intermittent noise, present when the train is passing and ceasing between trains. A researcher at the University of Edinburgh, Scotland determined the pattern of amplitude decay of train noise in the natural environment (Altringham, 2012), finding that it peaked at 25 meters (82 feet) with no significant difference between woodland and open ground. Sound in the higher frequency range experienced by birds deteriorated faster than full frequency spectrum sound. From its peak at 25 meters, railroad noise amplitude deteriorated to 50% at 200 meters (656 feet) for full spectrum noise, and deteriorated to 30% in the bird call frequency band. In other words, of all the noise generated by the train, only 30% would be experienced by birds 200 meters away. In comparison, she notes that vehicle road noise generates almost continuous noise pollution over a much greater distance, resulting in a wider lateral disturbance zone with amplitude deteriorating to just 50% at 900 meters (2,9503 feet).

The species currently inhabiting areas within 200 meters of the railroad are presumably habituated to the current level of railcar traffic, else they would not be present. It is possible these areas provide essential breeding habitats that are rare or missing in the surrounding landscape, and that species are present even though disturbance effects may reduce the quality of these habitats (Seiler, 2001). Special-status species documented to occur within a more conservative 400 meters (1,312 feet) of the railroad alignment through Suisun Marsh are the monarch butterfly, calippe silverspot butterfly, Suisun song sparrow, salt marsh common yellowthroat, California black rail, California clapper rail, burrowing owl, Suisun shrew, and salt marsh harvest mouse (CDFW, 2013). The Project would add up to four trains to the daily average of 42 trains traveling through the marsh. The majority of these, approximately 35 trains, run during daytime hours and approximately 7 trains run during nighttime hours; the Project would add trains during the nighttime hours. The average number of cars in each train (i.e., the duration of disturbance generated by a single train as experienced by a stationary receptor) is unknown for baseline and Project conditions.

The Project would not increase the lateral area of disturbance that extends approximately 200 meters from the railroad alignment, relative to baseline conditions, since this is determined by physical laws of sound attenuation. The addition of four trains would increase the number of intermittent disturbances by 9.5%. Perhaps more importantly, if all four trains were added during nighttime hours when presently only about 7 trains run, the percentage increase of train cars running during nighttime hours would be closer to 60%. However, it is reasonable to assume that there would continue to be long periods of silence punctuated by intermittent, and relatively short, periods of train disturbance. Thus, while the increase in train traffic may initially have a slight negative effect on nearby wildlife species, they are expected to soon habituate to the increased noise. The impact is less than significant, and no mitigation is required.

Mitigation: None required.

Impact 4.2-7: In the event of a train accident that involves a relatively large amount of oil spilled from one or more tank cars, the Project could have a substantial adverse effect on special-status natural communities and special-status species, including those present in the Suisun Marsh. (*Less than Significant*)

The approximately 730 trains that would transport crude oil through the Marsh each year would introduce a risk of an oil spill if a train were to derail *and* breach the integrity of the tank car, spilling some of its contents. Though a spill could occur anywhere along the line, the aquatic character of Suisun Marsh and the number of special-status organisms it supports make it an especially vulnerable location for a large spill. Depending on the location and severity of an oil spill and its resulting effects on special-status species, this could be a significant impact. However, the risk of a release greater than 100 gallons is along the portion of the route traversing the Suisun wetland area is very low at 0.00381, which corresponds to an estimated frequency of once per 262 years (see Section 4.7.5). Because the risk is very low, the impact would be considered to be less than significant.

Mitigation: None required.

---

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Impact 4.2-8: The Project could have a substantial adverse effect on federally protected wetlands. (*Less than Significant*)

Suisun Marsh is a federally protected wetland. As described in Section 4.2.2.1, Setting, Suisun Marsh is the largest contiguous brackish water marsh remaining on the west coast of North America and is a critical part of the San Francisco Bay-Delta estuary ecosystem. An oil spill in the Suisun Marsh, depending on the location and severity of the spill and its resulting effects, could be a significant impact. However, given that the likelihood of an oil spill of any size related to the trains that transport crude oil each year is considered to be “unlikely,” as explained in 4.2-7 above, the impact would be considered to be less than significant.

Mitigation: None required.

---

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

Impact 4.2-9: The Project may not be in conformance with applicable habitat conservation plans. (*Less than Significant*)

The *Solano County General Plan*, the *Suisun Marsh Habitat Management, Preservation, and Restoration Plan*, the *Solano County Habitat Conservation Plan*, and the *Yolo County Habitat*

Conservation Plan acknowledge the presence of railroad tracks through the Suisun Marsh and briefly address the need for levee maintenance, track maintenance, and/or transport of hazardous materials. Other plans do not address these issues. The biological focus of these plans is on the preservation, restoration, and enhancement of the Suisun Marsh. The tank car transport of crude oil through the Suisun Marsh does not expressly conflict with any of these plans.

Mitigation: None required.

4.3 Cultural Resources

4.3.1 Introduction

Cultural resources include historical resources, unique archaeological resources, paleontological resources, and human remains. This section evaluates the potential for the Project to result in substantial adverse effects on these resources.

4.3.2 Setting

The Valero Benicia Refinery is in the City of Benicia, situated on the northern bank of the Carquinez Strait. The strait represents the entry point for the Sacramento and San Joaquin Rivers into the San Francisco Bay. Benicia lies within both the San Francisco Bay and the west end of the Central Valley archaeological regions, and both contain a rich array of prehistoric and historic-period cultural resources. More specifically, the areas surrounding the Carquinez Strait and Suisun Bay have been occupied for millennia given its abundant combination of littoral and oak woodland resources.

4.3.2.1 Paleontological Setting

The Society of Vertebrate Paleontology (SVP) has established guidelines for the identification, assessment, and mitigation of adverse impacts on nonrenewable paleontological resources (SVP, 1995, 1996). Many federal, state, county, and city agencies have either formally or informally adopted the SVP's standard guidelines for the mitigation of adverse construction-related impacts on paleontological resources.

Paleontological Potential

The surface soils of the Project site consist of approximately 10 to 15 feet of artificial fills. Based on the guidelines discussed above, artificial fill does not have paleontological potential.

4.3.2.2 Geoarchaeological Context

Historically on the Refinery site, excavated native unconsolidated deposits and crushed bedrock were placed as compacted fill, ranging from approximately 10 to 50 feet in topographically low areas in the vicinity (Woodward-Clyde, 1993). A recent geotechnical study indicates the Project site specifically is underlain by between 10 to 15 feet of artificial fill (Kleinfelder, 2013). These disturbed deposits would not yield buried archaeological resources.

4.3.2.3 Cultural Setting

Prehistoric Context

Archaeologists have developed individual cultural chronological sequences tailored to the archaeology and material culture of each subregion of California. Each of these sequences is based principally on the presence of distinctive cultural traits and stratigraphic separation of

deposits. Milliken et al. (2007) suggest a framework for the interpretation of the San Francisco Bay Area. That research divides human history in California into three broad periods: the Early Period, the Middle Period, and the Late Period. Economic patterns, stylistic aspects, and regional phases further subdivide cultural patterns into shorter phases. This scheme uses economic and technological types, socio-politics, trade networks, population density, and variations of artifact types to differentiate between cultural periods.

Ethnographic Background

Based on a compilation of ethnographic, historic, and archaeological data, Milliken (1995) describes a group known as the Ohlone, who once occupied the general vicinity of the Project site. Levy (1978) describes the language group spoken by the Ohlone, known as "Costanoan." This term is originally derived from a Spanish word designating the coastal peoples of Central California. Today Costanoan is used as a linguistic term that references to a larger language family spoken by distinct sociopolitical groups that spoke at least eight languages (as different as Spanish is from French) of the same Penutian language group. The Ohlone once occupied a large territory from San Francisco Bay in the north to the Big Sur and Salinas Rivers in the south. The Project site is in the greater *Karkin*-speaking tribal area, centered on both sides of the Carquinez Strait (Milliken et al., 2009).

Historical Background

The first Europeans to visit the San Francisco Bay area were Spanish explorers who passed through in 1772. After Mexico won independence from Spain in 1821, large tracts of land in California were granted to military heroes and loyalists. The area surrounding Benicia became a portion of Mariano Vallejo's military territory with the purchase of Rancho Suscol from the government in 1844, which included control of Mission Sonoma and the Benicia area. In 1847 the United States government acquired 252-acres adjacent to the City of Benicia for a military reserve. The Benicia Barracks were constructed in 1849 and in 1851 the first Ordnance Supply Depot in the West was established. In 1852 it was designated the Benicia Arsenal. Benicia became a vital metropolis for Northern California that rivaled San Francisco in terms of religious, military, and educational diversity and centrality. The Benicia Arsenal was deactivated in 1963, and the facility was closed in 1964. The Arsenal Historic Conservation Plan, adopted by the City of Benicia in 1993, includes objectives and policies for the preservation of buildings and structures associated with the historic arsenal.

Cultural Resources Research and Assessment

ESA conducted a records search of all pertinent survey and site data at the Northwest Information Center (NWIC) of the California Historical Resources Information System on July 31, 2002 with an update on January 28, 2013 (File No. 12-0760). The records were accessed by referring to the Benicia USGS 7.5-minute quadrangle map, Sections 25 and 30, Township 2 North, Range 3 West and 2 West. The review included the Project site, as shown in Figures 3-2 through 3-3, and a half-mile buffer. Previous surveys, studies, and site records were accessed as they pertained to the Project site. Records were also accessed and reviewed in the *Historic Property Data File for*

Solano County, which includes listings from the *National Register of Historic Places*, the *California Register of Historical Resources*, the *California Inventory of Historic Resources*, the *California Historical Landmarks*, and the *California Points of Historical Interest*.

The records search indicated that no previously recorded archaeological resources have been identified within the Project site or within the half-mile records search radius. Qualified archaeologists conducted a pedestrian survey of the Refinery in 2001 (URS, 2001). The surveyors noted the extent of soil disturbance due to grading and identified no archaeological resources within the boundaries of the Refinery. Based on previous development/disturbance in the Refinery property generally and the Project site specifically, as well as expected ground disturbance from the Project, there is a very low potential to uncover archaeological resources.

The records search indicated that the nearest known recorded architectural resource is the Benicia Arsenal Igloo Bunker #C-425 (designated as P-48-000516; Dexter, 2001). This structure is a World War II-era concrete ammunition bunker within the Refinery property that was previously recommended not eligible for listing in the California Register of Historical Resources (CRHR) or the National Register of Historic Places (NRHP). The bunker is located over 1,000 feet west of the Project site and would be unaffected by the Project.

4.3.2.4 Regulatory Setting

Federal Regulations

Archaeological resources are protected through the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470f), and its implementing regulations. Prior to implementing an "undertaking" (e.g., federal funding or issuing a federal permit), Section 106 of the NHPA requires federal agencies to consider the effects of the undertaking on historic properties (i.e., properties listed in or eligible for listing in the NRHP) and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the NRHP. Under the NHPA, a property is considered significant if it meets the NRHP listing criteria at 36 CFR 60.4, as stated below:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and that:
>
> a) Are associated with events that have made a significant contribution to the broad patterns of our history, or
>
> b) Are associated with the lives of persons significant in our past, or
>
> c) Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or
>
> d) Have yielded, or may be likely to yield, information important in prehistory or history.

Federal review of projects is normally referred to as the Section 106 process. This process is the responsibility of the federal lead agency. The Section 106 review normally involves a four-step procedure, which is described in detail in the implementing regulations (36 CFR Part 800):

- Identify historic properties in consultation with the State Historic Preservation Officer (SHPO) and interested parties;
- Assess the effects of the undertaking on historic properties;
- Consult with the SHPO, other agencies, and interested parties to develop an agreement that addresses the treatment of historic properties and notify the Advisory Council on Historic Preservation; and finally,
- Proceed with the project according to the conditions of the agreement.

State Regulations

The State of California implements the NHPA of 1966, as amended, through its statewide comprehensive cultural resource surveys and preservation programs. The California Office of Historic Preservation, as an office of the California Department of Parks and Recreation (DPR), implements the policies of the NHPA on a statewide level. The Office of Historic Preservation also maintains the California Historical Resources Inventory. The SHPO is an appointed official who implements historic preservation programs within the State's jurisdictions.

California Environmental Quality Act

CEQA, as codified in Public Resources Code (PRC) Section 21000 et seq., is the principal statute governing the environmental review of projects in the State. CEQA requires lead agencies to determine if a proposed project would have a significant effect on historical resources, including archaeological resources. The CEQA Guidelines define a historical resource as: (1) a resource in the CRHR; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC Section 21084.1 and CEQA Guidelines Section 15064.5 would apply. If an archaeological site does not meet the CEQA Guidelines criteria for a historical resource, then the site may meet the threshold of PRC Section 21083 regarding unique archaeological resources. A unique archaeological resource is "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

3) Is directly associated with a scientifically recognized important prehistoric or historic event or person (PRC Section 21083.2 [g]).

The CEQA Guidelines note that if a resource is neither a unique archaeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064[c][4]).

California Register of Historical Resources

The CRHR is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility to the CRHR are based on NRHP criteria (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the CRHR, including California properties formally determined eligible for or listed in the NRHP.

To be eligible for the CRHR a historical resource must be significant at the local, state, and/or federal level under one or more of the following criteria:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

2) Is associated with the lives of persons important in our past.

3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

4) Has yielded, or may be likely to yield, information important in prehistory or history (PRC Section 5024.1[c]).

For a resource to be eligible for the CRHR, it must also retain enough integrity to be recognizable as a historical resource and to convey its significance. A resource that does not retain sufficient integrity to meet the NRHP criteria may still be eligible for listing in the CRHR.

Provisions for Paleontological Resource Protection

PRC Section 5097.5 prohibits "knowing and willful" excavation, removal, destruction, injury, and defacement of any paleontological feature on public lands (lands under state, county, city, district, or public authority jurisdiction, or the jurisdiction of a public corporation), except where the agency with jurisdiction has granted permission.

Effects on Human Remains

Under State law, human remains and associated burial items may be significant resources in two ways: they may be significant to descendent communities for patrimonial, cultural, lineage, and religious reasons; and human remains may also be important to the scientific community, such as

prehistoric archaeologists, epidemiologists, and physical anthropologists. The specific stake of some descendent groups in ancestral burials is a matter of law for some groups, such as Native Americans (CEQA Guidelines Section 15064.5 (d), PRC Section 5097.98). In other cases, the concerns of the associated descendent group regarding appropriate treatment and disposition of discovered human burials may become known only through outreach. Beliefs concerning appropriate treatment, study, and disposition of human remains and associated burial items may be inconsistent and even conflict between descendent and scientific communities. CEQA and other State regulations concerning Native American human remains provide the following procedural requirements to assist in avoiding potential adverse effects to human remains within the contexts of their value to both descendent communities and the scientific community:

- When an initial study identifies the existence or probable likelihood that a project would impact Native American human remains, the lead agency is to contact and work with the appropriate Native American representatives identified through the Native American Heritage Commission (NAHC) to develop an agreement for the treatment and disposal of the human remains and any associated burial items (CEQA Guidelines Section 15064.5 [d], PRC Section 5097.98).

- If human remains are accidentally discovered, the county coroner must be contacted. If the county coroner determines that the human remains are Native American, the coroner must contact the NAHC within 24 hours. The NAHC must identify the most likely descendant (MLD) to provide for the opportunity to make recommendations for the treatment and disposal of the human remains and associated burial items. If the MLD fails to make recommendations within 48 hours of notification or the project applicant rejects the recommendations of the MLD, the Native American human remains and associated burial items must be reburied in a location not subject to future disturbance within the project site (PRC Section 5097.98).

- If potentially affected human remains/burial may have scientific significance, whether or not having significance to Native Americans or other descendent communities, then under CEQA, the appropriate mitigation of effect may require the recovery of the scientific information of the remains/burial through identification, evaluation, data recovery, analysis, and interpretation (CEQA Guidelines Section 15064.5[c][2]).

4.3.3 Significance Criteria

Based on CEQA Guidelines Section 15064.5 and CEQA Guidelines Appendix G, a project would cause adverse impacts to cultural resources if it would:

a) Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5;

b) Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to CEQA Guidelines Section 15064.5;

c) Directly or indirectly destroy a unique paleontological resource or site or unique geological feature; or

d) Disturb any human remains, including those interred outside of formal cemeteries.

4.3.4 Discussion of No Cultural Resources Impacts

Review and comparison of the setting circumstances and Project characteristics with the significance criteria stated above, clearly show that no impacts would result for any of these criteria. The following discusses the reasoning supporting this conclusion:

a) Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5.

CEQA Guidelines Section 15064.5 requires the lead agency to consider the effects of a project on historical resources. A historical resource is defined as any building, structure, site, or object listed in or determined to be eligible for listing in the California Register of Historical Resources, or determined by a lead agency to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California. The following discussion focuses on architectural and structural resources. Archaeological resources, including archaeological resources that are historical resources according to Section 15064.5, are addressed below under criteria b).

The Project would not impact any previously recorded historic-period buildings or structures within the Project site. As discussed in Section 4.3.2.3 Cultural Setting above, the nearest known recorded resource is the Benicia Arsenal Igloo Bunker #C-425. This structure is located over 1,000 feet west of the Project site and would be unaffected by the Project.

The Project would have no impact on historical resources and no mitigation is required.

b) Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to CEQA Guidelines Section 15064.5.

This section discusses archaeological resources, both as historical resources according to CEQA Guidelines Section 15064.5 as well as unique archaeological resources as defined in Public Resources Code Section 21083.2 (g).

The records search at the NWIC discussed above indicates that no previously recorded archaeological resources are located within the Project site or within the half-mile records search radius. Qualified archaeologists conducted a pedestrian survey of the Refinery in 2001 (URS, 2001). The surveyors noted that the extent of soil disturbance due to grading and identified no prehistoric archaeological resources within the boundaries of the Refinery.

No unique prehistoric or historic-period archaeological resources were identified within the Project site during the background research or the 2001 surface survey. Based on previous development/disturbance in the Refinery property generally and the Project site specifically, as well as expected ground disturbance from the Project, there is a very low potential to uncover archaeological resources.

Based on the geologic context and proposed depth of ground disturbance there would be no impact on archaeological resources and no mitigation is required.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geological feature.

Rock formations that are considered of paleontological sensitivity are those rock units that have yielded significant vertebrate or invertebrate fossil remains. The soils of the Project site consist of approximately 10 to 15 feet of artificial fills below the ground surface. The Project would not extend below the artificial fills.

Artificial fill does not have paleontological potential and no mitigation is required.

d) Disturb any human remains, including those interred outside of formal cemeteries.

There is no indication that the Project site has been used for burial purposes in the recent or distant past. The soils of the Project site consist of approximately 10 to 15 feet of artificial fills below the ground surface.

Based on the geologic context of the Project site and proposed depth of ground disturbance, there would be no potential to uncover human remains and no mitigation is required.

4.3.5 Discussion of Impacts and Mitigation Measures

There would be no impacts to cultural resources.

4.4 Energy Conservation

4.4.1 Introduction

This section presents analysis of the Project's relationship to energy conservation goals as described in Appendix F of the CEQA Guidelines. This section discusses the physical and regulatory setting, the baseline for determining environmental impacts, the significance criteria used for determining environmental impacts, and potential impacts associated with construction and operation of the Project.

4.4.2 Setting

The Refinery is a component of the energy infrastructure in the State of California. The Refinery currently processes a range of raw materials to produce gasoline, diesel, and other fuels for the California market. Approximately 70% of the Refinery's product is clean-burning gasoline; other products include diesel, jet fuel, fuel oil, propane and asphalt.

4.4.2.1 Regional Setting

California's energy system includes electric, natural gas, hydroelectric, nuclear, and petroleum resources. California's energy production system provides 71% of the electricity, 12% of the natural gas, and 38% of the petroleum consumed or used for the State. The rest of the State's energy needs are imported and include: natural gas purchases from Canada (22%), the Rocky Mountain states (23%), and the Southwest (42%); electricity from the Pacific Northwest (8%, primarily hydroelectric-generated) and the Southwest (21%, primarily coal and nuclear generated); and crude oil imported from Alaska (12%) and foreign sources (50%) (CEC, 2011).

The production of electricity requires the consumption or conversion of energy resources, including water, wind, oil, gas, coal, solar, geothermal, and nuclear sources. Of the electricity generated in-State in 2012, 61.1% was generated by natural gas-fired power plants, 0.8% was generated by coal-fired power plants, 11.7% came from large hydroelectric dams, and 9.3% came from nuclear power plants. The remaining 17.1% of the in-State total electricity production was supplied by renewable sources (CEC, 2011). The electricity generated is distributed via a network of transmission and distribution lines commonly referred to as the power grid (CEC, 2013).

4.4.2.2 Project Setting

In 2001, Valero installed a one-unit 51 megawatt (MW) cogeneration plant. This unit met power demand of existing Refinery operations and effectively removed that demand from the grid at the time. In that timeframe, Valero considered installation of a second 51 MW cogeneration unit but decided not to implement it. In 2002, the Refinery power use was approximately 50 MW of electricity. As part of its 2003 Valero Improvement Project (VIP) Valero also proposed to increase its electrical power use by about 23 MW. This increase in energy use was approved as part of the approval of the VIP in 2003 by the City of Benicia.

The Refinery uses natural gas as the marginal fuel when it is not economical or possible to use refinery gas or propane. Natural gas is typically used as a feedstock for the processes that produce clean fuels. In addition, the Refinery currently generates most of the electricity and refinery gas necessary to operate the Refinery and with the Project, would continue this practice.

4.4.2.3 Regulatory Setting

Federal and state agencies regulate energy use and consumption through various programs. On the federal level, the U.S. Department of Transportation, U.S. Department of Energy, and U.S. Environmental Protection Agency are three agencies with substantial influence over energy policies and programs. Generally, federal agencies influence transportation energy consumption through establishment and enforcement of fuel economy standards for automobiles and light trucks, through funding of energy related research and development projects, and through funding for transportation infrastructure projects. On the state level, the California Public Utilities Commission and California Energy Commission (CEC) are the two agencies with authority over different aspects of energy.

In addition, the Federal Railroad Administration (FRA) was created by the Department of Transportation Act of 1966. It is one of ten agencies within the U.S. Department of Transportation concerned with intermodal transportation, and implements federal environmental laws and policies related to the nation's railroads. Any discretionary decisions are made by the FRA for projects under their jurisdiction; however, the Project does not require FRA approval.

Federal Regulations

Energy Policy and Conservation Act

The Energy Policy Act of 1975 was established in response to the oil crisis of 1973, which increased oil prices due to a shortage of reserves. The Act required that all vehicles sold in the U.S. meet certain fuel economy goals. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 miles per gallon. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not subject to fuel economy standards. This Act indirectly applies to the Project due to its requirements for increased fuel economy standards particularly for the construction equipment to be used.

Energy Policy Act of 2005

The Energy Policy Act of 2005 seeks to reduce reliance on non-renewable energy resources and provide incentives to reduce current demand on these resources. For example, under the Act, consumers and businesses can attain federal tax credits for purchasing fuel-efficient appliances and products, buying hybrid vehicles, building energy efficient buildings, and improving the energy efficiency of residential and commercial buildings. Additionally, tax credits are available for the installation of qualified fuel cells, stationary microturbine power plants, and solar power equipment.

State and Local Regulations

State of California Integrated Energy Policy

In 2002, the Legislature passed Senate Bill 1389, which required the CEC to develop an integrated energy plan biannually for electricity, natural gas, and transportation fuels, for the California Energy Report. The plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for Zero Emission Vehicles and their infrastructure needs, and encouragement of urban designs that reduce vehicle miles traveled and accommodate pedestrian and bicycle access.

The latest update – the *2013 Integrated Energy Policy Report Update* – was proposed for adoption by the CEC on December 20, 2013 (CEC, 2013) and provides the results of the CEC's assessments of a wide variety of energy issues currently facing California. These issues include future demand for electricity, natural gas, and transportation fuels; energy efficiency in California's existing buildings; publicly owned utilities' progress toward achieving 10-year energy efficiency targets; the definition of zero-net-energy and its inclusion in state building standards; challenges to increased use of geothermal heat pump/ground loop technologies and procurement of biomethane; using demand response to meet California's energy needs and integrate renewable technologies; bioenergy development; California's electricity infrastructure needs given potential retirement of power plants and the closure of the San Onofre Nuclear Generating Station; new generation costs for utility-scale renewable and fossil-fueled generation; the need for investments in new or upgraded transmission infrastructure; utility progress in implementing past recommendations related to nuclear power plants; natural gas market trends; the Alternative and Renewable Fuel and Vehicle Technology Program; potential vulnerability of California's energy supply and demand infrastructure to the effects of climate change, and potential electricity system needs in 2030.

City of Benicia Municipal Code

Chapter 17.32 of the City of Benicia Municipal Code contains several regulations and performance standards regarding Industrial District land uses, but does not contain specific polices related to energy conservation within industrial land uses that apply to the Project.

City of Benicia General Plan

The City of Benicia General Plan identifies goals and policies pertaining to energy conservation, however they are related to urban development and do not specifically apply to the Project.

Solano County General Plan

The Solano County General Plan's Energy Resources and Conservation section identifies Gasoline as an important source of energy in the county, including operations of the Refinery, and recognizes that it is an important contributor to energy production and the local economy. Specific goals identified within this section primarily focus on increasing efficiency of energy resources, and reducing energy consumption in all new and existing development, as well as the need to produce renewable energy, which will help the county reduce its reliance on fossil fuels.

City of Benicia Climate Action Plan

On September 15, 2009, the Benicia City Council adopted the Benicia Climate Action Plan (CAP), which identifies specific measures on how the City can achieve GHG reduction targets. The Climate Action Plan has established targets for City government operations and for the community at large. The City government goal is to reduce GHG emission 25 percent below 2000 levels by 2010 and 33 percent below 2000 by 2020. The community-wide emission reduction goal is to maintain 2005 emission levels by 2010 and reduce emissions to 10 percent below 2000 levels by 2020.

In 2014, the City Council accepted the 2010 GHG Inventory Update Report, which quantified 2010 emissions and assessed the City's progress toward meetings its reduction targets. The City narrowly missed its reduction targets (reduced emissions by 21%), while community-wide emissions excluding large emitters increased (41%) (emissions increased by only 24% including large emitteers). As part of the 2010 update, the City decided to report emissions from large emitters, but ultimately exclude them utilizing a method developed in nearby Contra Costa County. Permitted entities, 64% of natural gas use (process related), and Valero's emissions were ultimately excluded from totals and will allow the City to focus on those entities over which it has regulatory control. The Update Report also included reference to emission reducing projects completed be Valero including:

- Participated in the Solano Napa Commute Challenge; 24 people registered and 15 people completed the challenge. Valero earned a "Top 10" in the county for its participation.
- Nominated by the Solano Transportation Authority (STA) Board for Business of the Year (16th Annual STA Awards).
- Installed new heat exchanger that recovers heat from various processes and uses it to heat new crude oil. Nexant, the third-party company hired by PG&E to verify energy savings, reported that the exchanger will save 3,530 metric tons of CO2e annually.
- Changed shift cycles from 8 hours to 12 hours; 2 shifts per day instead of 3, reducing one round-trip commute for 275 people. In addition, employees travel during non-heavy commute times, reducing trip time and congestion during peak travel times.
- Installed Flue Gas Scrubber (FGS) unit at refinery. The FGS is designed to reduce SO2 (sulfur dioxide) and NOx (nitrogen oxide, a precursor to smog), and particulate matter (PM). Since startup in February 2011, the FGS has reduced emissions of SO2 by over 6,000 tons (95% reduction), 750 tons of NOx (55% reduction), and 60 tons of particulate matter per year. This project also allowed the refinery to retire older heaters in favor of new energy-efficient furnaces. Finally, this project also eliminates air emissions of ammonia that were previously used to control NOx.

4.4.2.4 Project Baseline

For the energy conservation analysis, the baseline reflects the existing energy used and/or produced at the Refinery as it existed at the time of preparation of the Initial Study / Mitigated Negative Declaration i.e., Spring 2013.

4.4.3 Significance Criteria

Appendix F of the CEQA Guidelines provides guidance for assessing energy impacts of projects. The appendix provides three goals:

- Decreasing overall per capita energy consumption;
- Decreasing reliance on natural gas and oil; and
- Increasing reliance on renewable energy sources.

Consistent with Appendix F, environmental impacts evaluated in this analysis include:

a) The Project's energy requirements by amount and fuel type for each stage of the Project including construction, operation, maintenance and/or removal;

b) The effects of the Project on local and regional energy supplies and on requirements for additional capacity;

c) The effects of the Project on peak and base period demands for electricity and other forms of energy;

d) The degree to which the Project complies with existing energy standards;

e) The effects of the Project on energy resources; and

f) The Project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.

4.4.4 Discussion of No Energy Conservation Impacts

Review and comparison of the setting circumstances and Project characteristics with each of the six significance criteria stated above, clearly show that no impacts would result with respect to the following four issues.

b) The Project would cause no adverse effect on local and regional energy supplies or requirements for additional capacity.

c) Generally, the effects of the Project on peak and base period demands for electricity and other forms of energy would be neutral or beneficial.

d) The Project complies with existing energy standards by directly supporting and furthering efforts toward achieving those standards.

e) The Project would have no adverse effect on energy resources

The following discusses the reasoning supporting this no impact conclusion for the four above criteria:

The Refinery currently generates most of the electricity and refinery gas necessary to operate the Refinery and with the Project, would continue this practice. The Project would change the transportation method used to deliver a portion of the crude oil to the Refinery. Operation of the Project is not expected to increase the total Refinery electrical and fuel usage. Furthermore, the

Project would directly support energy conservation efforts through the implementation of energy conservation measures. As described above, the Project is not expected to increase the total Refinery electrical and fuel usage; therefore, it would not be expected to result in any adverse effects on existing energy resources available to the local area or region.

The construction and implementation of the Project would be required to comply with current energy standards and policies including local building codes and energy related standards for industrial structures. The City of Benicia and the County of Solano do not currently have any energy efficiency policies or standards specifically related to industrial development. However, in order to support efforts toward achieving current energy standards, Valero proposes to incorporate energy conservation measures into the Project that include installing: 1) Energy efficient lighting; 2) High efficiency electric motors; and 3) High efficiency pumps. Thus, the Project would not conflict with energy efficiencies or standards. The Project would not increase the volume of crude oil delivered to the Refinery because crude oil quantities delivered by train would be offset by a corresponding decrease in crude oil deliveries by marine vessels. The Project would replace marine vessel delivery with rail delivery, resulting in an approximate 81% reduction in marine vessel deliveries. In addition, the amount of energy that would be utilized under the Project is projected to be approximately equal to the amount of energy currently utilized in order to pump and transport the crude oil to the storage facility from the proposed unloading rack in comparison to existing pumping from the marine terminal. Furthermore, Valero proposes to implement energy conservation measures, such as the use of high efficiency lighting, high efficiency electric motors, and high efficiency pumps at the proposed tank car unloading rack. Thus, the operational energy usage from the Project is not expected to represent a substantive increase in energy consumption, or a wasteful or unnecessary consumption of energy, and would not have a significant impact to energy resources.

The Benicia Climate Action Plan (CAP) described above in Section 4.4.2.3 lists several energy-related non-binding strategies specific to the Valero Refinery in general to reduce emissions of greenhouse gasses. These strategies are:

E-3.1: Encourage Parking Lot Solar Photovoltaic Arrays

"Photovoltaic arrays can be placed on shade structures above parking lots, providing a large area for photovoltaic panels. Such projects could be developed at large parking lot sites belonging to Amports, Benicia High School, Valero, and the City."

IC-4.2. Investigate On-site Energy Production

"Generating on-site energy reduces fluctuation in energy cost and increases the efficiency of the power generated because of reduced transmission loss. The refinery should aggressively pursue increased on-site energy production. As future demand and processes change, Valero should consider becoming operationally independent for energy supply. On-site energy production measures include photovoltaic, wind power, and an increased number of cogeneration systems, as well as the exploration of fuel cell technologies for energy storage."

Valero already self generates most of its onsite electrical energy through its cogeneration unit (see Section 4.4.2.2 above) installed in 2001. So, in some respects, Valero has already complied with

IC-4.2. With regard to E-3.1, there are no new proposed parking lots associated with the Project and while this may be a strategy the Refinery may implement in the future, because the energy operational demand for the Project would be similar to existing conditions, there does not appear to be a Project-specific need for a parking lot solar installation to support the Project.

In summary, under operation of the Project, the Refinery would not increase the importation or exportation of product, and would continue to be a net exporter of energy. The Project would utilize a more efficient mode of transportation of product, implement energy conservation measures, and would not have a significant effect on local and regional energy supplies, and construction related impacts would be short term and temporary in nature; therefore, the Project would have no impact on issues outlined in the four significance criteria items above.

4.4.5 Discussion of Impacts and Mitigation Measures

This energy analysis addresses the changes in energy conservation that would result from the construction and operation of the Project.

Although two of the objectives of Appendix F focus on decreasing reliance on natural gas and oil and increasing reliance on renewable energy sources, these hydrocarbon energy sources remain critical to the functioning of society today. As a part of the State's energy infrastructure, the Refinery produces gasoline, diesel, and other hydrocarbon fuels for the California market, which enable the State economy to continue in support of the State's long-term energy goals.

a) Would the Project's energy requirements by amount and fuel type for each stage of the Project, including construction, operation, maintenance and/or removal, be considered significant?

Impact 4.4-1: Construction and operation of the Project would result in consumption of energy and could cause adverse effect on local and regional energy supplies or requirements. (*Less than Significant with Mitigation)*

Construction

Although construction-related energy consumption would be short-term in duration, it would represent irreversible consumption of fossil fuel energy resources. Construction-related energy expenditures would include both direct and indirect uses of energy in the form of fuel (typically diesel and gasoline) and electricity. Indirect energy use typically represents about three-quarters of total construction-related energy consumption, while direct energy represents about one-quarter of consumption (Hannon et al., 1978). Direct energy use would include the consumption of petroleum fuels for operation of construction vehicles and the use of electricity for construction equipment, such as welding machines and power tools. Energy consumed by power equipment used during construction would be relatively minimal, as would be the energy required for any required lighting and operation of ancillary electrical equipment. Indirect energy use includes the energy required to make the materials and components used in construction of the Project. This includes energy used for extraction of raw materials, manufacturing, and transportation associated with manufacturing. Implementation of Mitigation Measure 4.1-1, which is described and analyzed in Section 4.1, *Air Quality*, would ensure that fuel energy consumed in the construction phase

would not be wasted through unnecessary idling or through the operation of poorly maintained equipment. With implementation of Mitigation Measure 4.1-1 and the short construction period, construction of the Project would be less than significant.

Operations

The exact amount of energy usage by Project operations is not known. However, as the Project would off load and pump the same amount of crude feedstocks uphill to the same tanks used by the current marine vessels, it is assumed that the average energy use from the Project would be similar to the equivalent operations for the same crude feedstocks at the marine terminal, i.e., because the Project would simply replace the same amount of crude being delivered by marine vessel with it being delivered by tanker car, there should be no real significant change in energy use. Therefore, impacts from operations and maintenance of the Project related to energy conservation would be less than significant.

---

f) Would the Project's projected transportation energy use requirements be significant, and would the Project's overall use of transportation alternatives be efficient?

Impact 4.4-2: Transportation energy usage for the Project could result in wasteful or unnecessary consumption of energy. (*Less than Significant*)

As discussed Section 4.4.4 and in the discussion of Impact 4.4-1 above, Project construction and operation would result in the consumption of energy (primarily though fuel usage) during transportation of labor and materials to and from the Project site. This transportation-related energy usage would be greatest during construction activities. For the reasons discussed above, construction-related transportation energy use would be less than significant.

During Project operations, transportation-related energy usage in the form of diesel fuel used by trains bringing crude oil feedstocks to the Refinery and returning empty tank cars to North American source locations for refilling. However, with the Project marine vessels that currently deliver crude oil feedstocks would be reduced by approximately 81% on an annual basis. This reduction in energy use from marine vessel trips would be offset to some degree by the increase in energy use with the Project-related rail trips. Given that distances to potential crude feedstock sources over the life of the Project for both marine vessel and rail transport are likely to vary and depend on future market forces, it would be speculative to estimate or compare exact energy usage differences between the two modes of transport. However, published data are available to generally compare these two transport modes. One study suggests that marine vessels in domestic waters can typically travel 514 miles / gallon of fuel while transporting one ton of cargo, while rail transport can typically travel 202 miles / gallon of fuel while transporting one ton of cargo (Tennessee-Tombigbee Waterway, 2014). Another study estimated the differences as 340 person miles per gallon (pmpg) for marine vessels and 190.5 pmpg for rail transport (True Cost, 2014). These general data suggests that rail transport varies between less than half to three quarters in efficiency when compared to marine vessel transport on a per mile basis. Although as already stated, exact distances to potential crude feedstocks are not known for either marine vessel or rail

transport, it is likely that rail transport of North American sourced crude would tend to be much shorter than crude brought from Alaska or more distant foreign sources by marine vessels.

In summary, with operation of the Project although transportation of crude feedstocks would tend to be less efficient than marine vessels, the Refinery would continue to be a net exporter of energy to the marketplace. Thus, the change in efficiency in transportation energy usage from the Project would not represent a wasteful or unnecessary consumption of energy and would be a less-than-significant impact.

This page intentionally left blank

4.5 Geology and Soils

4.5.1 Introduction

This section describes the existing geology, soil conditions, and seismicity in the Project area in terms of local topography, geology, soil resources, and regional seismicity. This section also identifies local geologic and seismic hazards that could affect structures associated with the Project. The study area relevant to geology, soils, and geologic hazards is the physical footprint of the Project. The study area relevant to faulting and seismic hazards for the physical footprint of the Project is the broader Bay Area region, because distant faults can produce ground shaking and secondary seismic hazards at the Project site. Regulations, plans, and policies including federal and state laws related to geologic and seismic considerations that may be relevant to the Project also are discussed. Environmental impacts are subsequently determined, based on changes in the existing conditions resulting from the Project. The impact analysis is based, in part, on site specific geotechnical studies prepared in support of the Project; Kleinfelder West, Inc. prepared a Geotechnical Seismic Deformation Modeling Report, dated February 5, 2013 (“Kleinfelder, 2013a) and updated November 15, 2013 which incorporates Kleinfelder 2013a (“Kleinfelder, 2013b”).

4.5.2 Setting

4.5.2.1 Regional Geology

The Project is located in southern Solano County along the northern edge of Suisun Bay in the region of California known as the Coast Ranges geomorphic province. This province is characterized by a series of northwest trending ridges and valleys controlled by tectonic folding and faulting, examples of which include the Suisun Bay to the south, the East Bay Hills and Briones Hills to the southwest, the Vaca Mountains and Napa Valley to the north, and the Diablo Ranges to the southeast.

Regional basement rocks consist of the highly deformed Great Valley Sequence, which include massive beds of sandstone interfingered with siltstone and shale. Unconsolidated alluvial deposits, artificial fill, and estuarine deposits underlie the low-lying region along the margins of the Carquinez Straight and Suisun Bay. The estuarine sediments found along the shorelines of Solano County are soft, water-saturated mud, peat, and loose sands. The organic, soft, clay-rich sediments along the San Francisco and San Pablo Bays are referred to locally as Bay Mud and can present a variety of engineering challenges due to inherent low strength, compressibility, and saturated conditions. Landslides in the region occur in weak, easily weathered bedrock on relatively steep slopes.

4.5.2.2 Local Geology

The Project is located within the existing Valero Benicia Refinery property, an area that has been extensively modified by cutting and filling. The Refinery was constructed in the late 1960’s. The Refinery consists of three areas in the Benicia Industrial Park, including the main refinery area,

the crude oil storage area (site of the Project), and the wastewater treatment area. Neither the natural unconsolidated deposits nor the underlying Great Valley Sequence bedrock is noted for unique or scientifically valuable features, and no such features have been reported from the surrounding region (URS, 2002).

Topography

The Refinery is located on an east-facing, 200-foot bedrock hill at the northwestern edge of the property. Weak bedrock composed of younger continental and marine sedimentary rocks and volcanic rocks underlie this hill slope. Along the southwestern side of the Refinery, a south-to-southeast trending alluvial valley and several east-to-west trending tributary valleys dissect the hillside. At the eastern side of the Refinery, and along the proposed rail spur alignment, the hill slopes downward to a broader, relatively flat south-to-southwest trending alluvial valley at an elevation of 10 to 20 feet above mean sea level.

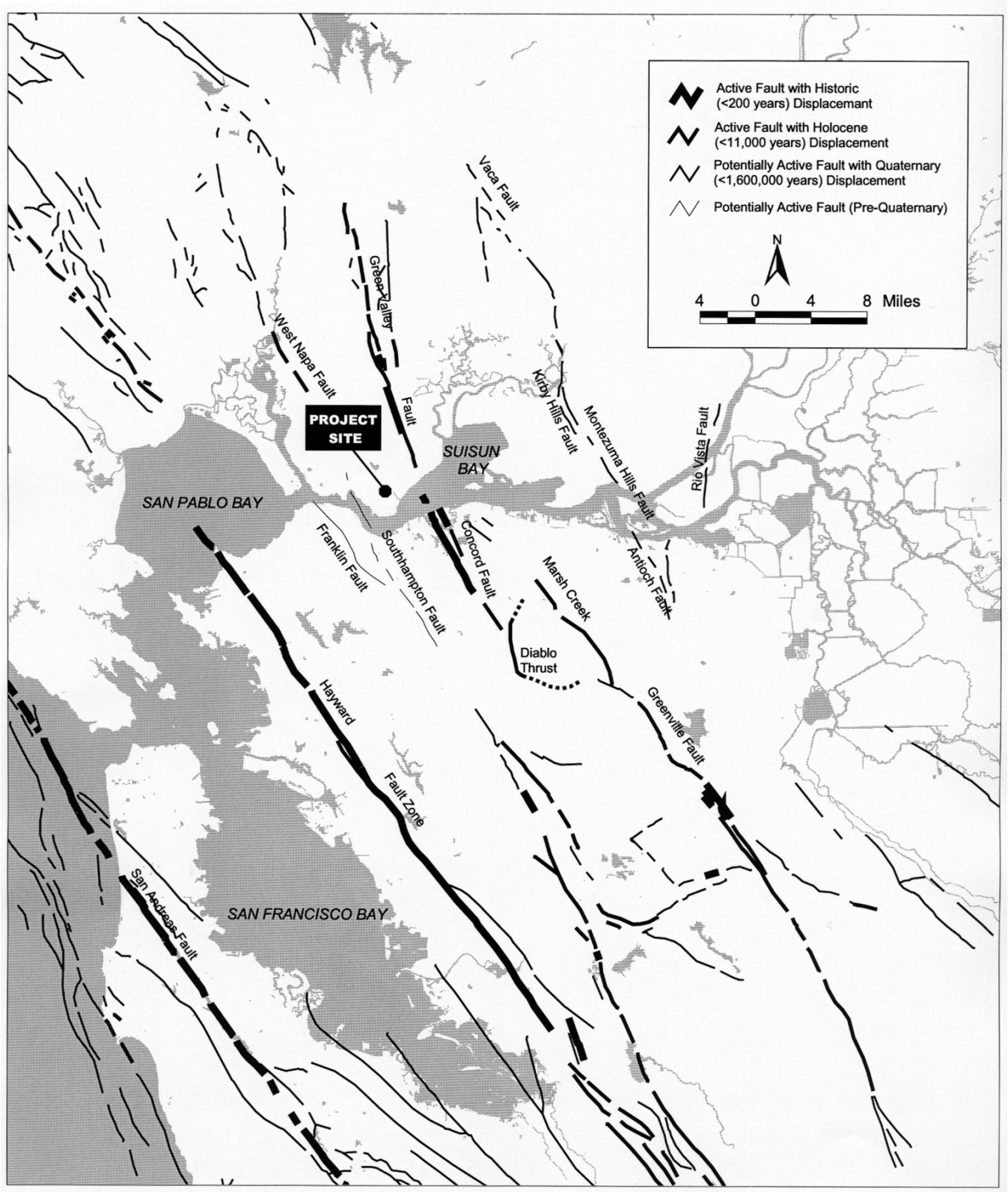
Soils

The hillsides within the Refinery property are covered with a varying thickness of stiff clay-rich colluvium. The colluvium accumulates as a result of in-situ weathering of underlying bedrock that is then subject to down-slope movement by soil creep and slope wash. The colluvium at the Refinery site is predominantly a highly plastic, expansive clay and sandy clay containing some carbonaceous materials. These hillsides have been subjected to extensive cut-and-fill excavation during past construction activities (Woodward-Clyde, 1993). The Project area is generally underlain by about 10 to 15 feet of manmade fill. This manmade fill is in turn underlain by alluvial and residual soils and bedrock. Of the manmade fill, the upper 10 feet is engineered fill. The lower layer of manmade fill is older fill that was placed for the former Benicia Army Arsenal. The native soils below the fill are primarily clays, but sandy layers are present (Kleinfelder, 2013b).

4.5.2.3 Faults and Seismicity

The Project site is located in the seismically active San Francisco Bay region, which is situated on a plate boundary marked by the San Andreas Fault System and several northwest trending active and potentially active faults (see Figure 4.5-1). According to the U.S. Geologic Survey Working Group on California Earthquake Probabilities, there is a 63% likelihood that an earthquake of moment magnitude[1] (Mw) 6.7 or higher will occur in the Bay Area between 2007 and 2037 (USGS, 2008). Although the Project site could be subjected to ground shaking and seismic hazards from movement on any one of the Bay Area Faults, the closest active fault to the Refinery is part of the Concord-Green Valley fault zone. The main trace of the Concord-Green Valley fault extends northwesterly approximately 1.75 miles east of the Project site (Kleinfelder, 2013a). The Working Group on California Earthquake Probabilities (USGS, 2008) assigns a 3% probability to the occurrence of a Mw 6.7 or larger earthquake on the Concord-Green Valley fault

[1] While Richter Magnitude was historically the primary measure of earthquake magnitude, seismologists now use Moment Magnitude as the preferred way to measure earthquakes. The Moment Magnitude scale (Mw) is related to the physical characteristics of a fault, including the rigidity of the rock, the size of fault rupture, and the style of movement or displacement across the fault. Although the formulae of the scales are different, they both contain a similar continuum of magnitude values, except that Mw can reliably measure larger earthquakes and do so from greater distances.



SOURCE: California Department of Conservation, Division of Mines and Geology (After Jennings, 1994)

Benicia Valero CBR . 202115.01

Figure 4.5-1

Active and Potentially Active Bay Area Earthquake Faults

over the next 30 years. The Concord-Green Valley fault is capable of generating a Maximum Credible Earthquake (MCE) of Mw 7.1.

Other smaller faults in the region classified as potentially active include the Southampton and Franklin faults (see Figure 4.5-1). The Southampton Fault, located approximately 3 miles west of the Project site, extends northwest from Nevada Dock, near the town of Port Costa along the south shore of the Carquinez Strait (USGS, 1968), to an inferred terminal point in the low-lying hills east of the City of Vallejo. The California Geological Survey (CGS) does not consider the Southampton Fault to be active, nor is it zoned as an Earthquake Fault Zone. The maximum credible earthquake for the Southampton fault has been estimated to be Mw 6.25. The Franklin Fault, located approximately 6 miles west of the Project site, is a reverse fault that extends from southwest of the Walnut Creek area to an inferred terminal point located near the town of Selby along the south shore of the Carquinez Strait. The CGS does not consider the Franklin Fault to be active, nor is it zoned as an Earthquake Fault Zone. The maximum credible earthquake for the Franklin Fault has been estimated to be Mw 6.5.

4.5.2.4 Seismic Hazards

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude and nature of fault rupture can vary for different faults, or even along different strands of the same fault. Ground rupture is considered more likely along active faults and is regulated under the Alquist-Priolo Earthquake Fault Zoning Act.[2] Under the Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Act) of 1972 (revised 1994), Earthquake Fault Zones were established by the California Division of Mines and Geology along "active" faults, or faults along which surface rupture occurred in Holocene time (the last 11,000 years). In the Bay Area, these include the San Andreas, Hayward, Rodgers Creek-Healdsburg, Concord-Green Valley, Greenville-Marsh Creek, Seal Cove/San Gregorio, and West Napa faults. The Project site is not located on a known active fault and is not within an Earthquake Fault Hazard Rupture Zone as defined by the Act (Hart, 1997). The closest active fault to the Project area mapped under the Alquist-Priolo Act is the Concord-Green Valley fault which is oriented north-south and is located approximately two miles east of the Project area (USGS, 2013; CDMG, 1993). Fault rupture is not necessarily bound to occur within the rupture zone, but the likelihood of rupture outside of this demarcation made by the CGS is considered low.

Ground Shaking

Strong ground motion is described as motion of sufficient strength to affect people and their environment or ground movement recorded on a strong-motion instrument or seismograph. Strong ground shaking from earthquakes generated by active faults in Solano County and the Bay Area is a significant hazard to the Project site. Ground movement intensity during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of

[2] The Alquist-Priolo Earthquake Fault Zoning Act, signed into law in December of 1972, requires the delineation of zones along active faults. The purpose of the Alquist-Priolo Act is to regulate development on or near active fault traces to reduce the hazard of fault rupture.

geologic material. Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments such as artificial fill. In general, bedrock areas will experience ground shaking of higher frequency, shorter period, and lower amplitude. Structural damage resulting from shaking tends to be worse for structures located on unconsolidated deposits, such as areas underlain by Bay Mud. Earthquake ground shaking may have secondary effects on certain foundation materials, including liquefaction, seismically induced settlement, and lateral spreading (discussed below). The Project site is likely to be subjected to at least one moderate to severe earthquake during the Project lifetime that will cause strong ground shaking.

Terminology and Concepts

Generally, the greater the earthquake magnitude and the closer the fault rupture to a site, the greater the intensity of ground shaking. The amplitude and frequency of ground shaking are related to the size of an earthquake, the distance from the causative fault, the type of fault (e.g., strike-slip), and the response of the geologic materials at the site. Ground shaking can be described in terms of acceleration, velocity, and displacement of the ground. A common measure of ground motion during an earthquake is the peak ground acceleration (PGA).[3] Unlike measures of magnitude, which provide a single measure of earthquake energy, PGA varies from place to place, and is dependent on the distance from the epicenter and the character of the underlying geology (e.g., hard bedrock, soft sediments, or artificial fills).

The primary tool that seismologists use to describe ground shaking hazard is a probabilistic seismic hazard assessment (PSHA). The PSHA for the State of California takes into consideration the range of possible earthquake sources and estimates their characteristic magnitudes to generate a probability map for ground shaking. The PSHA maps depict values of PGA that have a 10 percent probability of being exceeded in 50 years (probability of 1 in 475 of occurring in a given year). Use of this probability level allows engineers to design structures to withstand ground motions that have a 90 percent chance of not occurring in the next 50 years, making buildings safer than if they were merely designed for the most probable events.

The Modified Mercalli (MM) Intensity Scale (Table 4.5-1) assigns an intensity value based on the observed effects of ground shaking produced by an earthquake. Unlike measures of earthquake magnitude, the MM intensity scale is qualitative in nature (i.e., it is based on actual observed effects rather than measured values). MM intensity values for an earthquake at any one place can vary depending on its magnitude, the distance from its epicenter, and the type of geologic material. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage[4]. Because the MM Intensity Scale is a measure of ground shaking effects, intensity values can be related to a range of PGA values, also shown in Table 4.5-1.

---

3 The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 9.8 meters per second squared.

4 The damage level represents the estimated overall level of damage that will occur for various MM intensity levels. Some buildings will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all buildings perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a building all affect its performance.

TABLE 4.5-1
MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Ground Acceleration[a]
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0017 g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	0.0017 – 0.014 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	0.0017 – 0.014 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.014 – 0.039 g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.035 – 0.092 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	0.092 – 0.18 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.18 – 0.34 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	0.34 – 0.65 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.65 – 1.24 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 1.24 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24 g

NOTES:

[a] Value is expressed as a fraction of the acceleration due to gravity (g), which is 9.8 meters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

SOURCE: ABAG, 2010

Ground Shaking Potential on the Project Site

The Bay Area has experienced many large, damaging earthquakes during historic time. The 1989 moment magnitude (Mw) 6.9 Loma Prieta earthquake caused widespread damage throughout the Bay Area and produced shaking of Modified Mercalli Intensity (MMI) VI in the area of Benicia. The March 31, 1898, Mw 6.3 Mare Island earthquake resulted in significant damage along the northern shore of San Pablo Bay. This earthquake, which may have occurred on the Rodgers Creek fault, resulted in shaking intensities of MMI VII to VIII in the area of the Refinery property. The strongest shaking experienced in the Benicia area during historic time was generated from the April 18, 1906, Great San Francisco earthquake on the San Andreas Fault, which was a Mw 7.9 event. This earthquake produced shaking intensities of MMI VIII and IX (URS, 2002).

The Project site may be subject to strong seismic ground motions. The Concord-Green Valley fault is capable of generating a Maximum Credible Earthquake (MCE) of Mw 7.1. The Working Group on California Earthquake Probabilities (USGS, 2008) assigns a 3% probability to the occurrence of a Mw 6.7 or larger earthquake on the Concord-Green Valley fault over the next 30 years. A Mw 6.7 earthquake on the Concord-Green Valley fault is predicted to result in shaking intensities of MM-VIII (very strong) at the Project site (ABAG, 2013; ABAG, 2010). According to the PSHA, with a 10% probability of exceedance in 50 years (equivalent to an earthquake with a 475-year recurrence interval), the expected ground motions at the site would be 0.5g (CGS, 2013).[5]

Liquefaction and Lateral Spreading

Liquefaction is the sudden temporary loss of shear strength in saturated, loose to medium dense, granular sediments subjected to ground shaking. It generally occurs when seismically-induced ground shaking causes pore water pressure to increase to a point equal to the overburden pressure. Liquefaction can cause foundation failure of buildings and other facilities due to the reduction of foundation bearing strength. The potential for liquefaction depends on the duration and intensity of earthquake shaking, particle size distribution of the soil, density of the soil, and elevation of the groundwater. Portions of the project area that may be at risk due to the effects of liquefaction include areas that have a high groundwater table and are underlain by loose to medium-dense, granular sediments, particularly younger alluvium and non-engineered (uncompacted) artificial fill. Lateral spreading is a ground failure associated with liquefaction and generally results from predominantly horizontal displacement of materials toward relatively unsupported free faces. Unsupported fill slopes can be subject to lateral spreading. Shear and tensile cracking of the ground surface can accompany lateral spreading.

Seismic hazard mapping prepared by the Association of Bay Area Governments (ABAG, 2013), indicates that the Project site is located in a very low risk area for liquefaction. However, geotechnical investigations conducted in the vicinity of the Project (Kleinfelder, 2013a) have identified subsurface conditions that have the potential for seismically induced liquefaction and lateral spreading, including settlement and lateral migration towards Sulphur Springs Creek.

5 g is an acceleration equivalent to the earth's gravity = 980 centimeters per second squared. Ground accelerations are scaled by comparison to the earth's gravity. An acceleration of 1.0 g is equivalent to a car traveling 100 meters (328 feet) from rest in 4.5 seconds.

Earthquake-Induced Landslides

Earthquake motions can induce significant horizontal and vertical dynamic stresses in slopes that produce dynamic normal and shear stresses along potential failure surfaces within a slope. The susceptibility for native and engineered slopes to fail depends on the gradient and localized geology as well as the amount of rainfall, excavation, or seismic activities. During a slope failure, a mass of rock, soil, and debris is displaced down slope by sliding, flowing, or falling. Steep slopes and down-slope creep of surface materials characterize areas most susceptible to failure. Engineered slopes have a tendency to fail during an earthquake if not properly designed, constructed, or compacted. The Project site is not characterized by any major slopes and consequently is not considered susceptible to landslides.

Earthquake-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (particularly loose, non-compacted, and variable sandy sediments) due to the rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates). Typically, areas underlain by artificial fills, unconsolidated alluvial sediments, slope wash, and areas with improperly engineered construction fills are susceptible to this type of settlement. Geotechnical investigations conducted in the project area (Kleinfelder, 2013b) have identified subsurface conditions having the potential for seismically induced settlement.

4.5.2.5 Other Geologic Hazards

Soil Erosion

Soil erosion is the process whereby soil materials are worn away and transported to another area either by wind or water. Rates of erosion can vary depending on the soil material and structure, placement, and human activity. Erosion is most likely on sloped areas with exposed soil, especially where unnatural slopes are created by cut and fill activities. Soil erosion rates can therefore be higher during the construction phase. Typically, the soil erosion potential is reduced once the soil is graded and covered with concrete, structures, or asphalt. Soils in the project area have not been identified that are susceptible to significant, long-term erosion. However, due to soil disturbing activities conducted as part of proposed construction, soil erosion is assessed in Section 4.6, below.

Subsidence and Settlement

Subsidence is the gradual lowering of the land surface due to loss or compaction of underlying materials. Subsidence can occur as the result of hydro-compaction; groundwater, gas, and oil extraction; or the decomposition of highly organic soils. Hydro-compaction is the process of volume decrease and density increase upon saturation of moisture deficient deposits. Settlement is the depression of the bearing soil when a load, such as that of a building or new fill material, is placed upon it. Soils tend to settle at different rates and by varying amounts depending on the load weight, which is referred to as differential settlement. Differential settlement can be a greater

hazard than total settlement if there are variations in the thickness of previous and new fills or natural variations in the thickness and compressibility of soils across an area. Settlement commonly occurs as a result of building construction or other large projects that require soil stockpiles. As noted in Section 4.5.2.2, above, the Project site has been previously graded and filled with approximately 10 feet of engineered fill; consequently, the risk of soil settlement is minimal.

Slope Instability and Landslides

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. Rock slopes exposed to either air or water can undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and deep-seated rotational slides. The Project site is a relatively flat developed area with no hill or slope features susceptible to slope instability.

Expansive Soils

Expansive soils possess a “shrink-swell” behavior. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying. Structural damage may result over an extended period of time, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. The effects of expansive soils could damage foundations of above-ground structures, paved roads and streets, and concrete slabs. Expansion and contraction of soils, depending on the season and the amount of surface water infiltration, could exert enough pressure on structures to result in cracking, settlement, and uplift. Typically, soils that exhibit expansive characteristics comprise the upper five feet of the surface. Geotechnical investigations conducted at the Project site have concluded that the area is underlain by 10 to 15 feet of manmade fill which is in turn underlain by alluvial and residual soils and bedrock (Kleinfelder, 2013a). The upper 10 feet of fill is mainly engineered fill, placed during Refinery development, and is comprised of stiff, moderately expansive clay (Kleinfelder, 2013a).

4.5.2.6 Regulatory Setting

Federal

Federal Railroad Administration

The FRA’s regulations are contained in the Title 49 Code of Federal Regulations (CFR), Chapter 2, Parts 200 - 269. Under FRA regulations, each railroad has primary responsibility to ensure its track meets or exceeds the federal safety standards. This includes railroad inspectors performing track inspections at specified minimum frequencies based on the class of track, the type of track, the annual gross tonnage operated over the track, and whether it carries passenger trains (FRA, 2013). The primary duty of FRA’s federal track safety inspectors, along with certified State inspectors, is to strategically monitor, inspect, and assess track conditions to determine whether a railroad is complying with federal safety standards. The FRA’s federal track safety standards generally focus on track structure, track geometry, road bed (ballast, drainage and vegetation), and track inspection

(FRA, 2013). Track Safety Standards are contained in 49 CFR Parts 213.1 – 213.369. These standards developed a system of classification for track quality. The class of a section of track determines the maximum possible running speed limits for freight and passenger trains as well as various tolerance limits for changes to the track surface. Track surface is the evenness or uniformity of track in short distances measured along the tread of the rails. Under load, the track structure gradually deteriorates due to dynamic and mechanical wear effects of passing trains. Improper drainage, unstable roadbed, inadequate tamping, and deferred maintenance can create surface irregularities. Allowable deviations in track surface are specified in the Track Safety Standards. For example, the track sections proposed as part of the Project can undergo seismic related settlement of 2 inches across the track gage width and maintain compliance with 49 CFR § 213.63 for Class 1 track (IRC, 2013). Settlement of track, such as that proposed as part of the Project, is expected during routine operations and Federal Track Safety Standards (49 CFR § 213) allow for such settlement while maintaining safe operations (IRC, 2013).

The FRA's interest is in ensuring the railroad maintains the track to the appropriate federal safety standards for that class of track. According to FRA Regulations, railroads are required to maintain accurate records of regular and special or ad hoc track inspections. FRA inspectors monitor a railroad's safety performance hundreds of time per year to determine compliance and assess the potential risks or hazards. A railroad is subject to FRA enforcement actions, or possibly liable for civil penalties, if it fails to comply with the track safety standards, or if it operates trains in excess of the designated track speed (FRA, 2013).

State

Alquist-Priolo Earthquake Fault Zoning Act

Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act) of 1972 (revised in 1994) is the State law that addresses hazards from earthquake fault zones. The purpose of this law is to mitigate the hazard of surface fault rupture by regulating development near active faults. As required by the Act, the State has delineated Earthquake Fault Zones (formerly Special Studies Zones) along known active faults in California. The Project does not lie within an Alquist-Priolo Zone.

California Building Code

The California Building Standards Commission (CBSC), established in 1953 by the California Building Standards Law, is an independent commission within the State and Consumer Services Agency. Commission members are appointed by the Governor, confirmed by the State Senate, and include building and construction design professionals. The CBSC is charged with many tasks associated with the CBC including review and approval of building standards proposed and adopted by state agencies, codifying and publishing approved building standards in one state building standards code (California Code of Regulations, Title 24), administering California's building code adoption processes, and resolving conflict, duplication, and overlap in building standards.

The California Building Code (CBC), which is codified in Title 24 CCR Part 2, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards

related to structural strength, egress facilities, and general building stability. The purpose of the CBC is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction.

The 2013 CBC is based on the 2009 International Building Code. In addition, the CBC contains necessary California amendments that are based on the American Society of Civil Engineers (ASCE) Minimum Design Standards 7-05. ASCE 7-05 provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (flood, snow, wind, etc.) for inclusion in building codes. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, all of which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site, and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC.

Roles and Responsibilities. Implementing the regulatory requirements in the CBC and ensuring that a building is constructed in compliance with the law is the responsibility of the project engineers and Building Officials. The geotechnical engineer, as a registered professional with the State of California, is required to comply with the CBC and local codes while applying standard engineering practice and the appropriate standard of care for the particular region in California, which, in the case of the proposed project, is the San Francisco Bay Area. The California Professional Engineers Act (Building and Professions Code Sections 6700-6799), and the Codes of Professional Conduct, as administered by the California Board of Professional Engineers and Land Surveyors, provides the basis for regulating and enforcing engineering practice in California. The local Building Officials are typically with the local jurisdiction and are responsible for inspections and ensuring CBC compliance.

The geotechnical engineer is responsible for investigating the underlying soils and bedrock on a site and, if necessary, developing remedies to improve soil conditions based on standard, accepted, and proven engineering practices. The geotechnical investigation must characterize, log, and test soils and bedrock conditions and determine the response of those underlying materials to ground shaking generated during an earthquake. Seismic response to varying material types is especially critical in the San Francisco Bay Area where a considerable percentage of construction occurs over soft clay and fills at the San Francisco Bay margin.

The geotechnical investigation and the recommendations developed during the investigation are presented in a report, which is reviewed, signed, and stamped by the professional engineer in charge. Based on the site's geotechnical conditions, the geotechnical report includes recommendations for methods and materials for all aspects of the site development, including the site preparation, building foundations, structural design, utilities, sidewalks and roadways, to remedy any geotechnical conditions related to seismic impacts. Once finalized, the geotechnical

report is submitted to the local permitting agency for review and comment. The Building Officials work with the applicant and the geotechnical engineer to resolve inconsistencies and ensure that the investigation complies with the CBC and local ordinances. In connection with grading, foundation, building, and other site development permits, the building department engineers review the geotechnical investigation and recommendations and impose permit requirements based on the geotechnical recommendations and CBC provisions. While in many cases the geotechnical report is a required element for the project review and issuance of a building permit, it also provides the necessary soil and foundation information required by the structural engineer designing the building; a structure can not be designed without adequate information on the underlying soils and response of those soils to earthquake ground motion. Grading plans, foundation designs, and structural designs are also prepared based on the geotechnical recommendations and other pertinent requirements of the CBC.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate “zones of required investigation” (i.e., seismic hazard zones) where site investigations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements. The act requires cities, counties, and other local permitting agencies to regulate certain development projects by implementing the provisions of the act through various local building codes, permits, and ordinances. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design, consistent with California Geological Survey Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California* (2008b). The Project site has not yet been evaluated by the CGS. This act is included in the regulatory framework because it requires the State of California to identify and disseminate information about seismic hazards, which is considered relevant to the environmental setting.

Local

City of Benicia General Plan

The City of Benicia has established goals, policies, and programs in regard to geologic hazards. These are outlined in the Responses to Hazards section of the *City of Benicia General Plan* (City of Benicia, 1999). The following geologic hazard programs are directly related to the Project:

> **Community Hazards**
>
> **Goal 4.11:** Minimize harm from geologic hazards.
>
> > ***Program 4.11.A*:** Require geotechnical engineering reports to address site stability and building foundation integrity for projects involving substantial grading.
> >
> > ***Program 4.11.B*:** Develop guidelines for site-specific geologic and geotechnical reports.

> ***Program 4.11.C*:** Require peer review of geotechnical engineering reports if it is determined that City staff does not have the technical expertise to review such reports.

The Project would include construction grading and would be subject to these requirements, consistent with the General Plan, and Chapter 15.28 of Title 15 of the Benicia Municipal Code.

4.5.3 Significance Criteria

Based on California Environmental Quality Act (CEQA) Guidelines Appendix G, a project would cause adverse impacts related to geology and soils if it would:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

   i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publication 42;

   ii. Strong seismic ground shaking;

   iii. Seismic-related ground failure, including liquefaction;

   iv. Landslides;

b) Result in substantial soil erosion or the loss of topsoil;

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; or

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste disposal systems where sewers are not available for the disposal of wastewater.

4.5.4 Discussion of No Geology and Soils Impacts

Review and comparison of the Project characteristics with the significance criteria stated above, clearly show that no impact would result for the last geology and soils criterion. The following discusses the reasoning supporting this conclusion:

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste disposal systems where sewers are not available for the disposal of wastewater.

Implementation of the Project would not involve the use of septic tanks or alternative wastewater treatment disposal systems to handle wastewater generation. Surface water run-off and wastewater produced by Refinery operations are currently treated at the Project's wastewater treatment plant. Septic systems would not be an element of the Project and therefore, the ability

of the soils on the Project site to accommodate septic systems is not considered here. No impact is anticipated.

4.5.5 Discussion of Impacts and Mitigation Measures

a.i) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault.

Impact 4.5-1: The Project would not expose people or structures to potential adverse effects involving rupture of a known earthquake fault. (*Less than Significant*)

The State of California, through the Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) prohibits the development of structures for human occupancy across active fault traces.[6] Under the Alquist-Priolo Act, the CGS must establish zones on either side of an active fault that delimits areas susceptible to surface fault rupture. These zones are referred to as fault rupture hazard zones and are shown on official maps published by the CGS.

The closest active fault to the Project area mapped under the Alquist-Priolo Act is the Concord-Green Valley fault which is oriented north-south and is located approximately two miles east of the Project area (USGS, 2013; CDMG, 1993). The Project area is located approximately 1.7 miles outside of the fault rupture hazard zone for this fault. Although fault rupture is not necessarily bound by the limits of the hazard zone, it is considered unlikely to occur in areas outside of the mapped fault rupture hazard zone. The Project area is situated in close proximity to the east-dipping Lake Herman fault which runs along the eastern portion of the Refinery property (Graymer *et al*., 2002). This is a pre-Quaternary fault (no displacement has occurred during the previous 1.6 million years) and the CGS does not delineate this as an active fault under the Alquist-Priolo Act. No active faults are known to traverse through the Project area and the possibility of surface fault rupture on-site is very low (City of Benicia, 1999). Therefore, based on the current Project design, which does not include housing or facilities for human occupancy, the potential for damage to property or injury/loss of life to people as a result of fault rupture is considered less than significant.

6 The Alquist-Priolo Act designates zones that are most likely to experience fault rupture, although surface fault rupture is not necessarily restricted to those specifically zoned areas. The zones are defined by the California Geological Survey (CGS). An active fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 11,000 years). A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. Sufficiently active is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches. A structure for human occupancy is one that is intended for supporting or sheltering any use or occupancy, which is expected to have a human occupancy rate of more than 2,000 person hours per year (Hart, 1997).

a.ii) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking.

Impact 4.5-2: The Project would not expose people or structures to potential adverse effects involving strong seismic ground shaking. (*Less than Significant*)

The Project site is located in the San Francisco Bay Area, a seismically active region of California with numerous active faults. Seismic activity in the region is dominated by the San Andreas Fault system, which includes the San Andreas, Hayward, and Calaveras faults. Several other faults, including the Rodgers Creek, Concord-Green Valley, Southampton, and West Napa faults also accommodate some of this movement and are considered active.

ABAG has developed Earthquake Shaking Hazard Maps, which predict the potential for ground shaking during major earthquakes on the active faults in the Bay Area. The Shaking Hazard Maps rank degrees of ground shaking intensity based on the Modified Mercalli Intensity (MMI) scale. The Project site may be subject to strong seismic ground motions. This analysis considered an earthquake on the Concord-Green Valley fault due to the proximity of this fault to the Project site. This fault is capable of generating a Maximum Credible Earthquake (MCE) of Mw 7.1. The Working Group on California Earthquake Probabilities (USGS, 2008) assigns a 3% probability to the occurrence of a Mw 6.7 or larger earthquake on the Concord-Green Valley fault over the next 30 years. A Mw 6.7 earthquake on the Concord-Green Valley fault is predicted to result in shaking intensities of MM-VIII (very strong) at the Project site (ABAG, 2013). According to the CGS Probabilistic Seismic Hazard Assessment (PSHA), the peak ground acceleration at the Project site could reach 0.5 g (CGS, 2013).[7]

Predicting seismic events is not possible, nor is providing mitigation that can entirely reduce the potential for injury and damage that can occur during a seismic event. Although some structural damage is typically not avoidable during an earthquake, building codes, construction ordinances, and modern construction techniques and materials have been developed to reduce structural damage and minimize major injury during a seismic event. This is especially true in California where many of the seismic design criteria and standards contained in the CBC originated. The CBC is based on the International Building Code and contains informed and current seismic design criteria used throughout California. The project is required by California law to comply with the seismic design criteria set forth in the CBC. While building codes assume that some damage will occur during an earthquake, they are designed to prevent loss of life and limb and reduce the potential of structural collapse.

Seismic design consistent with current professional engineering and refinery industry standards would be employed in the proposed construction for resistance to strong ground shaking. At a minimum, the CBC design criteria, in conjunction with FRA regulations to ensure track meets or exceeds federal safety standards, would be required during design and construction of all elements of the Project. Under requirements of the CBC, the underlying soils on the project site would be investigated to determine the response of those underlying materials to ground shaking

[7] g is gravity = 980 centimeters per second squared. Acceleration is scaled against acceleration due to gravity or the acceleration with which a ball falls if released at rest in a vacuum (1.0 g). Acceleration of 1.0 g is equivalent to a car traveling 100 meters (328 feet) from rest in 4.5 seconds.

generated during an earthquake. The earthquake design requirements of the CBC are used to determine a Seismic Design Category for a project that combines the occupancy categories with the level of expected ground motions at the site to determine appropriate design specifications. Further, the design specifications for the Project are required to incorporate consideration of the response of the soils underlying the project site under earthquake loads as well as other loads (flood, snow, wind, etc.) to conform to Federal Track Safety Standards (49 CFR § 213). Therefore, considering that laws and regulations are currently in place that will ensure design and construction in compliance with modern engineering standards, the potential for substantial damage to property or injury/loss of life as a result of strong seismic ground shaking is less than significant.

a.iii) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction.

Impact 4.5-3: The Project would not expose people or structures to potential adverse effects involving seismic-related ground failure, including liquefaction. (*Less than Significant with Mitigation*)

Seismic shaking can also trigger secondary ground-failures caused by liquefaction. Liquefaction is a phenomenon where saturated subsurface soils lose strength because of increased pore pressure and exhibit properties of a liquid rather than those of a solid. The soils most susceptible to liquefaction are clean, loose, uniformly graded, saturated, and fine-grained and occur close to the ground surface, usually at depths of less than 50 feet.

Seismic hazard mapping prepared by the Association of Bay Area Governments (ABAG, 2013), indicates that the Project site is located in a very low risk area for liquefaction. However, geotechnical investigations conducted in the vicinity of the Project (Kleinfelder, 2013a) have identified subsurface conditions having the potential for seismically induced liquefaction, including settlement and lateral migration towards Sulphur Springs Creek. Liquefaction could result in vertical surface settlement of several inches and horizontal ground displacement of several feet, which could cause damage to Project components, specifically new railroad track.

The February 2013 geotechnical investigation (Kleinfelder, 2013a) reported that the extent of liquefiable soil layers were not fully determined and concluded based on available information that that the layers were relatively thin (typically less than five feet in thickness). Based on this conclusion, a subsequent, focused investigation (Kleinfelder 2013b) was conducted in November 2013 to assess the full lateral extent of the liquefiable soils and determine the potential for lateral spreading. Specifically, the scope of the November 2013 investigation required detailed seismic deformation analyses to provide refined estimates of the magnitude and distribution of horizontal displacements and vertical settlements associated with liquefaction and lateral spreading at the Project site.

Results of the November 2013 geotechnical investigation and deformation analysis identified lateral spreading displacements ranging from 8 inches to 39 inches and horizontal ground separation up to 6 inches. The horizontal displacements would be generally greatest along the

bank of Sulphur Springs Creek (east edge of existing Avenue A) and diminish toward the west (Kleinfelder, 2013b). The deformation analysis calculated that total seismic settlements (vertical displacements) would range between range between 5 inches and 11 inches and differential settlement across an 8.5 foot railroad tie length would be up to 3 inches.

Results of the previous geotechnical investigations identified the potential for lateral spreading and vertical displacement during seismic ground shaking. Unless properly designed to overcome the damage that the predicted ground displacement could cause, the ground movement during an earthquake could result in damage to tracks and other facilities during and immediately following a large regional earthquake.[8] The potential for liquefaction to cause lateral and vertical soil displacement is therefore considered a significant impact requiring mitigation. Implementation of Mitigation Measures 4.5-1 and 4.5-2 would reduce the impact relating to liquefaction and other seismic-related ground failure, such as lateral and vertical soil displacement, to a less-than-significant level.

> **Mitigation Measure 4.5-1:** Consistent with the geotechnical investigations and deformation analysis conducted to evaluate the potential for liquefaction hazards, the Valero Benicia Refinery shall incorporate into the final project design all recommendations to overcome lateral displacement, horizontal ground separation, and vertical settlement as provided by the licensed geotechnical engineer. Specifically, the Valero Benicia Refinery, in its design of the railroad project element located in areas identified as underlain by liquefiable or problematic soils, shall design for total seismic lateral displacements of 8 inches to 39 inches. Railroad ties and slabs shall be analyzed to evaluate the effect of up to a 6 inch wide horizontal ground separation and all recommendations to overcome such horizontal ground separation provided by the licensed geotechnical engineer incorporate into the final project design. A differential settlement of 2 inches across the gage width shall be analyzed to evaluate rail car tipping potential and all recommendations provided by the licensed geotechnical engineer incorporate into the final project design. All geotechnical design shall comply with seismic design requirements of CBC.
>
> **Mitigation Measure 4.5-2:** Valero Benicia Refinery shall include into its current track inspection program, regular and, in the event of a seismic incident with potential for track damage, post-earthquake inspections of the proposed track sections to ensure compliance with Federal Railroad Administration (FRA) track safety standards. Additionally, in the event of an incident with potential for track damage, such as an earthquake and associated secondary ground failure (such as liquefaction or lateral spreading) track inspection shall occur after the occurrence and before the operation of any train over that track.

Significance after Mitigation: Less than significant.

---

[8] It should be noted that, according to the applicants consultant, Industrial Railways Company (IRC), the proposed track sections can undergo seismic related settlement of 2 inches across the track gage width and maintain compliance with 49 CFR § 213.63 for Class 1 track (IRC, 2013). Settlement of track, such as that proposed as part of the Project, is expected during routine operations and Federal Track Safety Standards (49 CFR § 213) allow for such settlement while maintaining safe operations (IRC, 2013).

a.iv) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.

Impact 4.5-4: The Project would not expose people or structures to potential adverse effects involving landslides. (*Less than Significant*)

The Refinery site is partially located on bedrock slopes and slopes covered with relatively unconsolidated colluvium. However, the topography within the vicinity of the Project elements is relatively flat and approximately 0.2 miles from any noted slopes that could be subjected to seismically-induced landslides in the event of a major earthquake in the region. Additionally, ABAG (2013b) has mapped areas at risk of rainfall-induced landslides based on historic landslide information and the Project area has not been subject to historic rainfall-induced landslides or earth flows. The proposed rail line extension is located directly adjacent (within 50 to 80 feet) to Sulphur Springs Creek (see Figure 3-3, Site Plan, in the Project Description) which flows southeast towards Suisun Bay and is characterized by shallow creek banks. Therefore this portion of the Refinery is not considered to be at risk of slope failure; the potential for adverse effects involving landslides would be less than significant.

b) Result in substantial soil erosion or the loss of topsoil

Impact 4.5-5: The Project would not result in substantial soil erosion or loss of topsoil. (*Less than Significant*)

Given that the majority of the Project site is developed and is an operating refinery, the Project is not expected to expose soils that could result in substantial loss of topsoil or significant, long-term erosion. However, temporary erosion hazards could be an issue during construction. Construction activities associated with the Project would require land disturbing activities such as grading, earthmoving, backfilling, and compaction that would expose soils to the effects of wind and stormwater runoff, and could result in erosion or soil loss (see Section 4.8, *Hydrology and Water Quality*, for additional discussion of sedimentation).

In order to minimize erosion impacts during construction, the Applicant would implement best management practices (BMPs) as required under the National Pollutant Discharge Elimination System (NPDES) issued to Valero by the San Francisco Bay Regional Water Quality Control Board. BMPs are individual or combined measures that can be implemented in a practical and effective manner on the Project site which, when applied, prevent or minimize the potential release of contaminants into surface waters and groundwater. The NPDES permit requires Valero to prepare and maintain a Stormwater Pollution Prevention Plan (SWPPP). Consistent with the SWPPP, the contractor would be required to implement BMPs to protect stormwater quality, including minimizing erosion and soil loss during construction activities. Construction activities would be required to employ the specific erosion control BMPs presented in the SWPPP, typical examples of which include use of silt fencing, sandbag barriers, and placement of straw bales secured by stakes. Since BMPs have been recognized as methods to effectively prevent or minimize the potential release of contaminants into surface waters and groundwater, the potential for erosion impacts or loss of top soil during Project construction would be less than significant.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

Impact 4.5-6: The Project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in liquefaction. (*Less than Significant*)

The Project area is predominantly underlain by compacted fill consisting of native unconsolidated deposits and bedrock. The fill material is somewhat well compacted sandy clay, with abundant rock fragments common throughout. The fill material ranges from 18 on up to 53 feet in topographically low areas, on top of 2 to 13 feet of natural stiff clay that rests on bedrock. In general, the fill is moderately to highly expansive, and is strong and only slightly to moderately compressible (Woodward-Clyde, 1993, Kleinfelder 2013b). As described under Impacts 4.5-2 and 4.5-3, above, the results of the geotechnical investigation (Kleinfelder, 2013b) will be incorporated into the Project design to ensure that the Project is consistent with the requirements of the CBC as well as the Federal Railroad Administration (Valero Benicia Refinery, 2013). These requirements will ensure that the Project would have the structural fortitude to withstand anticipated ground shaking and seismically induced ground failures without significant damage. With compliance with applicable construction requirements in the California Building Code, and the design criteria recommendations from the geotechnical investigation that will be incorporated into the Project design, this impact would be less than significant.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

Impact 4.5-7: The Project would be located on expansive soil. (*Less than Significant*)

In general, the effects of expansive soils can damage foundations, concrete slabs, and aboveground structures over long periods of time. Previous studies (discussed in detail in Sections 4.5.2.2 and 4.5.2.5) have determined that clay-rich soils are present on the site. Additionally, the upper 10 feet of engineered fill that underlies the Project site is comprised of stiff, moderately expansive clay (Kleinfelder, 2013a). While these soil conditions are not unique in comparison to other areas, the soils identified are potentially moderately expansive. Standard engineering and building practices common to construction in California would be employed to address expansive soils encountered on site, such as compacting and replacement of soils. Typically, expansive soils can be re-engineered or replaced with engineered fills during grading and prior to construction to reduce the potential for adverse effects. For the Project, backfilling excavated areas with either imported fill or reuse of excavated material, if appropriate, and compacted as an engineered fill would eliminate the potential effects of expansive soils. Treatment of subsurface soils underneath the proposed facilities at the Project site according to measures designed by a geotechnical engineer would also eliminate potential hazards of expansive soils. Because soil conditions are not unique or particularly hazardous, and methods to address expansive soils are common engineering practices, this impact would be less than significant.

This page intentionally left blank

4.6 Greenhouse Gas Emissions

4.6.1 Introduction

This section analyzes the Project's relationship to greenhouse gas emissions. The section discusses the physical and regulatory setting; the baseline for determining environmental impacts; the criteria used for determining the significance of environmental impacts; and potential impacts associated with construction, operation, and maintenance of the Project.

4.6.2 Setting

4.6.2.1 Background on Greenhouse Gases and Climate Change

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). GHGs allow sunlight to enter the atmosphere, but trap a portion of the outward-bound infrared radiation, which warms the air. The process is similar to the effect greenhouses have in raising the internal temperature.

Both natural processes and human activities emit GHGs. The accumulation of GHGs in the atmosphere from natural processes regulates the Earth's temperature. Emissions from human activities, however, such as fossil fuel-based electricity production and the use of motor vehicles have elevated the concentration of GHGs in the atmosphere. GHGs emitted by human activities are known as "anthropogenic" GHGs. This accumulation of GHGs has contributed to an increase in the temperature of the Earth's atmosphere and the resulting "global climate change." Global climate change is a change in the average weather on Earth that can be measured by wind patterns, storms, precipitation, and temperature. Most scientists agree that there is a direct link between increased emissions of GHGs and long term global temperature increases.

The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). GHG emissions are often quantified and reported as CO_2 equivalents (CO_2e) to standardize and account for the difference in global warming potential from various GHG gases. For example, SF_6 is a GHG commonly used in the utility industry as an insulating gas in circuit breakers and other electronic equipment. SF_6, while comprising a small fraction of the total GHGs emitted annually world-wide, is a much more potent GHG with 23,900 times the global warming potential as CO_2. Therefore, one pound of SF_6 is assigned the standardized equivalent value of 23,900 pounds of CO_2e, which is the standard equivalent GHG unit of measure. Large emission sources are reported in million metric tons of CO_2e.[1]

The effects of global warming on weather and climate are likely to vary by region, but are expected to include the following direct effects (IPCC, 2014):

- Warmer and/or fewer cold days and nights over most land areas;

[1] The term metric ton is commonly used in the U.S. to refer to the metric system unit, tonne, which is defined as a mass equal to 1,000 kilograms. A metric ton is approximately 1.1 short tons and approximately 2,204.6 pounds.

- Warmer and/or more frequent hot days and nights over most land areas;
- Heavy precipitation events. Increase in the frequency, intensity, and/or amount of heavy precipitation; and
- Increased incidence and/or magnitude of extreme high sea level.

Also, there are many secondary effects that are projected to result from climate change, including impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity. In California, secondary effects of climate change may also include decrease in snow pack, more high ozone days, more large forest fires, and more drought years (CARB, 2014a and CNRA, 2013). While the possible outcomes and the feedback mechanisms involved are not fully understood and much research remains to be done, the potential for substantial environmental, social, and economic consequences over the long term is great.

Anthropogenic GHG emissions in the United States are derived mostly from the combustion of fossil fuels for transportation and power production. Approximately three-quarters of the anthropogenic CO_2 emissions generated in the United States come from the exploration for, and use of, fossil fuels for energy. Approximately one-third of the GHG emissions come from electricity production, such as power plants; approximately one-third derive from transportation; and a majority of the remaining sources include industrial processes, agriculture, forestry, other land uses, and waste management (USEPA, 2013).

Table 4.6-1 summarizes statewide emissions of GHG from relevant source categories for 2006 through 2012. As shown in the Table, California produced 458.67 million metric tons of CO_2e emissions in 2012 from a variety of sources. Oil refineries generated approximately 7% of GHG emissions produced in California in 2012 (CARB, 2014b).

TABLE 4.6-1
CALIFORNIA GREENHOUSE GAS EMISSIONS (million metric tons CO_2e)

Emission Inventory Category	2006	2007	2008	2009	2010	2011	2012	
Transportation	189.18	189.27	178.02	171.47	170.46	168.13	167.38	36%
Electric Power	104.54	113.94	120.15	101.32	90.3	88.04	95.09	21%
Commercial and Residential	41.89	42.11	42.44	42.65	43.82	44.32	42.28	9%
Industrial	90.28	87.1	87.54	84.95	88.51	88.34	89.16	19%
Recycling and Waste	7.8	7.93	8.09	8.23	8.34	8.42	8.49	14%
High Global Warming Potential	11.08	11.78	12.87	13.99	15.89	17.35	18.41	
Agriculture	37.75	37.03	37.99	35.84	35.73	36.34	37.86	
Total Gross Emissions	**482.52**	**489.16**	**487.1**	**458.45**	**453.05**	**450.94**	**458.67**	**100%**

SOURCE: CARB, 2014b

Emission inventories developed for the City of Benicia *Climate Action Plan 2010 GHG Emissions Inventory Update* reveal that activities of the City's government generated approximately 6,160 metric tons of CO_2e emissions in 2000 and the community as a whole

generated 3,138,900 metric tons CO_2e in 2000 and 3,885,770 metric tons CO_2e in 2010. The commercial/industrial category (excluding the Refinery, which is considered a "large emitter"), generated approximately 48% of the community-wide emissions in 2010. Transportation accounted for 44%, residential 6%, and solid waste 1% of the total community-wide emissions in 2010 (excluding large emitters) (City of Benicia, 2014).

4.6.2.2 Regulatory Setting

Federal

The USEPA began to regulate greenhouse gases under the Clean Air Act in 2009. To date, USEPA has adopted two final rules relating to GHGs:

> ***40 CFR Part 98. Mandatory Reporting of Greenhouse Gases Rule.*** In general, this rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2e emissions per year (USEPA, 2014b). Facilities, such as petroleum refineries, are subject to the regulation regardless of the quantity of GHG emissions. Valero currently reports Refinery GHG emissions as required by this regulation.
>
> ***40 CFR Part 52. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule.*** USEPA has mandated that Title V requirements apply to facilities whose stationary source CO_2e emissions exceed 100,000 short tons per year (USEPA, 2014a). In addition, at a facility that currently emits 100,000 short tons per year of CO_2e, Prevention of Significant Deterioration (PSD) applies to projects that increase GHG emissions by 75,000 short tons of CO_2e. The Project would not trigger PSD for CO_2e emissions under this regulation.

The USEPA is currently developing new GHG regulations for existing and new fossil fueled power plants and oil refineries. These regulations will affect the new source review process under the CAA. At the time of this writing, however, these regulations have not yet been issued.

State of California

The State of California has begun to regulate GHG emissions through legislation, rules, and executive orders.

Assembly Bill 1493

In 2002, Governor Gray Davis signed Assembly Bill (AB) 1493. AB 1493 required that CARB develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State."

To meet the requirements of AB 1493, in 2004 CARB approved amendments to the California Code of Regulations (CCR) adding GHG emissions standards to California's existing standards for motor vehicle emissions. Amendments to CCR Title 13, Sections 1900 and 1961 (13 CCR 1900, 1961), and adoption of Section 1961.1 (13 CCR 1961.1) require automobile manufacturers to meet fleet-average GHG emissions limits for all passenger cars, light-duty trucks within

various weight criteria, and medium-duty passenger vehicle weight classes (i.e., any medium-duty vehicle with a gross vehicle weight rating less than 10,000 pounds that is designed primarily for the transportation of persons), beginning with the 2009 model year. For passenger cars and light-duty trucks with a loaded vehicle weight (LVW) of 3,750 pounds or less, the GHG emission limits for the 2016 model year are approximately 37% lower than the limits for the first year of the regulations, the 2009 model year. For light-duty trucks with LVW of 3,751 pounds to gross vehicle weight of 8,500 pounds, as well as medium-duty passenger vehicles, GHG emissions would be reduced approximately 24% between 2009 and 2016.

On September 15, 2009, USEPA and the Department of Transportation's National Highway Safety Administration (NHTSA) proposed a national program to reduce GHG emissions and improve fuel economy for new cars and trucks sold in the United States. The combined USEPA and NHTSA standards that make up the proposed national program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They require these vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile, equivalent to 35.5 miles per gallon (mpg) if the automobile industry were to meet this CO_2 level solely through fuel economy improvements. Under the proposed national program, automobile manufacturers would be able to build a single light-duty national fleet that satisfies all requirements under both the national program and the standards of California and other states, while ensuring that consumers still have a full range of vehicle choices. In order to promote the adoption of the national program, CARB has adopted amendments to the GHG emissions standards for new passenger vehicles from 2009 through 2016. All mobile sources would be required to comply with these regulations as they are phased in.

Executive Order S-3-05

In 2005, in recognition of California's vulnerability to the effects of climate change, Governor Arnold Schwarzenegger established Executive Order S-3-05, which set forth a series of target dates by which statewide emissions of GHGs would be progressively reduced, as follows:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG emissions to 80% below 1990 levels.

Assembly Bill 32 – California Global Warming Solutions Act

In December 2008, CARB approved the AB 32 Scoping Plan outlining the state's strategy to achieve the 2020 GHG emissions limit. The Scoping Plan estimates a reduction of 174 million metric tons CO_2e from the transportation, energy, agriculture, forestry, and high climate-change-potential sectors, and proposes a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify California's energy sources, save energy, create new jobs, and enhance public health. The Scoping Plan expanded the list of the nine Early Action Measures into a list of 39 Recommended Actions contained in Appendices C and E of the Scoping Plan (CARB, 2009). Of these measures, the five that may be relevant to the Refinery are presented in Table 4.6-2; however, these measures are not directly applicable to the Project.

TABLE 4.6-2
RECOMMENDED ACTIONS OF CLIMATE CHANGE SCOPING PLAN RELEVENT TO THE REFINERY

ID #	Sector	Strategy Name and Description
I-1	Industry	Energy Efficiency and Co-Benefits Audits for Large Industrial Sources
I-3	Industry	GHG Leak Reduction from Oil and Gas Transmission*
I-4	Industry	Refinery Flare Recovery Process Improvements
I-5	Industry	Removal of CH_4 Exemption from Existing Refinery Regulations
T-2	Transportation	Low Carbon Fuel Standard

* This recommended action is related to the transmission of natural gas, not crude oil.

SOURCE: CARB, 2009

The Scoping Plan must be updated every five years to evaluate the mix of AB 32 policies to ensure that California is on track to achieve the 2020 GHG reduction goal. CARB has initiated activities to update the AB 32 Scoping Plan and has released a first update to the Scoping Plan Update in May 2014 (CARB, 2014a).

Executive Order S-1-07

Executive Order S-1-07, which was signed by Governor Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California, generating more than 40% of statewide emissions. It establishes a goal to reduce the carbon intensity of transportation fuels sold in California by at least 10% by 2020. This order also directs CARB to determine whether this low carbon fuel standard (LCFS) could be adopted as a discrete early-action measure as part of the effort to meet the mandates in AB 32.

On April 23, 2009, CARB approved the proposed regulation to implement the LCFS. The LCFS will reduce GHG emissions from the transportation sector in California by about 16 million metric tons by 2020. The LCFS is designed to reduce California's dependence on petroleum, create a lasting market for clean transportation technology, and stimulate the production and use of alternative, low-carbon fuels in California. The LCFS is designed to provide a durable framework that uses market mechanisms to spur the steady introduction of lower carbon fuels. The framework establishes performance standards for each year starting in 2011 that fuel producers and importers must meet. One standard is established for gasoline and the alternative fuels that can replace it. A second similar standard is set for diesel fuel and its replacements.

The standards are "back-loaded;" that is, there are more reductions required in the last 5 years, than the first 5 years. This schedule allows for the development of advanced fuels that are lower in carbon than today's fuels and the market penetration of plug-in hybrid electric vehicles, battery electric vehicles, fuel cell vehicles, and flexible fuel vehicles. It is anticipated that compliance with the LCFS will be based on a combination of strategies involving lower carbon fuels and more efficient, advanced-technology vehicles.

The LCFS baseline fuels are 1) reformulated gasoline mixed with corn-derived ethanol at 10% by volume, and 2) low sulfur diesel fuel. The lower carbon fuels may be ethanol, biodiesel, or blends of these fuels with gasoline or diesel as appropriate. Compressed natural gas and liquefied natural gas are also low carbon fuels. Hydrogen and electricity are also low carbon energy sources for vehicles and result in significant reductions of GHGs when used in fuel cell or electric vehicles due to vehicle power train efficiency improvements over conventionally-fueled vehicles. As such, these fuels are included in the LCFS as low carbon options. Other fuels may be used to meet the standards and are subject to meeting existing requirements.

Cap-and-Trade Program

The AB 32 Scoping Plan identified a cap-and-trade program as one of the strategies California will employ to reduce the GHG emissions that cause climate change. This program has put California on the path to meet its goal of reducing GHG emissions to 1990 levels by the year 2020, and ultimately achieving an 80% reduction from 1990 levels by 2050. Under AB 32, reporting of GHGs is required by major sources, such as electricity generation facilities, refineries, cement plants, facilities that produce over 25,000 metric tons of CO_2e from combustion sources, suppliers, and others. Under the cap-and-trade program, an overall limit on GHG emissions from capped sectors has been established and facilities that emit 25,000 metric tons or more of CO_2e per year, such as the Refinery, are able to trade permits (allowances) to emit GHGs.

CARB designed the California cap-and-trade program to be enforceable and to meet the requirements of AB 32. The development of this program included a multi-year stakeholder process and consideration of potential impacts on disproportionately impacted communities. The program started 2012, with an enforceable compliance obligation beginning with 2013 GHG emissions. Trading creates incentives to reduce GHGs below allowable levels through investments in clean technologies. With a carbon market, a price on carbon is established for GHGs. Market forces spur technological innovation and investments in clean energy. Cap-and-trade is intended to be an environmentally effective and economically efficient response to climate change.

Senate Bill 97

In 2007, the California State Legislature passed SB 97, which required amendment of the CEQA Guidelines to incorporate analysis of, and mitigation for, GHG emissions from projects subject to CEQA. The amendments took effect March 18, 2010. The amendments added Section 15064.4 to the CEQA Guidelines, specifically addressing the potential significance of GHG emissions. Section 15064.4 neither requires nor recommends a specific analytical methodology or quantitative criteria for determining the significance of GHG emissions. Rather, the section calls for a “good faith effort” to “describe, calculate or estimate” GHG emissions and indicates that the analysis of the significance of any GHG impacts should include consideration of the extent to which the project would:

- Increase or reduce GHG emissions;
- Exceed a locally applicable threshold of significance; or

- Comply with "regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions."

The CEQA Guidelines also state that a project may be found to have a less-than-significant impact related to GHG emissions if it complies with an adopted plan that includes specific measures to sufficiently reduce GHG emissions (14 Cal. Code Regs. §15064(h)(3)). Some jurisdictions have adopted "Climate Action Plans" to be used in connection with CEQA review. Importantly, however, the CEQA Guidelines do not require or recommend a specific analytical methodology or provide quantitative criteria for determining the significance of GHG emissions.

Bay Area Air Quality Management District 2010 Clean Air Plan

On September 15, 2010, the Bay Area Air Quality Management District (BAAQMD) Board of Directors adopted the final *Bay Area 2010 Clean Air Plan* (2010 CAP).[2] The 2010 CAP control strategies include revised, updated, and new measures in the three traditional control measure categories, including stationary sources measures, mobile source measures, and transportation control measures. In addition, the Bay Area 2010 CAP identifies two new categories of control measures, including land use and local impact measures and energy and climate measures (BAAQMD, 2010).

City of Benicia Climate Action Plan

On September 15, 2009, the Benicia City Council adopted the Benicia Climate Action Plan, which identifies specific measures on how the City can achieve GHG reduction targets. The Climate Action Plan established targets for City government operations and community-wide activities. The City government goal is to reduce GHG emission 25% below 2000 levels by 2010 and 33% below 2000 by 2020. According to the City's 2010 GHG emissions update, the City reduced GHG emissions 21% below 2000 levels in 2010, missing its reduction target by 4% (City of Benicia, 2014). The community-wide emission reduction goal is to maintain 2005 emission levels by 2010 and reduce emissions to 10% below 2000 levels by 2020. In 2010, community-wide emissions with large industrial emitters had increased from 2005 by 24% while community-wide emissions without large industrial emitters increased by 41% (City of Benicia, 2014). Objective IC-4, *Encourage the Refinery to Continue to Reduce Emissions*, directly applies to the Refinery as do Strategy IC-4.1, *Continue Implementing Capital Improvement Programs*, and Strategy IC4.2, *Investigate Onsite Energy Production* (City of Benicia, 2009).

4.6.2.3 Project Baseline

Under CEQA, the project baseline normally consists of the physical environmental conditions in the vicinity of the project as they exist at the time the lead agency publishes a Notice of Preparation of an EIR or, if no such notice is published, when the lead agency commences CEQA

[2] The BAAQMD is currently in the process of updating this plan and held a public workshop on February 28, 2014 to initiate development of this plan.

review[3] (CEQA Guidelines Section 15125(a)). When existing conditions regularly fluctuate, however, this baseline may not be representative of conditions as they exist over time. In such situations, a lead agency has discretion to select a baseline that represents an average of recent conditions. (*Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal.4th 310, 328.)

As is widely recognized, refinery operations regularly fluctuate over time. While refineries tend to operate at capacity for extended periods, refineries also undergo periodic multi-week unit-specific and plant-wide shutdowns for scheduled maintenance (referred to as a turnaround) These scheduled maintenance activities can be as frequent as annually or be as infrequent as once every six years. Market forces can also cause refineries to vary their production to meet market demand. For the reasons described, the annual average based on three previous years of operation is more representative of a refinery's baseline operation than a single point in time. This approach is consistent with the Project baseline defined in Section 4.1, *Air Quality*.

Annual average baseline GHG emissions for the Project were estimated using a baseline period of 3 years from December 2009, through November 2012. (The applicant filed the Use Permit Application for this project in December 2012.) Baseline emissions include maritime emissions from the following sources: ocean going vessel main engines from the California Coastal Waters boundary (approximately 71 nautical miles west of the Golden Gate Bridge) to the Refinery marine terminal; the vessel's auxiliary engines and auxiliary boilers; and the tugboats that would be required to escort and to position the ocean going vessels at the marine terminal.

The baseline does not include emissions from the sources outside of California: pumps and heaters to move oil from the well by pipeline to the marine terminal; pumps to load oil into the ocean going vessels; and vessel engines to transport the oil from its port of origin to the California Coastal Waters west of the Golden Gate Bridge. The baseline emissions scenario is conservative because it assumes that ocean going vessels would leave State-controlled waters due west of Golden Gate Bridge. It is possible that they could travel within State-controlled waters along the California coast, which could increase their related baseline emissions within the State by a factor of up to 10.

4.6.3 Significance Criteria

Based on CEQA Guidelines Sections 15064.4 and 15064.7(c), as well as Appendix G, a project would cause adverse impacts associated with GHG emissions if it would:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

[3] Although the NOP for the EIR was published in August 2013, the City began to commence the CEQA review for the Project through the preparation of the Initial Study / Mitigated Negative Declaration after Valero filed its Use Permit Application in December 2012.

Analysis Methodology

GHG emission estimates for the Project presented in this section were prepared by Environmental Resource Management (ERM), a consultant of the Applicant, and independently reviewed by the City's consultant, Environmental Science Associates (ESA). ESA determined that the emission estimates were acceptable for incorporation in this analysis. GHG emissions from locomotives were estimated for the small line haul round trip and switching operations within the Refinery and for the large line haul round trip between inland California state boundary and the Refinery. Because there is uncertainty regarding the exact route(s) that the crude by rail trains would use to enter the state and arrive at the Roseville rail yard, an average of the track length between the Roseville rail yard and the Nevada state line and the track length between the Roseville rail yard and the Oregon state line (approximately 195 miles of mainline track) was used, to estimate in-state GHG emissions from large line haul. For details of data, calculations, and assumptions used to determine Project-related GHG emissions that would be associated with the Project, refer to Appendix E.

As explained in Section 4.1.3, the BAAQMD adopted Thresholds of Significance in 2010, including certain thresholds for GHG emissions. Due to pending litigation the BAAQMD is no longer recommending that the Thresholds be used as a "generally applicable measure" of a project's significant air quality impacts. Lead agencies remain free, however, to apply any significance thresholds that are based on substantial evidence in the record including, but not limited to, the same thresholds that the BAAQMD adopted in 2010.

The BAAQMD's *Revised Draft Options and Justification Report (2009)* recommended an operational significance threshold of 10,000 metric tons per year of CO_2e for projects involving stationary sources within the jurisdiction of the BAAQMD. The threshold level of 10,000 metric tons of CO_2e per year represents a capture rate of approximately 95% of all GHG emissions from stationary sources in the San Francisco Bay Area Air Basin. This threshold level was calculated as an average of the combined CO_2 emissions from all stationary source permit applications submitted to the BAAQMD during a three year analysis period (BAAQMD, 2009). This threshold is consistent with the Executive Order S-3-05 GHG emissions reductions goal of 80% below 1990 levels by 2050, which is roughly equivalent to 90% below current levels by 2050. This emissions reduction goal goes beyond the AB 32 emissions reduction goal established for 2020. The BAAQMD recommended that the stationary source threshold be used for land use projects that would accommodate processes and equipment that would emit GHG emissions and would require a BAAQMD permit.

The Project would require a BAAQMD permit and would result in emissions of GHG within the Bay Area and within other parts of California. Because the effects of GHG emissions are not local and have no relevance to the individual air basins where the emissions are generated, the City of Benicia has determined, based on the 2009 Report and the evidence cited therein, that the 10,000 metric ton threshold is conservative and appropriate to assess the significance of Project-related emissions that would be generated within California. Therefore, the Project-related net annual operational GHG emissions generated within the State would be considered to result in a

significant impact on the environment if the net emissions would be more than 10,000 metric tons CO_2e per year.

The BAAQMD's 2009 Report did not identify a significance threshold for construction-related GHG emissions. However, the City has elected to use an approach to the determination of significance of GHG construction emissions based on guidance developed by the South Coast Air Quality Management District (SCAQMD). For construction related GHGs, SCAQMD recommends that total emissions from construction be amortized over 30 years and added to operational emissions and then compared to the operations significance threshold (SCAQMD, 2008). Similar to the SCAQMD's recommended approach for construction emissions, this analysis amortizes the construction emissions over a 30-year project lifetime then compares those emissions to the significance threshold of 10,000 metric tons CO_2e per year.

CEQA requires the City to consider whether the Project might conflict with the implementation of any applicable plan designed to address climate change. The analysis below considers potential conflicts between the Project and the following three such plans: 1) CARB's 2008 Climate Change Scoping Plan in 2008, as updated on May 22, 2014 (CARB, 2014a); 2) the 2010 CAP (BAAQMD, 2010); and 3) the City of Benicia Climate Action Plan (City of Benicia, 2009).

4.6.4 Discussion of No Greenhouse Gas Emissions Impacts

Review and comparison of the setting circumstances and Project characteristics with the significance criteria stated above, clearly show that no impact would result for the second GHG emissions significance criterion. The following discusses the reasoning to support this conclusion.

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

As discussed above, the City of Benicia Climate Action Plan Objective IC-4 is to *Encourage the Refinery to Continue to Reduce Emissions* applies to the Refinery (City of Benicia, 2009). Although the Project may result in an increase in GHG emissions (see Impact 4.6-1 discussion, below), the Project would not directly conflict with the City's established strategies to support Objective IC-4; including Strategy IC-4.1, *Continue Implementing Capital Improvement Programs*, and Strategy IC4.2, *Investigate Onsite Energy Production* (City of Benicia, 2009). Therefore, the Project would not conflict with the Climate Action Plan.

In addition, the Project would not conflict with any of the 39 Recommended Actions identified by CARB in its Climate Change Scoping Plan, including the five Recommended Actions that may be relevant to the overall operations of the Refinery (see Table 4.6-2), because none of the recommended actions are directly applicable to the Project. Also, pursuant to State law the Refinery currently participates in the AB 32 emissions reporting and cap-and-trade programs. Any change in GHG emissions generated at the Refinery due to implementation of the Project would be accounted for in these programs. Furthermore, the Project would not result in any potential conflicts related to implementation of measures identified in the BAAQMD's 2010 CAP. There would be no impact.

4.6.5 Discussion of Impacts and Mitigation Measures

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

Impact 4.6-1: The Project would generate direct and indirect GHG emissions. (*Less than Significant*)

Construction Emissions

The majority of Project-related GHG construction emissions would be generated onsite due to the use of heavy-duty off-road equipment that would include excavators, graders, front loaders, dump trucks, cranes, paving equipment, etc., to relocate a portion of an existing spill containment berm, and to construct the proposed rail car unloading rack, unloading rail spurs, and ancillary facilities, such as an aboveground crude oil pipeline, spill containment structures, a firewater pipeline, groundwater wells, and a service road. The equipment operation hours per day and number of required work-days would vary depending on the specific type of equipment and on the construction activity; however, for the purposes of this analysis, it is assumed that construction activities at the site would occur during two shifts each day for an average of 10 hours per shift, 7 days a week, for 25 weeks. GHG emissions would also be generated by construction worker daily commutes and by heavy-duty diesel tractor trailer trucks that would be required to haul materials (e.g., concrete, asphalt, rails) and debris to/from the Project site.

Table 4.6-3 sets forth a summary of the GHG construction emissions that the Project would generate. As indicated in the table, total GHG construction emissions that would be generated over the 6-month construction period in the form of CO_2e would be approximately 601 metric tons. These emissions amortized over a 30-year period equal approximately 20 metric tons per year. As described in the analysis methodology, the total emissions from construction are added to operational emissions and then compared to the operations significance threshold (see Table 4.6-5, below). For details of the GHG construction emissions calculations and assumptions, refer to Appendix E.

TABLE 4.6-3
PROJECT CONSTRUCTION GREENHOUSE GAS EMISSIONS

Sources	CO_2e Emissions (metric tons)
Equipment Exhaust	474
Onsite Vehicle Exhaust	24
Off site Vehicle Exhaust	103
Total Emissions	**601**
Amortized Emissions	20 per year

SOURCE: ERM, 2013a, see Appendix E.1

Operational Emissions in California

Table 4.6-4 identifies (1) the Refinery's total maritime emissions of GHGs over the three-year baseline period; (2) the three-year average to be used as the baseline for maritime emissions (14,260 metric tons of CO_2e); and (3) the portion of those baseline maritime emissions that the Project would eliminate (11,707 metric tons of CO_2e). For additional information about the GHG baseline associated with the Project, refer to Section 4.6.2.3, *Project Baseline*, and Appendix E.2.

TABLE 4.6-4
BASELINE MARINE VESSEL GHG EMISSIONS WITHIN CALIFORNIA

Marine Vessel Baseline Emissions	CO_2e (metric tons)
Total Emissions over Baseline Period	42,780
Annual Average Emissions over Baseline Period	14,260
Estimated Baseline Emissions Displaced by Project	11,707

NOTES: Total crude delivered by marine vessel during the 3-year baseline period was 93,361,985 barrels, which equals an annual average of approximately 31,120,662 barrels. It is estimated that the Project would displace approximately 25,550,000 barrels per year of crude oil delivered by marine vessel.

SOURCES: ERM, 2014 and ESA, 2014, see Appendix Sections E.2 and E.5.

As Table 4.6-5 shows, Project operations would result in a net increase of approximately 6,726 metric tons of CO_2e per year for the state compared to the existing baseline emissions. This increase in emissions is less than the conservative significance threshold of 10,000 tons of CO_2e per year. Therefore, the emissions of GHG that would be generated by the Project would not be cumulatively considerable and would represent a less-than-significant impact.

TABLE 4.6-5
PROJECT ANNUAL NET GHG EMISSIONS GENERATED WITHIN CALIFORNIA

Sources	California CO_2e Emissions (metric tons/year)
Trains - Long Line Haul from California State Line to Roseville[a]	13,158
Trains – Long Line Haul from Roseville to Refinery	4,589
Trains – Short Line Haul at Refinery	135
Trains – Switching at Refinery	351
Electricity Consumption[b]	180
Amortized Construction Emissions	20
Total Project Emissions	**18,433**
Marine Vessel Emissions Displaced (Baseline)	-11,707
Total Net Emissions	**6,726**
Significance Threshold	10,000
Significant Impact?	No

[a] Train emissions from the state line to Roseville were estimated by ESA based on ERM, 2013b.
[b] Indirect GHG emissions associated with electricity consumption were provided by Valero (2013).

SOURCES: ERM, 2013b and 2014, and ESA 2014, see Appendix Sections E.2, E.3, and E.5.

Operational Emissions Outside of California

As explained in Section 4.1, trains travelling between the Refinery and North American oil fields would generate locomotive emissions outside of the State. In order to understand the Project's net impact on climate change, however, one must consider the maritime emissions that the Project would eliminate. The baseline includes emissions from marine vessels travelling between the Refinery and shipping ports throughout the world, including ports in Alaska, South America, and the Middle East.

In order to compare the Project's increase in locomotive emissions with the Project's decrease in baseline maritime emissions, ESA developed emissions factors for GHG emissions from locomotives hauling 100-car trains and marine vessels based on calculations provided by Valero. The emission factors, set forth in Table 4.6-6, are stated in metric tons of CO_2e emitted for delivery of one million barrels of crude oil for each thousand miles of distance traveled[4] between the source and the Refinery.

TABLE 4.6-6[5]
EMISSIONS FACTORS COMPARISON FOR 1,000,000 BARRELS DELIVERED PER 1,000 MILES TRAVELLED OUTSIDE OF CALIFORNIA

Sources	Metric tons CO_2e per thousand miles hauled per million barrels delivered
Locomotives – large line haul	1,321
Marine Vessel Main & Aux Engines, Open Ocean	876

SOURCE: ESA, 2014; See Appendix E.5

Table 4.6-7 presents estimates of GHG emissions that would be generated outside of California due to transport of the Project maximum quantity of crude oil by marine vessels and trains. Emissions from marine vessel operation outside California have been estimated using a composite nautical distance for crude oil delivered from source countries of origin during the baseline period. Due to the uncertainty of the origins of the crude oil that would be delivered by rail, the total Project-related GHG emissions that would be generated outside of State cannot be precisely calculated. GHG emissions have been estimated using average estimated distance from two potential North American sources.

4 The mileage is the one-way distance from the terminal to the Refinery; the emissions are doubled to include the trip to return to the terminal.

5 The estimates provided in Table 4.6-7 do not include the following emissions, which occur in California: locomotive emissions associated with small-line (25-rail car trains) hauling or switching that would occur at or in the vicinity of the Refinery, and the marine vessel emissions do not include emissions from main and auxiliary engines and auxiliary boiler operation associated with slow cruise in reduced speed zone, vessel maneuvering, or hoteling at the Refinery dock (i.e., operation of main and auxiliary engines and boilers at/near the dock) or emissions associated with tugboat escorts and berthing, because it would be overly speculative to attempt to estimate such emissions.

TABLE 4.6-7
EXAMPLES OF GHG EMISSIONS OUTSIDE OF CALIFORNIA

Emission Sources for Example Crude Oil Origins	Example One-Way Distance (miles)	Metric tons CO_2e per 25,550,000 Barrels Delivered per Year (round trip)
Project Locomotives – large line haul from composite North American Origin	1,500	101,219
Baseline Marine Vessel Engines - Alaskan Origin	2,000	89,540
Baseline Marine Vessel Engines – South American Origin	4,000	179,080
Baseline Marine Vessel Engines –Middle East Origin	8,500	380,554
Baseline Marine Vessel Engines – Composite Baseline Origin	7,305	327,044
Net Emissions with Alaskan Origin Baseline	--	11,679
Net Emissions with South American Origin Baseline	--	-77,861
Net Emissions with Middle East Origin Baseline	---	-279,325
Net Emissions with Composite Baseline Origin Baseline	---	-225,825

* This estimate excludes emissions from operation of any pipeline to terminal of origin. The weighted average of sea distances between various ports form which crude oil was imported during the baseline period and the Refinery terminal.

SOURCE: ESA, 2014; See Appendix E.5

As indicated in Table 4.6-6, delivery of crude oil by large line haul tank cars would result in lower overall emissions outside of the State than delivery of crude oil by marine vessel from the composite baseline origin. Net GHG emissions that would be generated outside of the State are highly dependent on the origin of the crude oil source and due to the uncertainty in the origins of the crudes that would be delivered by rail as well as the origins of the crudes that would be displaced, the net Project emissions estimates presented in Table 4.6-7 are disclosed for comparison purposes only.

Mitigation: None required.

4.7 Hazards and Hazardous Materials

4.7.1 Introduction

The Project would allow the Refinery to receive shipments of crude oil by rail. These shipments would replace some of the crude oil shipments currently delivered by marine vessel. This section evaluates the Project's potential impacts based on hazards. The section examines risks associated with the accidental release of crude oil from railroad tank cars, including fires, explosions, inhalation of vapors, and environmental damage. The section also examines the health risks associated with routine operations, such as exposure to locomotive emissions.

The section discusses the environmental setting, regulatory setting, significance criteria, potential risks, and their significance.

4.7.2 Setting

The existing setting includes the existing Project area conditions and the programs, procedures, and regulations that are designed to minimize the potential for accidents related to the Project.

4.7.2.1 Regional Setting

The existing Refinery receives crude oil by pipeline and marine vessel. Current marine vessel shipments come from various locations in the world, including Alaska, South America, and the Middle East. These shipments enter the San Francisco Bay through the Golden Gate and proceed to the Refinery dock in Benicia. Although accidents and spills could occur anywhere along the shipping route, from this regional perspective, only the last part of that route is known with relative certainty and is discussed in detail here.

4.7.2.2 Local Setting

The existing Refinery routinely receives, processes, and transports various hazardous materials. These materials exhibit one or more hazardous characteristics, such as combustibility, flammability, or toxicity. Flammable materials can ignite, causing significant fires, explosions, or the release of toxic hazardous materials. Operations at the Refinery are subject to strict safety protocols and process safety management programs that are intended to minimize the possibility of accidental releases.

For this analysis, the study area includes the rail corridor between Roseville and Benicia, the unloading facility, and those portions of San Francisco Bay that could be affected by a maritime oil spill. The analysis does not attempt to consider any impacts that might occur along train routes on the way to Roseville. Any such analysis would be speculative, because crude oil shipments heading to the Refinery could come from oil producing regions all over North America. The study area includes:

- Residences and businesses near the Rail Unloading facility;

- Residences and businesses located along the transportation route; and
- Environmental sensitive areas, including the Suisun Marsh along the train route from Roseville to Benicia.

The analysis also considers the San Francisco Bay, to the extent that the Project would reduce the risk of a crude oil spill from a ship traveling to the port in Benicia.

Airports and Air Hazards

Airport Influence Areas are used in land use planning to identify areas travelled by aircraft as they approach and depart an airport, or as they fly within established airport traffic patterns. The Project is located approximately seven miles northwest from Buchanan Field Airport in the City of Concord, approximately 12 miles southeast from Napa County Airport, in Napa County, and approximately 15 miles southwest from Travis Air Force Base.

Wildland Fire

The Project area is within a developed industrial land use area. The California Department of Forestry and Fire Protection (CAL FIRE) Fire Hazard Severity Zoning (FHSZ) maps ranks land zones under State and Local Responsibility regarding wildland fire hazard. The Project area (loading racks and railroad spurs) within the Refinery is classified as mostly unzoned within the Refinery block and a portion of the northern boundary of the Refinery property is listed as Moderate and High with in the Local Responsibility Area.[1] An area just south of the main Refinery and Park Road containing Valero's main crude tank farm (see Figure 3-2) is surrounded by a CAL FIRE local responsibility area of moderate to high severity zones. Note that CAL FIRE indicates that no portion of the City of Benicia is within a Very High Fire Hazard Severity Zone (CAL FIRE, 2008).

4.7.2.3 Regulatory Setting

A variety of laws, regulations, and industry standards govern the handling and transport of crude oil. The Federal Oil Pollution Prevention regulations (40 CFR 112), as implemented under the Refinery's Emergency Management Plan, require that the Refinery have Spill Prevention Control and Countermeasure (SPCC) plans and Facility Response Plans (FRPs) to address oil spill prevention, preparedness, and response measures. The Refinery already has an approved SPCC and FRP, but the plans must be modified to cover the shipment of crude oil by rail. The modified plans must include any changes in site security measures, personnel training, testing procedures, inspection and record-keeping procedures, secondary containment and oil spill controls, emergency notification procedures, and reporting requirements. These modified plans must describe how the handling of crude oil by rail will be implemented as compared with the existing approach.

[1] The City of Benicia Fire Department is responsible for the Local Responsibility Area within the City of Benicia.

Federal and State

Hazardous Materials Management

Under the Federal Emergency Planning & Community Right-To-Know Act (EPCRA), businesses must retain manufacturers' Safety Data Sheets (SDS) for each hazardous chemical product. Each SDS sets forth information about the chemical in question, including its hazards, guidelines for handling and storage, and accidental release response measures. EPCRA also requires businesses to submit hazardous chemical inventory forms to the State Emergency Response Commission, Local Emergency Planning Committee, and local fire department annually on March 1st.

In California, businesses meet the federal requirements by complying with the California Hazardous Materials Business Plan program (CA Health and Safety Code § 25504 [a-c]). The Hazardous Materials Business Plans describe hazardous materials inventories, storage container types and locations, emergency response and evacuation procedures, and employee hazardous materials training program. The Solano County Department of Resource Management, Environmental Health Services Division Enforcement (SCDRM) enforces the hazardous materials the Hazardous Materials Business Plan requirements as they apply to the Refinery. SCDRM is the Certified Unified Program Agency (CUPA) for Solano County under state law.

Hazardous Waste Management

The Federal Resource Conservation and Recovery Act of 1976 (RCRA) sets forth a "cradle-to-grave" regulatory program governing the generation, transportation, treatment, storage, and disposal of hazardous waste. Under RCRA, individual states may implement their own hazardous waste programs in lieu of RCRA as long as the state program is at least as stringent as federal RCRA requirements.

In California, the Department of Toxic Substances Control (DTSC) implements the federal RCRA requirements under the California Hazardous Waste Control Law. DTSC's hazardous waste regulations establish criteria for identifying, packaging, labeling, and managing of hazardous wastes. The requirements are implemented through a permit program governing treatment, storage, disposal, and transportation of hazardous waste. The regulations require hazardous waste generators to prepare a Hazardous Waste Contingency Plan describing hazardous waste storage and secondary containment facilities, emergency response and evacuation procedures, and employee hazardous waste training program. While DTSC generally retains authority to implement and enforce its hazardous waste management regulations, much of the day-to-day regulation is delegated to the SCDRM as the local CUPA.

Federal Regulation of Oil Transport by Rail

The Federal Railroad Administration (FRA) is a department within the U.S. Department of Transportation (USDOT). FRA adopts and enforces railroad safety regulations, including regulations relating to track safety, grade crossings, rail equipment, operating practices, and the transport of hazardous materials by rail. The FRA inspects rail facilities throughout the country in order to ensure compliance with its own regulations, and those adopted by the Pipeline and Hazardous Materials Safety Administration (PHMSA). The FRA operates through a number of

regional offices. The Region 7 office, headquartered in Sacramento, governs rail activities in Arizona, California, Nevada, and Utah.

PHMSA is another department within the USDOT. Pursuant to the Hazardous Materials Transportation Act, PHMSA adopts regulations governing the transport of hazardous materials by rail, highway, air, and water. The PHMSA regulations are set forth in Chapter I of Subtitle B of Title 49 of the Code of Federal Regulations (CFR). The FRA enforces the requirements set forth in PHMSA regulations.

The National Transportation Safety Board (NTSB) is an independent federal agency. The NTSB reviews transportation accidents, including rail accidents, and makes recommendations to FRA and PHMSA for regulatory changes.

The American Association of Railroads (AAR) is an industry trade association that represents railroads, including the major freight railroads in the United States, Canada, and Mexico. AAR adopts standards for the design and construction of tank cars carried by its members. In some cases, these standards are more stringent than the requirements set forth in FRA or PHMSA regulations. In addition, USDOT's predecessor delegated to AAR regulatory authority to approve the construction, alteration, repair, and conversion of tank cars and to certify facilities engaged in these activities.

The PHMSA regulations classify hazardous materials based on each material's hazardous characteristics. Crude oil is assigned to hazard Class 3, based on specified characteristics of flammability and combustibility (49 CFR 173.120). The pertinent PHMSA regulations governing rail transport are summarized as follows:

- 49 CFR 172, *Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans,* addresses numerous aspects of safe rail transport, including requirements pertaining to the hazardous materials classification of crude oil.

- 49 CFR 173, *General Requirements for Shipments and Packages*, specifies requirements for bulk packaging including the type of tank car a hazardous material must be transported in based on its assigned Packing Group.

- 49 CFR 174, *Carriage by Rail*, specifies handling, loading, and unloading requirements for the safe transport and shipping of hazardous materials, which must be performed by qualified personnel. This part also addresses correct placarding of rail cars to indicate the hazard classifications of the materials, and segregation of incompatible materials.

- 49 CFR 176, *Carriage by Vessel*, provides further details on vessel carriage requirements for different classes of hazardous materials.

- 49 CFR 179, *Specifications for Tank Cars*, provides design standards and construction requirements for rail tank cars including tank wall thickness, tank mounting, welding certification, pressure relief devices, protection of fittings, loading/unloading valve requirements, coupler vertical restraints systems, tank-head puncture-resistance systems, and thermal protection systems.

Under PMHSA regulations, all crude oil must be shipped in a tank car built to the "DOT-111" specification. DOT-111 tank cars are non pressure tank cars. The cars have a minimum shell thickness of 7/16 inch and a design pressure of up to 500 pounds per square inch gage (psig). DOT-111 tank cars are used to transport a variety of hazardous materials, including crude oil and ethanol. The DOT-111 design has been in use since the 1960's.

Different "packaging" requirements apply to different crude oils transported by rail. PHMSA regulations assign hazardous materials to "Packing Groups" based on the risks posed by the transport of each hazardous material. Packing Group I indicates great danger; Packing Group II indicates medium danger; and Packing Group III indicates minor danger (49 CFR 171.8). Materials assigned to Packing Group I are subject to the most stringent packaging requirements, while crude oils assigned to Packing Group III are subject to the least stringent requirements.

Individual crude oils can be classified as Packing Group I, II, or III materials depending on their boiling points and flash points. Any crude oil with a boiling point below 95° Fahrenheit is assigned to Packing Group I. Packing Group II includes any crude oil with a boiling point above 95° and a flash point below 73° Fahrenheit. Packing Group II crude oils are less volatile than Packing Group I, although more volatile than Packing Group III crude oils. Packing Group III includes any crude oil with a boiling point above 95° and a flash point between 73° and 140° Fahrenheit.

Recent and Ongoing Developments in the Regulation of Crude Transport by Rail

In response to recent rail accidents involving crude oil and ethanol, federal regulatory agencies and AAR have taken a variety of actions designed to reduce the risk of accidental releases from DOT-111 tank cars. The effort to reduce risk is ongoing, and further regulatory changes are expected in the relatively near future.

The first of these rail accidents occurred at a highway/rail grade crossing in Cherry Valley, Illinois on June 19, 2009. A freight train carrying ethanol in DOT-111 tank cars derailed, causing the release of ethanol from thirteen tank cars. The ethanol caught fire. At the time of the derailment, several motor vehicles were stopped on either side of the grade crossing waiting for the train to pass. The fire fatally injured an occupant in one of the motor vehicles, and seriously injured two other occupants. Five occupants of other vehicles were also injured. The accident prompted a mandatory evacuation of approximately 600 residences within a ½ mile radius of the grade crossing (NTSB, 2012a).

In its 2012 Accident Report, the NTSB identified a number of causes of the Cherry Valley accident and the ensuing release, including the fact that the track structure was washed out by a flash flood. The NTSB also concluded that design of the DOT-111tank cars was "inadequate," making the cars "subject to damage and catastrophic loss of hazardous materials during derailment" (NTSB, 2012a).

In 2012, NTSB issued a safety recommendation urging PHMSA to adopt more stringent specifications for DOT-111 tank cars that carry ethanol or crude oil and are assigned to Packing Groups I or II (NTSB, 2012b). The recommendations included making the tank head and shell

more puncture resistant and requiring that bottom outlet valves are designed to remain closed during accidents when the valve and operating handle are subjected to impact forces.

Also in response to the Cherry Valley accident, AAR's North American Tank Car Committee began to consider possible changes to the DOT-111 design that would help prevent releases. In March 2011, the AAR filed Petition P-1577 with the PHMSA, asking PHMSA to adopt more stringent standards for DOT-111 tank cars (AAR, 2011a). PHMSA has not yet acted on the AAR Petition. PHMSA has, however, instituted a rulemaking to address the AAR Petition along with seven other petitions and four NTSB recommendations relating to transportation of hazardous materials by rail (PHMSA, 2013). The rulemaking will address, among other issues, the adequacy of the DOT-111 tank cars. The PHMSA rulemaking may well result in more stringent regulations governing the design of tank cars that carry crude oil and other hazardous materials.

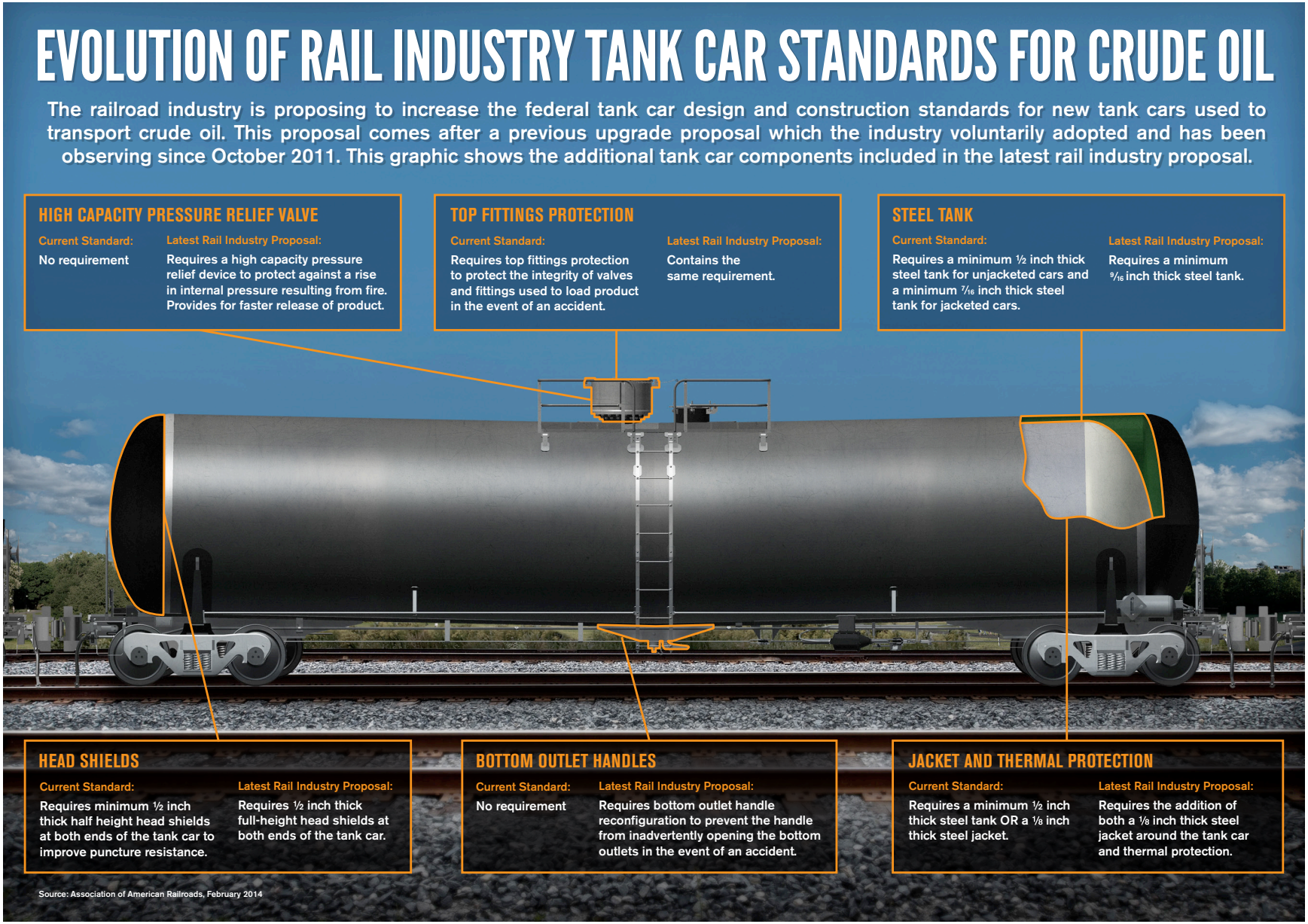
Rather than wait for action on its PHMSA Petition, on August 31, 2011, AAR voluntarily imposed more stringent standards for the design of DOT-111 tank cars. AAR issued the new standards through Casualty Prevention Circular 1232 (CPC-1232) (AAR, 2011b). CPC-1232 established the following requirements for DOT-111 tank cars:

- Thicker, tank shell and heads;
- Higher tensile strength, normalized steel to improve the ability of tank cars to survive an accident;
- Protective, steel head shields at both ends of tank car;
- Consolidated top fittings located beneath a robust steel protective housing; and
- A reclosing pressure relief device to reduce the likelihood of over-pressure if the car is involved in an accident and pool fire.

DOT-111 tank cars that meet these standards are often referred to by the number "1232," and shall be referred to here as "1232 Tank Cars" (see Figure 4.7-1). DOT-111 tank cars that do not comply with CPC 1232 are often referred to as "legacy" DOT-111 tank cars, and are referred to here as "DOT-111 Legacy Tank Cars." As a result of CPC-1232, all DOT-111 tank cars ordered after October 1, 2011 must meet the standards for 1232 Tank Cars. As of April, 2013, approximately one third of the DOT-111 tank cars used to transport crude oil in North America are 1232 Tank Cars, while the rest are DOT-111 Legacy Tank Cars (AAR, 2014).

In addition, in just the last year, PHMSA, FRA, NTSB, and AAR have taken a number of actions in response to certain accidents involving the rail transportation of crude oil from the Bakken Shale formation in North Dakota. These incidents are summarized as follows:

- On July 6, 2013, a train carrying Bakken crude oil in 72 DOT-111 Legacy Tank Cars derailed in the downtown area of Lac-Mégantic, Canada. The waybills described the Bakken crude oil as a Class 3 hazardous material, assigned to Packing Group III. The engineer stopped the train at a designated crew change point, left the lead locomotive engine idling, and departed the area leaving the train unattended on the mainline track. A fire was later reported on one of the train's unattended locomotive engines and local emergency personnel



SOURCE: Association of American Railroads, February 2014

Benicia Valero CBR . 202115.01

Figure 4.7-1
Evolution of Rail Industry Tank Car Standards for Crude Oil

responded. An employee of the rail line also arrived on scene. After the responders departed, the unattended train began to move and gather speed, travelling uncontrolled for 7.4 miles down a descending 1.2% grade into the town of Lac-Mégantic. The train reached a top speed of 60-70 miles per hour. Sixty-three of the tank cars derailed and, of these, at least 60 released a total of 1.6 million gallons of crude oil. The spilled oil ignited immediately, and the resulting fire engulfed the tank cars and the surrounding area. A total of 47 people died in the accident. Thirty buildings were destroyed and 2,000 people were evacuated. Approximately 26,000 gallons of crude oil was discharged into the Chaudière River (NTSB, 2014a).

- On November 8, 2013, a train derailed in Aliceville, Alabama. The train was carrying 90 DOT-111 Legacy Tank Cars with Bakken crude oil from North Dakota to a refinery in the Gulf Coast. Approximately 12 of the tank cars released crude oil and caught fire. There were no reported injuries.

- On December 30, 2013, a train carrying 106 DOT-111 Legacy Tank Cars with Bakken crude oil collided with a grain train in Casselton, North Dakota. A total of 34 cars from both trains derailed, including 20 that were carrying Bakken crude oil. These cars released their contents, exploded and burned for over 24 hours. There were no reported injuries. Over 1,400 residents were evacuated from the scene.

- On April 30, 2014 in Lynchburg, Virginia, a train carrying crude oil tank cars derailed. Some of the cars that derailed were Legacy DOT-111 Tank Cars, while some were 1232 Tank Cars. One of the 1232 Tank Cars ruptured and released crude oil that ignited (Oil Daily, 2014). In addition, over 33,000 gallons of Bakken crude oil was released into the James River. There were no reported injuries.

These accidents triggered the following responses from federal regulators and the AAR:

- On August 2, 2013, FRA issued Emergency Order No. 28 establishing additional requirements for unattended trains. The requirements are designed to ensure that unattended trains, locomotives, and tenders on the mainline track or siding are properly secured against unintended movement. The Order was prompted by the Lac-Mégantic accident, which involved an unattended train (FRA, 2013a).

- Also on August 2, 2013, PHMSA and FRA issued joint Safety Advisory 2013-06. The advisory recommended eight specific actions that railroads and shippers should take relating to unattended trains, procedures for securing trains, safety and security plans, and proper classification of hazardous materials for shipment (FRA/PHMSA, 2013b).

- On September 6, 2013 PHMSA published an Advanced Notice of Proposed Rulemaking. This rulemaking will address, among other topics, the need to enhance the standards for DOT-111 tank cars used to transport Packing Group I and II hazardous materials, including crude oil (78 FR 54849; PMHSA, 2013).

- On November 14, 2013, AAR submitted comments in response PHMSA's advance notice of rulemaking. In the comments, AAR recommended that PHMSA adopt tank car standards that are even more stringent than those adopted by AAR in CPC-1232. AAR recommended that PHMSA adopt standards for new cars, and require retrofit of existing cars, to include:

  - an outer steel jacket around the tank car and thermal protection,
  - full-height head shields, and
  - high-flow capacity pressure relief valves.

AAR also recommended that PHMSA require additional safety upgrades for 1232 Tank Cars, including:

- installation of high-flow-capacity relief valves, and
- design modifications to prevent bottom outlets from opening in the case of an accident.

AAR also recommended that PHMSA aggressively phase out older-model tank cars used to move flammable liquids that cannot be retrofitted to meet new federal requirements, and eliminate the option for rail shippers to classify a flammable liquid with a flash point between 100 and 140 degrees Fahrenheit as a combustible liquid. The tank standards that AAR is currently recommending are displayed in Figure 4.7-1.

- On November 20, 2013, PHMSA and FRA issued joint Safety Advisory 2013-07 relating to the proper classification of crude oil for purposes of the packing group requirements. (FRA/PHMSA 2013c). The Advisory expressed the concern that, based on its low flash point, the Bakken crude involved in the Lac-Mégantic incident should not have been classified as a Packing Group III material. The Advisory stressed the importance of proper classification based on flash point and other hazardous characteristics. The Advisory also announced a joint FRA/PHMSA compliance initiative called "Operation Classification." The initiative involves unannounced inspections at oil producing sites to ensure that crude oil has been properly tested and classified before it is loaded onto a tank car. The initiative has informally been referred to as the "Bakken Blitz."

- On January 2, 2014, PHMSA issued a Safety Alert reinforcing the need to properly characterize crude oil offered for shipment (PHMSA, 2014). The Alert specifically noted that, because of its low flash point and/or low boiling point, light sweet crude such as Bakken should typically be assigned to Packing Group I or II.

- On January 21, 2014, NTSB issued Safety Recommendations R-14-4, 14-5, and 14-6 to PHMSA relating to the Lac-Mégantic incident (NTSB, 2014a). NTSB reported its finding that, based on its flash point, the Bakken crude oil released in the Lac-Mégantic incident was improperly characterized as a Packing Group III material, and should have been assigned to Packing Group II. NTSB recommended, among other things, that PHMSA and FRA work together to require shippers to accurately characterize hazardous materials offered for shipment to ensure that they are assigned to the correct packing group.

- On January 23, 2014, NTSB issued Safety Recommendations R-14-1, 14-2, and 14-3 to FRA relating to the Lac-Mégantic incident (NTSB, 2014b). NTSB repeated its findings relating to mischaracterization of Bakken crude oil and recommended that FRA, among other things, audit shippers and railroads to ensure that they are using the correct shipping classifications.

- On February 21, 2014, DOT and AAR announced an agreement relating to the transport of crude oil by rail (USDOT/AAR, 2014). AAR and its individual members (including Union Pacific Railroad) agreed to take the following eight specific actions designed to reduce the risk of transporting crude by rail:

  - Increase track inspections;
  - Upgrade braking systems;

- Apply the route planning and route selection requirements set forth in 49 CFR 172.820[2] to the routing of crude oil trains (the requirements do not currently apply to trains transporting crude oil);
- Establish a maximum speed limit of 40 miles per hour for DOT-111 Legacy Tank Cars carrying crude oil through federally designated "high threat urban areas." (These areas include cities along the route from Roseville to Benicia);
- Continue to work with local communities to address their concerns about crude-by-rail transport in their areas;
- Install wayside wheel bearing detectors on tracks at 40-mile intervals. These devices monitor train wheels and can detect potential defects before they cause an accident;
- Increase emergency response training;
- Conduct planning for emergency response capability.

- On March 6, 2014, USDOT issued Emergency Order DOT-OST-2014-0025. (USDOT, 2014a). Among other things, the Order requires shippers to assign crude oil to Packing Groups I or II, thereby assuring that Bakken and other highly volatile crude oils cannot be mischaracterized and assigned to Packing Group III.

- On May 7, 2014, USDOT issued Emergency Order DOT-OST-2014-0067. (USDOT, 2014b). The Order requires railroads to notify the State Emergency Response Commission for each state in which the railroad transports Bakken crude oil. The notice must contain certain prescribed information, including the number of trains, the train routes, and the characteristics of the crude oil. Absent the required notice, railroads are prohibited from transporting Bakken crude oil. The Order allows states to effectively plan emergency response procedures for an accident involving Bakken crude oil.

- On May 7, 2014, FRA and PHMSA issued a joint Safety Advisory relating to the transport of Bakken crude by rail. (FRA/PHMSA, 2014). The Advisory recommended that shippers and railroads use the rail tank car designs with the "highest level of integrity reasonably available within their fleet" for the shipment of Bakken crude oil. The Advisory also specifically advised shippers and railroads to avoid the use of DOT-111 Legacy Tank Cars for shipping Bakken crude oil, to the extent reasonably practicable.

Accidental Release Prevention

Under federal and state laws, certain facilities must assess the potential for accidental releases of toxic, reactive, flammable, or explosive chemicals, and establish programs to minimize the frequency and extent of accidental releases. These laws include the U.S. Environmental Protection Agency Risk Management Plan (RMP) Rule; the California Accidental Release Programs (CalARP); and the California Occupational Safety and Health (Cal/OSHA) Process Safety Management (PSM) standard. The PSM standard addresses workplace and employee safety on-site. The RMP and CalARP regulations address on-site incidents that might have offsite consequences for the general public

[2] Section 172.820 requires rail carriers to analyze the safety and security risks for each transportation route. The analysis must take into account a variety of relevant factors including, among others, the volume of hazardous materials transported, the density of rail traffic, trip length, track type, class and maintenance schedule, track grade and curvature, signals and train control system, environmentally sensitive or significant areas, and venues along the route (49 CFR 172 app. D). The analysis must also identify and analyze practicable alternative routes.

Fire Protection-Flammable Liquid and Compressed Gas Storage

The Refinery is required to comply with the California Fire Code and National Fire Protection Association (NFPA) codes that address requirements for flammable and combustible liquid and compressed gas storage including pressure vessel installation, water mains, foam fire protection systems, and water supply reliability requirements. The Benicia Fire Department has local jurisdiction over proper implementation of fire code requirements.

Worker Safety

Occupational safety standards exist in federal and State laws to minimize worker safety risks from both physical and chemical hazards in the work place. The Cal/OSHA and the federal Occupational Safety and Health Administration are the agencies responsible for assuring worker safety in the workplace.

Cal/OSHA assumes primary responsibility for developing and enforcing standards for safe workplaces and work practices within the State. The Cal/OSHA PSM rule is discussed above under Accidental Release Prevention. Worker entry into confined spaces, such as bulk storage tanks, must be performed in accordance with OSHA confined space procedures, including training for participants, planning, provisions for access/egress, monitoring, and supervision. Work requiring welding, grinding, demolition, repair, and installation require hot work (cutting torches, welding, grinding, etc.). Hot work within the Refinery environment must be performed under the facility hot work program that is designed in accordance with OSHA requirements and industry guidelines. At sites known to have hazardous materials present (hydrocarbons, lead based paint, asbestos, contaminated soil, etc.), a site safety plan must be prepared to protect workers. The site safety plan establishes policies and procedures to protect workers and the public from exposure to known and potential hazards at the site. Additional information on Valero's Process Safety Management programs are discussed in Chapter 3, *Project Description*, and in this section, see Impact 4.7-7 below.

In addition, regulations protecting worker safety during crude oil unloading from tank cars are under the supervision of Cal/OSHA. The State requirements under California Code of Regulations, Title 8 are designed to protect workers and the public from health and safety hazards during crude oil handling related to rail transport. Cal/OSHA requires that employers provide employees with information and training on hazardous chemicals that may be encountered in their work area and instructions on ways to protect themselves in the event of a spill or release of hazardous substances.

Emergency Response

California has developed an emergency response plan to coordinate emergency services provided by federal, State, and local government and private agencies. Responding to hazardous materials incidents is one part of this plan, as is responding to intentional acts of destruction. Another part of the plan involves development of a downstream evacuation plan for areas within the potential inundation area. For Solano County, the plan is administered by the California Emergency Management Agency, which coordinates the responses of other agencies, including the California

Environmental Protection Agency, California Highway Patrol, California Department of Fish and Wildlife, Regional Water Quality Control Board, and local fire departments.

Crude Oil Tank Car Movements

Union Pacific Railroad (UPRR) is a common carrier, which is a company that transports goods for any person or company and that is responsible for the loss of goods during transport. UPRR transports all materials (hazardous or otherwise) in accordance with applicable federal law, industry standards, and other operating rules to safely and efficiently move freight. Specifically, 49 CFR 130 - Oil Spill Prevention and Response Plans, requires transporters of oil (both non-hazardous and hazardous) to have a written emergency response plan. UPRR's Hazardous Material Emergency Response Plan (HMERP) meets this requirement. Additionally, UPRR's Hazmat Team is trained to respond and manage incidents involving the release, or potential release, of hazardous materials during an incident.

Local

Benicia General Plan

The *City of Benicia General Plan* (1999) identifies the following goals and policies relating to hazardous materials:

> **Goal 4.7:** Ensure that existing and future neighborhoods are safe from risks to public health that could result from exposure to hazardous materials.
>
> > ***Policy 4.7.1*:** Actively recruit industries and businesses that sustain environmental quality and have sound, responsible environmental policies, such as "best available control technology" (BACT), source reduction, reduced use of hazardous materials in production, and reduced waste.
> >
> > ***Policy 4.7.2*:** Establish a "Community Right to know "program to promote general public understanding of Benicia toxics problems as they affect current and future generations.
>
> **Goal 4.8:** Protect sensitive receptors from hazards.
>
> > ***Policy 4.8.1*:** Evaluate potential hazards and environmental risks to sensitive receptors before approving development.
>
> **Goal 4.16:** Require hazardous materials and hazardous waste management handling and disposal procedures that are protective of human health and the environment.

4.7.2.4 Project Baseline

Baseline conditions reflect the ongoing operation of the Refinery as it existed at the time of the preparation of the Initial Study (Spring 2013), including the shipment of crude oil by marine vessel.

4.7.3 Significance Criteria

Based on California Environmental Quality Act (CEQA) Guidelines Appendix G, a project would cause adverse impacts related to hazards and hazardous materials if it would:

a) Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials;

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school;

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would result in a safety hazard for people residing or working in the project area;

f) For a project within the vicinity of a private airstrip, would result in a safety hazard for people residing or working in the project area;

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

4.7.3.1 Approach to Analysis

Within each impact area, this analysis compares existing conditions with existing-plus-project conditions, and applies an appropriate qualitative or quantitative significance threshold. An increased cancer risk, for example, is considered significant if the risk exceeds 10 in 1 million. The risk of an accidental release of hazardous materials is subject to a qualitative evaluation, taking into account the applicable regulatory framework, the probability that an accident will occur, and the potential consequences of an accident.

4.7.4 Hazardous Properties of Crude Oil to be Shipped by Rail

The consequences of a release of crude oil for a rail tank car depend on the properties of the crude oil and the area into which the crude oil is released. Relatively lighter crude oil has a lower flash point than relatively heavier crude oil. Therefore, relatively lighter crude oil is more likely to ignite upon release, causing a fire and/or explosion.

As explained in Section 3.3.1.1 *Types of Crude Oil*, crude oil is a mixture of hydrocarbon compounds. While most of the compounds are liquid at room temperature, some are vapors at room temperature. Methane, ethane, propane, butane, and pentane, for example, are vapors at room temperature. Some crude oils also contain various sulfur compounds, including hydrogen sulfide, a toxic gas that can cause adverse acute health effects above certain concentrations and exposure duration.

Crude oil produced from an oil well usually undergoes some processing, separation, or treatment near the well location prior to being loaded onto tank cars. Processing includes the separation of water and solids from the oil as well as the separation of light vapors from the liquid crude oil. Depending on the characteristics of the crude oil reservoir, hydrogen sulfide might be present in the vapors produced with the crude. Most of the hydrogen sulfide and vapors are removed from crude oil before it is loaded onto a tank car.

As explained above, shippers must characterize crude oil that they offer to railroads for shipment based on initial boiling point and flash point. Crudes with relatively lower boiling points and/or lower flash points are more easily ignited by heat, sparks or flames than crudes with relatively high boiling points and/or flash points. Crude oil vapors can form an explosive mixture with oxygen. Inhalation of vapor or contact with the material may irritate or burn skin or eyes. Fire may produce irritating, corrosive and/or toxic gases.

4.7.5 Discussion of No Hazards and Hazardous Materials Impacts

Based on the facts and reasoning set forth below, no impact would result for three hazards criteria.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.

The Valero Benicia Refinery is listed by the State Water Resources Control Board as having potentially contaminated ground water, and performs ongoing groundwater monitoring, remediation, and reporting activities. The Project is compatible with Valero’s groundwater compliance activities. The Project would be constructed entirely within the Refinery, where no public access is allowed. As the Project involves the installation of underground equipment and other new construction that would involve soil disturbance, there is the potential to encounter contaminated soil or groundwater. If contamination is encountered, construction work would follow legally required procedures to protect worker and public health and safety. Excavated soils would be segregated and sampled relative to the profiling requirements of the accepting landfill, and disposed of in accordance with policies of the accepting landfill and applicable regulations.

For these reasons, the potential presence of hazardous materials on the site would not create a hazard to the public or to the environment. No impact would occur.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would result in a safety hazard for people residing or working in the project area.

The Project is not located within an airport use plan. No impact would occur.

f) For a project within the vicinity of a private airstrip, would result in a safety hazard for people residing or working in the project area.

There are no private airstrips in the vicinity of the Project. Therefore, there are no impacts anticipated from a private airstrip. No impact would occur.

4.7.6 Discussion of Impacts and Mitigation Measures

a) Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials.

General Railroad Safety

UPRR is a common carrier by rail and would be responsible for transporting crude oil to the Refinery if the Project were approved. Federal law requires common carriers like UPRR, to transport hazardous materials, such as ethanol or crude oil, for its customers. If a customer delivers the hazardous material in conformity with applicable DOT requirements, UPRR must transport the hazardous material.

UPRR transports all commodities in accordance with applicable federal laws and industry standards. To maximize safety and security when moving hazardous materials, UPRR has implemented additional voluntary rules to secure trains operating on their 23-state network. UPRR invests substantially in efforts to improve hazardous materials transportation safety, funding an array of security and hazardous materials-related initiatives that exceed mandatory compliance measures. UPRR has indicated that it is continuously improving safety when it comes to transporting crude oil and other hazardous materials. Every day, as part of this effort, UPRR inspects tracks, locomotives, and cars carrying crude oil and other hazardous liquids. UPRR conducts extensive training and preparedness programs involving specialized safety training for rail personnel, as well as local first responders (UPRR, 2013).

It should be noted that UPRR does not produce hazardous materials, own the tank cars that move the hazardous materials, load or unload those tank cars, or select the origin point or destination where the hazardous materials are shipped. In addition, UPRR has procedures in place to ensure that equipment is properly secured, including several checks and balances to control the risk of an uncontrolled movement. Project trains are expected to move directly from Roseville to Benicia, and will be attended at all times. To maximize safety and security, UPRR has implemented additional procedures to secure an unattended train or locomotives (UPRR, 2013). These include:

- Designate trains carrying loads of hazardous materials that will not be left unattended on main line tracks or sidings outside of yards or terminals unless specifically authorized.

- Develop a written plan that specifies locations and circumstances under which it is safe to leave unattended trains or vehicles transporting hazardous material loads.
- Develop a process for employees securing unattended trains or vehicles that include specific communications with the train dispatchers.
- Review, verify and adjust as necessary protocols related to securing unattended trains or vehicles.
- Implement operating rules and instructions regarding job briefings that include appropriate securement protocols.
- Implement procedures for inspecting equipment for proper securement in cases where an emergency responder has been on, under or between equipment.

Impact 4.7-1: The Project could pose a significant hazard to the public or environment during operation of the Project or routine transport or disposal of hazardous materials. (*Less than Significant*)

The operation of the Project and transportation of crude oil by rail would increase the frequency of emissions of toxic air contaminants (TACs) from locomotive emissions, and from equipment fugitive emissions. Crude oil delivered by tank car would be stored in existing crude storage tanks and the crude brought in by rail will displace crude brought in by marine vessel. Therefore, there would be no increase in fugitive emissions from storage tanks. A health risk assessment performed for the Project (see Appendix E.6) including operations at the new unloading facility and along the UPRR mainline between the Refinery and the Roseville rail yards, shows that the cancer risk from the increase in exposure to TACs ranges from 0.3 to 8 in one million, which is less than the significance threshold of 10 in one million. Also, the maximum chronic and acute hazard indices of 0.014 and 0.0113, respectively, are less than the significance threshold of 1.0. Thus, the potential risk to the public and environment for the routine transport of crude oil by rail for the Project is considered to be less than significant.

Mitigation: None required.

---

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Impact 4.7-2: The Project could pose significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. (*Less than Significant*)

If the Project were approved and constructed, trains would transport crude oil on UPRR's mainline tracks from the Roseville Yard to the Refinery's unloading facility. Each train, carrying up to 50 cars of crude oil, would pass through the cities of Roseville, Sacramento, Davis, Dixon, Vacaville, Fairfield, Suisun City, and Benicia. The Refinery would receive two trains per day, 7 days per week (730 train visits per year).

If a train carrying crude oil from the Roseville Yard to the Refinery were to derail, and one or more tank cars were to rupture, crude oil could be released into the environment.[4] If an ignition source is present, the released crude oil could ignite and/or explode. This section b) performs a qualitative analysis of this risk. The analysis takes into account the following factors: (1) the probability of an accidental release of crude oil from a train; (2) the consequences of a release; (3) the reduction in the risk of accidental releases from a marine vessel, based on the reduction in marine trips that would be caused by the Project; (4) the recent history of accidents involving DOT-111 tank cars carrying crude oil; and (5) the regulatory requirements designed to prevent releases and/or mitigate the consequences in the event of a release from trains.

If a release were to occur, the consequences depend largely on the amount and location of release. A release in any area could, depending on the specific circumstances, require a significant hazardous materials cleanup. A release of a relatively small amount of crude may not have significant consequences if it were to occur along the line in a rural area other than the Suisun Marsh. If a release in an urban area were to ignite and/or explode, depending on the specific circumstances, the release could result in property damage and/or injury and/or loss of life. As explained in Section 4.2, *Biological Resources*, a release into the Suisun Marsh could result in significant damage to biological resources.

As explained above, there is a variety of federal regulations designed to prevent the accidental release of crude oil from trains, and minimize the consequences of any such release. FRA and PHMSA closely regulate the rail transport of crude oil and other hazardous materials. Crude oil must be classified, assigned to a packing group subject to packaging requirements, and transported in rail cars that meet certain specifications. The transport of crude oil by rail is subject to requirements for handling, loading and unloading, and the placement of placards to alert emergency response teams as to the contents of each car. FRA routinely inspects the facilities of shippers and railroads to ensure that all regulatory requirements are being met.

In order to identify the probability of an accidental release of crude oil from a Valero train, the City retained Dr. Christopher Barkan to conduct a quantitative assessment. Dr. Barkan is Professor and Executive Director of the Rail Transportation and Engineering Center at the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. He and his colleagues prepared a report that is attached hereto as Appendix F.

The annual rate of crude oil release accidents on the route between Roseville and Benicia was estimated. Consistent with recent industry practice a release event in which a tank car loses more than 100 gallons of crude oil was considered significant. It was assumed that the Refinery would use 1232 Tank Cars for all shipments, based on Valero’s commitment to do so. The risk analysis took into account major risk factors, including the route’s FRA track class, method of operation, tank car safety design and the proposed volume of petroleum crude oil traffic over the route.

[4] Not every tank car derailment results in a spill, fire, or explosion. This analysis focuses on derailments that result in a release of crude oil.

The estimated risk of an accident resulting in a release of more than 100 gallons is approximately 0.009 per year, which corresponds to an estimated frequency of occurrence of once per 111 years. The risk of a release along the portion of the route traversing the Suisun wetland area has an even lower annual risk of 0.00381, which corresponds to an estimated frequency of once per 262 years.

According to the report, these risk estimates are probably conservative, meaning that they probably overstate the actual risk. This is because the rate of hazardous materials releases from trains has declined since the rate estimates were developed; the accident rate has been declining for decades, and this trend will likely continue based on continued investment in infrastructure and new safety technologies; the analysis does not take into account the safety practices adopted by AAR earlier this year. In addition, the pending PHMSA rulemaking could result in new tank car standards that are even more stringent than those for 1232 Tank Cars.

The report also compared the likelihood of an accident involving a Valero train travelling from Roseville to Benicia with the likelihood of automobile accidents, based on recent US federal data on highway safety in terms of incidents per million vehicle miles traveled. The risk of a motor vehicle accident is 22 times higher than the risk of a Valero train release. Considered on an annual basis, the average US driver is 6.3 times more likely to be involved in a motor vehicle accident, and 1.9 times more likely to be involved in an accident involving injuries or fatalities, than the occurrence of a release incident on the Roseville to Benicia route.

Although the Project involves a risk of an accidental release from tank cars (albeit very low at 0.009), the Project also involves a corresponding reduction in the risk of an accidental maritime release from vessels carrying crude oil to the Refinery. For harbor and mooring accidents, the probability of an accident as reported by FEMA is 0.001 accidents per transit, and about 0.15 of these accidents would result in a spill (FEMA, 1989). Assuming current baseline transits for marine terminal (approximately 89 ships per year); the estimated baseline probability of an accidental release resulting in a spill would be 0.0267 releases per year (or once every 37.5 years). With operation of the Project, marine vessel deliveries would be reduced by up to 82% per year and the probability of a maritime release in San Francisco Bay would be lowered to 0.0048 releases per year (once in 208 years).

As also explained above, in the past year there have been several significant accidents involving the release of Bakken crude oil from rail cars, including the incidents in Lac-Mégantic, Aliceville, Casselton, and Lynchburg. All of these incidents involved a significant fire and/or explosion. The Lac-Mégantic was the only incident involving injuries or loss of life, although the loss in that event can only be described as catastrophic. The Lac-Mégantic and Lynchburg events both resulted in a significant discharge of crude oil into a waterway.

These incidents raise the concern that a release of Bakken crude is more likely to result in a fire or explosion because of its low flash point and/or low boiling point than other crude oils. Since Bakken is one of the available North American crudes that Valero might purchase and transport by rail to Benicia, it is important to consider those incidents, and the regulatory requirements adopted in their aftermath. It is also important to consider how the circumstances in those incidents compare to the Project’s train trips.

The accident in Lac-Mégantic was caused by human error – the decision to leave an idling train unattended at the top of a steep grade. DOT's Emergency Order No. 28 substantially reduces the risk of such an occurrence in the United States by imposing a variety of requirements relating to unattended trains and the securing thereof.

The accidents in Lac-Mégantic, Aliceville, and Casselton all involved DOT-111 Legacy Tank Cars. If the Project were approved, Valero here would use only 1232 Tank Cars to transport oil from Roseville to Benicia. This substantially reduces the risk of release in the event of derailment as compared with the use DOT-111 Legacy Tank Cars because, as explained above, 1232 Tank Cars are designed according to more stringent requirements. Had the trains in Aliceville or Casselton been using 1232 Tank Cars, it is possible that crude oil might not have been released. (Since the train in the Lac-Mégantic incident was travelling at a rate of 63 miles per hour when it derailed, it is unlikely that the use of 1232 Tank Cars would have prevented a release, although it might have reduced the severity somewhat).

At the same time, it is important to recognize that, in the Lynchburg incident, one of the 1232 Tank Cars ruptured (Oil Daily, 2014).

As explained above, in the past year the following actions by FRA, PHMSA, and AAR will significantly reduce the risk of further incidents involving Bakken crude oil:

- DOT and AAR agreed to a program involving more track inspections, better braking systems, maximum speed limits, installation of wayside wheel bearing detectors every 40 miles, additional training and planning for emergency response, and application of route planning and selection requirements to crude by rail.
- FRA Emergency Order No. 28 established additional requirements to ensure that unattended trains, locomotives, and tenders on the mainline track or siding are properly secured against unintended movement.
- DOT Emergency Order 2014-25 mandated that all crude oil be transported according to the requirements for Packing Groups I or II, even if the material in question might otherwise meet the requirements for Packing Group III. This will ensure a higher level of protection for all shipments of crude oil, including Bakken.
- As part of the "Bakken Blitz" compliance initiative, the FRA began unannounced inspections at oil producing sites to ensure that crude oil has been properly tested and classified before it is loaded onto a tank car.
- DOT Emergency Order 2014-0067 required railroads to notify the State Emergency Response Commission for each state in which the railroad transports Bakken crude oil so that adequate emergency response procedures are in place in the event of an incident.

In addition, PHMSA is currently considering more stringent regulations for the transportation of crude by rail, including requirements for tank car design that are even more stringent than those set forth in CPC-1232. AAR has already advocated such an approach in its rulemaking comments. PHMSA's review will benefit from the lessons learned from all recent incidents, and the input of FRA and NTSB. Union Pacific and Valero will comply with any revised regulations, thereby reducing the risk of an accident, and the potential consequences of an accident, even further.

In conclusion, the risk of an accidental release of crude oil from a train travelling from Roseville to Benicia is considered insignificant based on the following:

- Although the consequences of a release are potentially severe, the likelihood of such a release is very low. The probability of an accidental release of crude oil from a tank car traveling to the Refinery involving more than 100 gallons of crude oil is just 0.009 per year.
- An extensive body of rules and regulations adopted by FRA, PHMSA, and AAR are designed to minimize the risk of an accidental release of crude oil from tank cars.
- Although there have been a number of recent fires involving Bakken crude oil, the DOT, FRA, PHMSA, NTSB, and AAR have moved aggressively to identify the causes of those incidents and reduce the risk of similar incidents. The transport of Bakken crude to the Refinery, if any, will be subject to the new, more stringent requirements.
- The Project would significantly reduce the risk of an accidental release of crude oil from a vessel in San Francisco Bay. If the Project were approved and constructed, the risk of maritime spill would be reduced from 0.0267 (once every 37.5 years) to 0.0048 (once every 208 years).

Finally, it bears noting that federal law preempts the ability of state and local governments to regulate rail activity and/or impose any requirements that burden the unrestricted movement of trains in interstate commerce. While the City can identify and disclose the risks posed by rail transport of crude oil, it must rely on the federal authorities to ensure that any such risks are mitigated as appropriate.

Mitigation: None required.

Impact 4.7-3: The Project could create a hazard to the public or environment through reasonably foreseeable upset or accident conditions during train maneuver at the rail unloading facility. (*Less than Significant*)

There is also a potential that a tank car could derail while being maneuvered onto the side-track unloading area at the Refinery. FRA has published ten-year accident statistics for UPRR on side track maneuvers (FRA, 2013d). The average accident rate for these maneuvers was reported to be about 15 accidents per million yard switching miles. Assuming that the travel distance during these maneuvers is about one mile per train visit, the probability of a derailment or other accident at this location on an annual basis is estimated to be 0.01, or once in one hundred years. In addition, assuming a reasonable worst case scenario where one entire tank car contents spilled, from such an accident (30,000 gallons), the Project's spill containment system is designed to hold the entire contents of a spill plus any firefighting water and firefighting foam fire suppression system that might be used to prevent a fire. Thus, the impact would be less than significant.

Mitigation: None required.

Impact 4.7-4: The Project could create a hazard to the public or the environment through reasonably foreseeable upset or accident conditions during the line hookup and crude oil transfer from a tank car at the unloading facility. (*Less than Significant*)

An accident may occur at the rail unloading facility when a rail car is coupled to the manifold during unloading operations. For this operation a hard-piped elbow would be connected to the bottom drain at the tank car to be unloaded. Then one end of a flexible hose would be connected to the elbow and the other end connected to the manifold. It is possible that the hose connection could leak and crude oil would drain and be contained in to the sump below the tank car. Although such an event may have a higher probability of occurring than a derailment at the unloading facility, the amount of crude oil that could be released would be much smaller before remedial action could take place, such as closing the valve at the bottom of the tank car. To minimize the likelihood and the volume in the event of an oil spill at the unloading rack, hardware design on the rack includes a sight/flow glass for each tank car to verify that the contents have been emptied prior to decoupling the hose, a check valve between the offloading header and each tank car to prevent backflow from the offloading header, and manually operated block valves on both ends of the offloading hose. Since the volume released would be relatively small, contained on site, and under controlled conditions, the impact would be less than significant. Even so, the sump under the unloading facility has the capacity to receive and contain a volume almost nine times greater than the capacity of one tank car. This containment volume is significantly larger than the EPA 40 CFR 112.9 SPCC, which requires 100% of a single storage container and sufficient freeboard to contain precipitation. Given this, even if the contents of one entire tank car were released during an unloading operation, the impact would remain contained and less than significant.

Mitigation: None required.

Impact 4.7-5: The Project could create a hazard to the public or the environment through reasonably foreseeable upset or accident conditions due to corrosion of process related equipment handling crude oil. (*Less than Significant*)

Comments received during the EIR scoping (see Appendix B) speculated that this Project will result in the processing of increased amounts of heavy sour crudes, specifically crudes from Canadian tar sands, and that Refinery metallurgy may not be adequate to handle the unique chemical composition of tar sands crudes. Among the various crude oils that could be imported by rail are crude oils that may contain acid or other contaminants that could increase corrosion in tanks, piping and equipment. Without adequate monitoring and maintenance, the comments stated, increased corrosion could lead to failure of the tanks, piping or equipment.

The corrosion of carbon steel piping and other equipment used to refine crude petroleum is not a new concern. Extensive information is available on organic acid corrosion and sulfidation corrosion from authoritative sources such as the API and National Association of Corrosion Engineers along with guidance and recommended practices for monitoring and control of process streams potentially susceptible to these corrosion mechanisms.

As discussed in Chapter 3, *Project Description*, the redesign and physical improvements to the Refinery made as a result of the VIP enable the Refinery to process heavy sour crudes and, in fact, various crude oils, from various sources, are currently imported and processed at the Refinery. Due to the processing capability of the refinery, the physical characteristics of the

various crudes, including the acid or other contaminants, contents must be within acceptable ranges, so that the crude blend remains within the acceptable range for safe processing.

In addition to the VIP improvements that are in place, two particular programs are in place as part of the Refinery's safety systems to manage the effects of corrosion on piping, process equipment, and tanks. The first is the Management of Change (MOC) process. Management of change requires that employers have procedures in place to manage changes to process chemicals, technology, equipment, and procedures. Before crude oils are processed at the Refinery they are evaluated for their potential impact on equipment and operations. This includes a review of the acid content of the material (Total Acid Number [TAN]) and sulfur content. Only after this extensive review are any new materials approved for processing. Monitoring of changes continues with routine sampling of crude receipts as well as sampling of process streams for corrosion, dew point, and other parameters necessary to insure safe operations.

The second program in place to address effects of corrosion on piping, process equipment, and tanks is the Mechanical Integrity (MI) program. The MI program is an integral part of the Refinery's Process Safety Management (PSM) program. The MI program includes an extensive plan for the ongoing field monitoring and evaluation of piping and equipment to determine the actual condition of the equipment. An array of hundreds of thousands of condition monitoring locations (CML) has been established to gather data to determine pipe thicknesses and corrosion rates. The positive material identification (PMI) element of the MI program is utilized to positively verify the actual materials of construction that are in place in the Refinery. Valero's PMI program includes a special procedure for identification of low-silicon carbon steel material that may be susceptible to corrosion. Under this comprehensive MI program, strategies are developed for CML monitoring frequencies and to forecast the timing for equipment replacement or repair. As a direct result of this program, and not only as a result of VIP, various upgrades have been made at the Refinery to continue to safely process a variety of crude oils.

As a Cal/OSHA Voluntary Protection Program (Cal/VPP) Star Site since 2006, the Refinery's safety management systems have undergone extensive reviews by Cal/OSHA and their auditors. This includes a thorough review of the MOC and MI programs. Cal/VPP is designed to recognize employers and their employees who have implemented safety and health programs that effectively prevent and control the hazards inherent to our business. These programs go beyond minimal Cal/OSHA standards and provide the best feasible protection at the Refinery.

Given that existing Refinery processes are already in place to monitor and manage corrosion from crude oil, this impact is considered less than significant.

Mitigation: None required.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.

Impact 4.7-6: Operation of the Project could emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school. (*Less than Significant*)

There are no schools within a 1/4 mile radius of the Refinery and the Project facilities (unloading racks and rail spurs) within the Refinery. No direct impact would result from operation of the proposed facilities within the Refinery.

Along the UPRR mainline between the Refinery and the yards in Roseville, California some portion of 27 school properties are located within an approximately 1/4 mile radius of the UPRR mainline. Table 4.7-1 lists these schools.

TABLE 4.7-1
SCHOOLS WITHIN 1/4 MILE OF THE UPRR MAINLINE

School Name	City	County
Crystal Middle School	Suisun City	Solano
Our Christian Scholastic Academy	Suisun City	Solano
Children's World Learning Center	Suisun City	Solano
Armijo High School	Fairfield	Solano
Holy Spirit School	Fairfield	Solano
Grange Middle School	Fairfield	Solano
Vanden High School	n/a	Solano
Travis Community Day	n/a	Solano
Dixon High School	Dixon	Solano
Maine Prairie High School	Dixon	Solano
Linford L Anderson Elementary School	Dixon	Solano
University of California Davis	Davis	Yolo
Families First NPS	Davis	Yolo
River City Christian Academy	West Sacramento	Yolo
Westfield Village Elementary	West Sacramento	Yolo
Washington Elementary	Sacramento	Sacramento
Sacramento Montessori School	Sacramento	Sacramento
Mustard Seed School	Sacramento	Sacramento
Woodlake Elementary	Sacramento	Sacramento
Martins' Achievement School	n/a	Sacramento
Aero Haven Elementary	n/a	Sacramento
Kohler Elementary	n/a	Sacramento
Northwood Elementary	Sacramento	Sacramento
Miles P. Richmond School	n/a	Sacramento
Hillsdale Elementary	n/a	Sacramento
Highlands High School	n/a	Sacramento
Placer Christian Academy	Roseville	Placer

SOURCE: ESRI, Tele Atlas North America, 2010, ESA, 2014

The intent of this criteria per CEQA §21151.4 is to ensure that construction or alteration of a facility within 1/4 mile of a school is disclosed and potential impacts from hazardous emissions or the handling of hazardous or acutely hazardous materials. Given that the schools identified along the existing UPRR mainline are already in place as is the UPRR mainline that there are no alternations or proposed construction for this Project within any school, the proximity of these schools to the indirect Project impacts from railroad emissions transporting the crude by rail would likely represent a less than significant impact per the intent of CEQA §21151.4. In addition, the health risk assessment (see Appendix E.6) discussed above for Impact 4.7-1, considered TAC emissions from the operation of Project trains along the UPRR mainline. The health risk assessment found a less than significant impact for the nearest receptors along the mainline and in all cases these receptors were much closer to the mainline than the school properties listed in Table 4.7-1, also see Section 4.1.5, for a full discussion of this analysis. Consequently, given the intent of CEQA §21151.4 and the results of the health risk assessment (see Appendix E.6); this impact is considered less than significant.

Mitigation: None required.

---

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Valero Emergency Response

The Refinery's emergency notification procedures, including notification to City of Benicia Dispatch and the public, are contained in Section 203 of Valero's Emergency Procedures Manual (EPM) see Appendix G. In the event of an emergency, courtesy notification may also be provided to the California Governor's Office of Emergency Services (Cal-OES). If a release of a hazardous substance exceeds regulatory reportable quantities, Valero would also contact the appropriate state or federal agencies.

The Valero Fire Department maintains its own equipment to respond to emergencies within the Refinery. Under agreements with the City of Benicia, equipment and resources to operate the equipment, may also be dispatched at the request of the City of Benicia Fire Department. A copy of Valero's EPM is on file with the City of Benicia Fire Department. A list of Apparatus and Equipment available on Valero property is listed in Section 206 of Valero's EPM see Appendix G.

Refinery operators are qualified and trained annually on fire response, hazmat and rescue. Certified Emergency Medical Technicians (EMT's), fire truck operators, and personnel trained in oil spill response are on site at all times. Valero currently has approximately 30 certified EMT's on staff. There is at least one EMT on site at all times. The Refinery is also staffed with a Registered Nurse during weekday business hours and has access to an off-site medical clinic staffed and available 24 hours a day.

Valero's Oil Spill Contingency Plan contains a list of oil spill response equipment available on site. Annual refresher training is conducted for refinery personnel trained in oil spill response.

Periodic tabletop and equipment deployment drills are conducted with various federal, state, county, and local agencies.

The City of Benicia Fire Department has access to Valero property through three gates. These include two gates from East Second Street, and one gate on Park Road. To expedite access of City of Benicia Fire Department personnel to the Valero facility, a list of all Benicia Fire Department members is on file with Valero security personnel.

The Refinery also has a separate agreement for emergency mutual aid with other refineries in the Bay area. Per the agreement with all members of the Bay Area Petrochemical Mutual Aid Organization (PMAO), members provide mutual aid to other member facilities in case of an emergency, contingent upon the availability of responders or equipment at the time of the event. The PMAO Manual outlines the response for different types of events.

An example of a recent response was the August 6, 2012 fire at the Chevron Richmond Refinery. All responding members of the PMAO were on site during that event. Valero provided one fire engine with three firefighters along with the Valero Fire Chief to assist in the emergency response. Valero's fire engine connected to the Chevron refinery fire water system and provided 1,250 gpm of firewater flow to the base of the fire. Valero was on site a total of 6 hours until the fire was extinguished.

Valero Spill Response

The Refinery utilizes a multi-level organization based on the Incident Command System to provide immediate, efficient and flexible response to spills associated with the operation of its facilities. The initial level of response is provided by trained operating personnel, the Refinery Process Team-Spill Response Team, who are on-duty 24 hours per day. If the demands of the incident require capabilities beyond those of this team, the Spill Management Team (SMT) is activated. The SMT is initially staffed using on-call Benicia Refinery personnel. In general, the SMT should be capable of managing a response to any of the planning scenarios described in the Oil Spill Contingency Plan.

The structure of the Refinery SMT is based on the National Interagency Incident Management System Incident Command System. The organization permits immediate scale-up to meet the requirements of any size incident. Coordination with state and federal Incident Commanders is maintained using the Unified Command approach, regardless of the level of activation of Valero resources.

In the event of an incident that results in the accidental spill or release of oil outside the Refinery, the Incident Command System would be immediately activated. As representatives of various agencies are deployed in the response, a Unified Command would be established and populated by Federal, State and Local agency personnel including but not limited to the following agencies:

- U.S. Coast Guard
- California Office of Spill Prevention and Response

- California Department of Fish and Wildlife
- U.S. EPA
- Solano County Department of Environmental Management
- Local Police and Fire Departments

Additional agency representatives would be integrated into the incident command organization as required by the extent of the event and scope of the response. In addition, Valero has standing agreements with experts in the field of oil spill containment and recovery, such as NRC Environmental Services. These firms also maintain an inventory of containment boom and other specialized materials that can be deployed immediately upon discovery of an accidental release.

Any release of oil in an environmentally sensitive area, whether from a pipeline, marine vessel or train cargo, would activate the Incident Command organization described above. Together with the regulatory agencies, Valero would participate in the incident to:

- Ensure the safety of the public and response personnel
- Control the source of the spill
- Maximize protection of environmentally sensitive areas
- Manage coordinated response efforts
- Contain, recover and dispose of material in accordance with an established Waste Plan
- Recover and rehabilitate injured wildlife
- Remove oil from impacted areas
- Minimize economic impacts from business interruptions, and
- Keep stakeholders and the public informed of response activities.

UPRR Hazardous Material Emergency Response

Details of UPRR emergency response are provided in their HMERP (see Appendix H). In general, should an incident happen involving hazardous materials (such as crude oil), UPRR would contact the appropriate agencies / first responders to contain the incident and stay on scene until control/clean up is finished. UPRR personnel from their Roseville, California office would be responsible for incidents that may happen between Roseville and the Refinery. In addition, UPRR currently has three (3) emergency response contractors in northern California that cover Benicia. Two of the contractors are US Coast Guard approved Oil Spill Response Organizations (OSROs). One of the OSRO certified contractors is located in the Benicia area.

Impact 4.7-7: The Project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (*Less than Significant with Mitigation*)

Valero personnel respond to emergencies at the Refinery while the City of Benicia has overall responsibility for emergency response and evacuation plans within the City. The main feature of the Project that could interfere with evacuation plans is the amount of time during which project-related rail traffic would block Park Road outside the Refinery's southern border. As discussed in Section 14, *Public Services*, of the IS/MND (see Appendix A) and Section 4.11.5,

Transportation/Traffic, the Project with implementation of Mitigation Measure 4.11-4, would not pose a potentially significant new delay on this road and thus, is considered to be a less than significant impact on emergency/evacuation response plans.

Mitigation: Implement Mitigation Measure 4.11-4.

Significance after Mitigation: Less than significant.

---

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Impact 4.7-8: Operation of the Project could expose people or structures to significant risk, injury, or loss from wildland fires. (*Less than Significant*)

Construction of the Project (loading racks and railroad spurs) would occur within the Refinery property within the unzoned CAL FIRE local FHSZ and would not pose and risk to starting wildland fires or being affected by wildland fires. Similarly, operation of the loading racks and railroad spurs pose no risk to or from potential wildland fires. Furthermore, the Valero Fire Department personnel would respond to all emergencies within the Refinery and would address any such fire risks as needed. No impact.

As discussed in Section 4.7.2.2 above, an area just south of the main Refinery and Park Road containing Valero's main crude tank farm (see Figure 3-2) located on a small hill, is surrounded by a CAL FIRE Local Responsibility Area of FHSZ of moderate to high severity (CAL FIRE, 2008). These moderate and high FHSZ areas extend to the east from this small hill and cover a portion of the likely railroad spur used by UPRR to deliver and remove tank cars from the Refinery. Given that the existing crude tank farm is between 1,000 to 1,300 feet separated by local roads and other railroad tracks from this railroad spur and that the existing conditions already includes routine movements of rail cars and locomotives, the addition of the Project's railroad operations is expected to be a less than significant impact to potential wildland fires in the vicinity of this Local Responsibility Area.

Mitigation: None required.

This page intentionally left blank

4.8 Hydrology and Water Quality

4.8.1 Introduction

This section addresses potential changes in hydrology, water quality, groundwater, and flooding conditions that could result from implementation of the Project. This section describes the existing hydrologic setting; provides an overview of applicable federal, state, and local regulatory framework; presents an analysis of potential environmental impacts; and where appropriate, identifies suitable mitigation measures to reduce the intensity of potential impacts. Information sources used to prepare this section include documents from various local, state, and federal agencies, and numerous published documents and maps related to the topic.

4.8.2 Setting

4.8.2.1 Regional Setting

The Project site is located within the Valero Benicia Refinery, situated within rolling, low elevation hills (ranging up to 200 feet above mean sea level) along the northern shores of the Carquinez Strait and Suisun Bay, just to the west of the Sacramento-San Joaquin River Delta. Several small drainage catchments are located in the area and are referred to as the Lake Herman/Sulphur Springs Creek watershed. Lake Herman Reservoir, which impounds Sulphur Springs Creek, is located north of the Refinery. Below the reservoir, Sulphur Springs Creek traverses a narrow band of marshland and discharges to Suisun Bay. Along the eastern border of the Refinery, this creek flows through an engineered channel through the Benicia Industrial Park. Other small ephemeral tributaries to Sulphur Springs Creek flow from west to east near the Refinery property. Tidal marshlands lying near or below sea level characterize the Suisun Bay margin and represent the endpoints of the Napa Valley and Sonoma Valley alluvial plains, both located to the north and west of the Refinery.

The Refinery property is within the San Francisco Bay Area Hydrologic Basin and is bounded to the east by the Suisun-Fairfield Valley Groundwater Basin and to the west by the Napa-Sonoma Valley Groundwater Basin (Woodward-Clyde, 1993). The water bearing units within the region consists of Sonoma Volcanic rocks, Pleistocene alluvium, and recently deposited alluvium. Natural recharge is principally from infiltration of precipitation that falls on the valley floor and the surrounding hills within the drainage basin. Some limited infiltration occurs from streams in areas where the water table is lower than the stream channels. Regional groundwater flow (gradient) is generally from the recharge areas in the hills northwest of the Refinery toward the tidal marshes of Suisun Bay and the Carquinez Strait. Groundwater quality in the region ranges from generally good in the alluvial sediments to poor in the tidal marsh sediments. The groundwater in the estuarine sediments is brackish to saline (Woodward-Clyde, 1993).

Climate

The Project area is characterized by a Mediterranean climate with mild, wet winters and dry, warm summers. Both summer and winter temperatures are moderated by proximity to the

San Francisco Bay and the Pacific Ocean; summer temperatures rarely reach those characteristic of inland valleys, and winter temperatures rarely reach freezing. The mean annual temperature is 63 degrees Fahrenheit with prevailing winds from west to southeast. Annual rainfall averages 19 inches and falls mostly from December through April (City of Benicia, 2013).

4.8.2.2 Project Setting

Surface Water

The Project is located within the existing Refinery property, an area that has been extensively modified by industrial development. Much of the process area surfaces and the roadways within the Refinery, including most locations affected by the Project, are covered with impervious asphalt and concrete and as a result, storm water runoff is generally rapid and surface infiltration rates are very low. For details on local topography and site soils, see Section 4.5, *Geology and Soils*.

The storm drainage system at the Refinery is divided into three major drainage parcels. One parcel, where the Project is proposed, includes the main Refinery area, administration building, and tank farm. The other two parcels contain the crude oil tank farm and the wastewater treatment plant (WWTP). Within each of the drainage parcels, storm water may be handled three different ways. First, some specific areas are diked or otherwise contained such that storm water flows are collected and may be detained before they are released to the wastewater treatment plant. This controlled system allows the Refinery to regulate the volume of storm water flow that enters the wastewater treatment plant at any given time. Second, there are areas where storm water runoff is not collected or detained, and drains directly into a collection system that transports the flows to the wastewater treatment plant. Finally, there are areas (primarily undeveloped) where storm water drains to a system of outfalls that are permitted under the National Pollutant Discharge Elimination System (NPDES); these outfalls eventually drain to Suisun Bay. The Refinery's storm water system for each of the major drainage parcels is described below with emphasis on the parcel encompassing the Project.

Main Refinery Area

The main Refinery area covers approximately 176 acres. The majority of runoff from the main Refinery area flows to the wastewater treatment plant through the storm water drainage system. Dikes enclose approximately 108 acres of this drainage area. Drainage from the diked areas is controlled (detained) by manually operated valves so storm water can be stored and drained to the treatment plant after the storm ends. Runoff from the remaining 68 acres is not controlled and flows directly to the treatment plant. Storm water is treated at the plant and discharged to San Francisco Bay via NPDES-permitted outfall 001. The Refinery's non-industrial storm water is discharged via Outfalls 002 through 017, which discharge to either Sulphur Springs Creek (which ultimately flows to Suisun Bay) or to the City of Benicia stormwater drainage system which flows to the Carquinez Strait.

Crude Tank Farm

The crude tank farm is located south of and is geographically separated from the main Refinery. Runoff from this diked crude tank farm area can be stored and released to the WWTP via the storm drain system after the storm ends. Runoff from areas outside of diked areas surrounding the crude tanks would not come into contact with crude oil; therefore, it is discharged to Sulphur Springs Creek (and ultimately to Suisun Bay) through NPDES-permitted discharge point 006.

Wastewater Treatment Plant

This drainage area covers approximately 20 acres and surrounds Valero's WWTP, all of which is diked. Approximately half of this drainage area is covered by three surface water impoundments that include an equalization pond, a retention pond, and a final pond. If a storm event causes flows in excess of the treatment plant capacity, WWTP influent is diverted to the ponds.

Wastewater Treatment and Storm Water Discharges

The Refinery wastewater and most of the storm water runoff is collected and managed in the existing wastewater treatment system that is regulated by San Francisco Regional Water Quality Control Board (SFRWQCB). The Refinery treats and discharges process wastewater, storm water runoff from process and non-process areas, and extracted groundwater and monitoring well purge water from on-site remediation activities. The average process and utility waste water flow uses approximately 55 percent of the hydraulic capacity of the treatment plant. The remaining 45 percent of capacity is available for treating storm water runoff.

Treated wastewater is discharged into Suisun Bay through Outfall 001 via a 12-inch pipe with three diffusion ports. Outfall 001 is located at a depth of 18 feet about 1,100 feet offshore and west of the Suisun Reserve Fleet Anchorage. The diffuser at the end of the pipe provides a minimum dilution ratio of 10:1.

Water Quality

During periods of wet weather, rain carries pollutants and sediments from all parts of a watershed into surface water bodies such as open storm drains, streams, rivers, reservoirs, or marshes. In a developed setting, such as the Refinery property, natural drainage patterns have been altered and storm water runoff, as well as non-storm discharges (irrigation water, washdown water, etc.), pick up sediments and contaminants from land surfaces and transport these pollutants into surface and possibly groundwater. Storm water discharges from industrial storm sewer systems in industrialized areas can be a concern because of the potential for high concentrations of typical pollutants found in these discharges.

The Refinery is regulated by the SFRWQCB for effluent discharges from their wastewater treatment plant and discharges of all storm water associated with industrial activity from the Refinery to Suisun Bay and Carquinez Strait (waters of the United States). The Refinery operates under a NPDES permit administered by the SFRWQCB. Storm water runoff is currently discharged through the storm water outfalls that service the Refinery property.[1] The storm water

[1] Storm water outfalls in the vicinity of the Project include EFF-003 through -004 and EFF-007 through -010.

outfalls are permitted under the Refinery NPDES permit, which sets storm water outfall discharge limits and monitoring requirements. Routine water quality monitoring is conducted on outflows from one outfall (Outfall 001) into Suisun Bay, eleven outfalls (Outfall 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, and 017) into Sulphur Springs Creek, and five outfalls (Outfall 012, 013, 014, 015, and 016) into Carquinez Strait.

Storm water discharges and water quality at the Refinery's 16 storm water outfalls are managed through application of an existing Storm Water Pollution Prevention Plan (SWPPP), which incorporates the NPDES discharge limits and monitoring requirements as well as incorporates procedures, pollution prevention strategies, and best management practices (BMPs) used to meet these discharge limits. The SWPPP was originally prepared to comply with SFRWQCB Order Number 2002-0112 (NPDES Permit No. CA0005550) adopted in October, 2002 (URS, 2002). In 2011, the SWPPP was revised to comply with Order Number R2-2009-0079, issued by the SFRWQCB in 2009 to be effective from January 1 through December 31, 2014. The current discharge limitations for untreated storm water and wastewater treatment plant effluent are outlined in the SFRWQCB NPDES Order. Its purpose is to describe storm water and effluent discharges generated from the Refinery and, based on the discharge types and concentrations, provides effluent and receiving water quality limitations and special discharge provisions in accordance with the Clean Water Act.

Receiving Waters and Beneficial Uses

Discharges from the Refinery property ultimately drain into Suisun Bay and the Carquinez Strait, the channel between Suisun Bay and San Pablo Bay of the San Francisco Delta system. Suisun Bay and the Carquinez Strait receiving waters, which include the Suisun Marsh, are tidally influenced water bodies, with significant fresh water inflows during the wet weather season that allow frequent flushing and dilution. Additionally, the Project is located adjacent to Sulphur Springs Creek, which parallels the proposed rail alignment to the east.

In accordance with State policy for water quality control, the SFRWQCB employs a range of beneficial use definitions for surface waters, groundwater, marshes, and mudflats that serve as the basis for establishing water quality objectives and discharge conditions and prohibitions. The SFRWQCB has identified existing and potential beneficial uses supported by the key surface water drainages throughout the Bay Area in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan; SFRWQCB, 2011). The beneficial uses designated in the Basin Plan for Suisun Bay, Carquinez Strait, and Sulphur Springs Creek are identified in Table 4.8-1. The State Water Resources Control Board's Water Quality Assessment has indicated that Carquinez Strait and Suisun Bay have elevated levels of selenium, mercury, and PCBs in aquatic organisms, sediment, and the water column (SFRWQCB, 2010). On May 12, 1999, the U.S. Environmental Protection Agency (EPA) added dioxins and furan compounds, chlordane, dieldrin, and 4,4'-DDT to the Board's list (SFRWQCB, 2010).

TABLE 4.8-1
DESIGNATED BENEFICIAL USES

Waterbody	Freshwater Replenishment	Industrial Service Supply	Industrial Process Supply	Commercial and Sport Fishing	Estuarine Habitat	Fish Migration	Rare Species Preservation	Fish Spawning	Warm Freshwater Habitat	Wildlife Habitat	Water Contact Recreation	Noncontact Water Recreation	Navigation
Sulphur Springs Creek	E								E	E	E	E	
Suisun Bay		E	E	E	E	E	E	E		E	E	E	E
Carquinez Strait		E	E	E	E	E	E	E		E	E	E	E

E = existing beneficial use

SOURCE: RWQCB, San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan), December, 2011.

Groundwater and Groundwater Quality

The primary regional groundwater water-bearing formations include the Recent and Pleistocene (up to two million years old) alluvial deposits and the Pleistocene Huichica formation. Groundwater in the region is used for agriculture and to a smaller degree for domestic use. Agricultural use of groundwater is heavy in the Suisun Valley north of the Refinery because of the extensive thickness of the older alluvium there, but is very limited in the low lying hills northwest of the Refinery because of the limited occurrence of water-bearing formations. Although some local valleys may have sufficient thickness of saturated material that could potentially yield up to 10 gallons per minute (gpm), much of the Benicia area, including the Refinery and the down-gradient vicinity, are underlain by low permeable, fractured bedrock, which has very limited storage capacity and well yield. Because of its limited overall potential for groundwater development, the Benicia area has not been extensively studied as a groundwater basin (Woodward-Clyde, 1993).

Generally, water table elevations follow the topography at the site (Woodward-Clyde, 1993). The depth to water is a function of water table depth and the proximity to the edge of a particular terrace. Depth to water at the Refinery ranges from 2 to 50 feet below ground surface (bgs) (URS, 2001), but in general is approximately 10 feet below existing grade at the Project site (Stantec 2010). The prevailing direction of groundwater flow within the Refinery property is generally toward Sulphur Springs Creek, which flows in a channel that parallels the eastern boundary of the Refinery (Woodward-Clyde, 1993). The groundwater on the east side of Sulphur Springs Creek (i.e., across the creek from the Refinery) appears to flow west into the creek.

Groundwater quality in the Refinery area ranges from good in the upland areas of the facility to brackish to saline in the areas along Suisun Bay. Free phase liquid hydrocarbons have been observed in monitoring wells at various locations within the Refinery property (Woodward-Clyde 1993). Soil and groundwater investigations have been conducted at the Refinery since 1988. As required by SFRWQCB Order No. 91-094, a Refinery-wide site assessment began in November

1991 for the purpose of characterizing soil and groundwater contamination and developing a remediation plan (URS, 2001). Several investigations have been conducted since the initial investigations and have included other areas besides those at the main Refinery area. A follow-up SFRWQCB Order No. 97-077 rescinded SFRWQCB Order No. 91-094 and required additional investigation and the development of a Remedial Action Plan (RAP) (URS, 2001). URS Corporation (URS) prepared and revised a RAP for the Refinery in July 2001. The RAP addresses free-phase product plumes and associated dissolved-phase groundwater constituents at the Refinery and specific remedial recommendations.

Flooding

The Federal Emergency Management Agency (FEMA) has prepared flood maps identifying areas that would be subject to flooding (Special Flood Hazard Areas). The Special Flood Hazard Areas are rated by FEMA according to risk of flooding and depth of flooding. The Special Flood Hazard Areas are typically defined by the 1-percent annual chance flood (also referred to as the base flood or 100-year flood) and the 0.2-percent-annual-chance (or 500-year) flood. Within these Special Flood Hazard Areas, various zones (described below, as relevant to the Project) have been defined that provide additional information on flooding and flood risks:

- **Zone AE** – 100-year floodplains, with base flood elevations determined.
- **Regulatory Floodway (RF)** – The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Development in these floodways is regulated to ensure that there are no increases in upstream flood elevations.
- **Zone X** – 500-year floodplains and areas of reduced flood risk due to protection from levees from the 1 percent annual chance flood.
- **Area of Minimal Flood Hazard** – Areas outside the 500-year floodplain.

The majority of the Project site is designated as a Special Flood Hazard Area (SFHA) that is within the 100-year flood zone associated with Sulphur Springs Creek. North of Bayshore Road the Project site is designated as Zone RF. In the immediate vicinity of Bayshore Road, the Project site is designated as Zone RF and Zone AE. Approximately 500 linear feet of the proposed rail alignment south west of Bayshore Road is in an area of minimal flood hazard or in Zone X (FEMA, 2013).

Tsunamis

Tsunamis (seismic sea waves) are long period waves that are typically caused by underwater disturbances (landslides), volcanic eruptions, or seismic events. Areas that are highly susceptible to tsunami inundation tend to be located in low-lying coastal areas such as tidal flats, marshlands, and former bay margins that have been artificially filled but are still at or near sea level. The Suisun Bay has been determined to be at moderate risk to tsunamis. The Project would be located on a developed land parcel that does not lie in a mapped area with flood risks associated with tsunami or tidal flooding (CEMA, 2009).

Seiche

A seiche is a free or standing wave oscillation(s) of the surface of water in an enclosed or semi-enclosed basin, such as Suisun Bay, that may be initiated by an earthquake. Due to the relatively large size of Suisun Bay with an inlet to the east and an outlet to the west, the hazard of seiche waves is interpreted to be low. In addition, there is no historic record of such waves occurring in Suisun Bay during recent strong earthquakes.

4.8.2.3 Regulatory Setting

Federal

Clean Water Act

The federal Clean Water Act (CWA) (33 U.S.C. 1251 – 1376) establishes the basic structure for regulating discharges of pollutants into the waters of the U.S. and gives the U.S. EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA sets water quality standards for all contaminants in surface waters. The statute employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. The U.S. Army Corps of Engineers has jurisdiction over all waters of the U.S. including, but not limited to, perennial and intermittent streams, lakes, and ponds, as well as wetlands in marshes, wet meadows, and side hill seeps. Under Section 401 of the CWA every applicant for a federal permit or license for any activity which may result in a discharge to a water body must obtain State Water Quality Certification that the proposed activity will comply with state water quality standards.

The NPDES permit program under the CWA controls water pollution by regulating point and nonpoint sources that discharge pollutants into “waters of the U.S.” California has an approved state NPDES program. The U.S. EPA has delegated authority for NPDES permitting to the California State Water Resources Control Board (SWRCB), which has nine regional boards. The SFRWQCB regulates water quality in the Project Site and surroundings.

Section 303(d) of the CWA requires that each state identify water bodies or segments of water bodies that are “impaired” (i.e., not meeting one or more of the water quality standards established by the state). These waters are identified in the Section 303(d) list as waters that are polluted and need further attention to support their beneficial uses. Once the water body or segment is listed, the state is required to establish Total Maximum Daily Load (TMDL) for the pollutant causing the conditions of impairment. TMDL is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. Generally, TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The intent of the Section 303(d) list is to identify water bodies that require future development of a TMDL to maintain water quality. Carquinez Strait and Suisun Bay are included on the 2006 California 303(d) List as impaired water bodies resulting from the presence of chlordane, DDT, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, PCBs, and selenium. The 2006 303(d) list identifies probable sources for each pollutant, such as industrial point sources discharges, municipal point source discharges, natural sources, non-point sources, and mining.

Executive Order 11988 and National Flood Insurance Program

Under Executive Order 11988, FEMA is responsible for management of floodplain areas defined as the lowland and relatively flat areas adjoining inland and coastal waters subject to a one percent or greater chance of flooding in any given year. FEMA also administers the National Flood Insurance Program, which requires that local governments covered by federal flood insurance pass and enforce a floodplain management ordinance that specifies minimum requirements for any construction within the one percent annual chance flood zone. FEMA prepares FIRMs that are used to identify areas prone to flooding.

FEMA prepared a Flood Insurance Rate Map (FIRM) that delineated flood hazard zones for Benicia and adjacent portions of Solano County. The zones detail low-lying areas that would be subject to flooding during a 100-year storm. The lower reaches of the Sulphur Springs Creek Watershed downstream of Lake Herman are included in the mapped flood hazard zones. A Storm Water Master Plan that includes flood control improvements has been adopted by the Refinery and has addressed these flood hazard conditions.

Oil Pollution Act

Enacted in 1990, this Act (Public Law No. 101-380) amends the CWA to create a comprehensive oil spill and prevention response scheme. Spill Prevention Control and Countermeasure Plans must be prepared by owners or operators of facilities that have or could reasonably be expected to discharge a certain amount of oil. These plans should contain preventative (failsafe) and contingency (cleanup) plans for controlling accidental discharges, and for minimizing the effect of such events.

State

Porter-Cologne Water Quality Control Act and California's Water Boards

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) provides the basis for water quality regulation within California. This Act establishes the authority of the SWRCB and the nine RWQCBs. The SWRCB administers water rights, water pollution control, and water quality functions throughout the state, while the RWQCBs conduct planning, permitting, and enforcement activities. The Project site lies within the jurisdiction of the RWQCB, San Francisco Bay region.

The Porter-Cologne Water Quality Control Act requires the SWRCB to adopt statewide water quality control plans, the purpose of which is to establish water quality objectives for specific water bodies. In the San Francisco Bay region, the Water Quality Control Plan, known as the Basin Plan, is the RWQCB's master policy document. The Act also authorizes the NPDES program, which establishes effluent limitations and quality requirements for discharges to waters of the State. In the San Francisco Bay region, the RWQCB has included permit requirements for storm-water runoff under the NPDES program since 1991.

Regional Water Quality Control Basin Plan

The SFRWQCB prepared the *San Francisco Bay Basin Water Quality Control Plan* (Basin Plan) for the San Francisco Bay region. The Basin Plan contains descriptions of the legal, technical, and

programmatic bases of water quality regulation in the region and describes beneficial uses of major surface waters and their tributaries (RWQCB, 2011). For development under the Project, the SFRWQCB is responsible for regulating construction activities to ensure the protection of the beneficial uses of any receiving waters.

Construction Activity Permitting

Storm water discharges from construction activities on one acre or more are regulated by the SFRWQCB and are subject to the permitting requirements of the NPDES General Permit for Discharges of Stormwater Runoff Associated with Construction Activity (General Construction Permit, 99-08-DWQ). Effective July 1, 2010, dischargers without an existing site NPDES permit have been required to obtain coverage under the Construction General Permit Order 2009-0009-DWQ[2] adopted on September 2, 2009. The General Construction Permit states that construction activity covered by an individual NPDES Permit for storm water discharges is not required to obtain coverage under the General Permit (General Finding #29).

The General Construction Permit requires the preparation and implementation of a SWPPP for construction activities and specifies minimum qualifications for a SWPPP developer and a SWPPP practitioner. The SWPPP must be prepared before the construction begins, and in certain cases, before demolition begins. The SWPPP must include specifications for BMPs that would need to be implemented during Project construction. BMPs are measures that are undertaken to control degradation of surface water by preventing soil erosion or the discharge of pollutants from the construction area. The SWPPP must describe measures to prevent or control runoff after construction is complete and identify procedures for inspecting and maintaining facilities or other project elements. Required elements of a SWPPP include:

1. Site description addressing the elements and characteristics specific to the site;
2. Descriptions of BMPs for erosion and sediment controls;
3. BMPs for construction waste handling and disposal;
4. Implementation of approved local plans;
5. Proposed post-construction controls; and
6. Non-storm water management.

Examples of typical construction BMPs include scheduling or limiting activities to certain times of year, installing sediment barriers such as silt fence and fiber rolls, maintaining equipment and vehicles used for construction, tracking controls such as stabilizing entrances to the construction site, and developing and implementing a spill prevention and cleanup plan. Non-storm water management measures include installing specific discharge controls during certain activities, such as paving operations, and vehicle and equipment washing and fueling. The California Stormwater Quality Association established BMPs for the State of California in the *California Storm Water Best Management Practice Handbook* (2003) to effectively reduce degradation of surface waters to an acceptable level.

[2] As amended by 2010-0014-DWQ and 2012-006-DWQ.

As explained above, however, Valero holds an NPDES permit issued by the SFRWQCB, NPDES No. CA0005550. The NPDES permit which requires Valero to prepare and maintain an SWPPP. Therefore, Valero need not obtain coverage under the Construction General Permit Order. As specified in Section 5 of the Valero SWPPP, BMPs for Erosion Control and Construction Activities, developed in accordance with the NPDES permit issued by the SFRWQCB, any construction permit executed in a drainage area that is not covered under the NPDES permit will be performed in a way consistent with the requirements of the General Permit for Construction Activities. Additionally, the Valero SWPPP includes the required elements detailed above for a SWPPP prepared and implemented as part of the requirements for the Construction General Permit.

Dewatering Permit

Construction activities such as excavation and trenching in areas with shallow groundwater would require dewatering, which could be subject to the SWRCB construction dewatering permit requirements. Dewatering operations are regulated under State requirements for storm water pollution prevention and control. Discharge of non-storm water from a trench or excavation that contains sediments or other pollutants to sanitary sewer, storm drain systems, creek bed (even if dry), or receiving waters is prohibited. Discharge of uncontaminated groundwater from dewatering is a conditionally exempted discharge by the RWQCB. However, the removed water could potentially be contaminated with chemicals released from construction equipment or sediments from excavation. Therefore, disposal of dewatering discharge would require permits either from the RWQCB for discharge to surface creeks and groundwater or from local agencies for discharge to storm or sanitary sewers. The SWRCB lists non-storm water discharge controls specifically for dewatering operations.

The control measures would be implemented by the Project sponsor during construction activities at the Project site. Discharge of water resulting from dewatering operations would require an NPDES Permit, or a waiver (exemption) from the RWQCB, which would establish discharge limitations for specific chemicals (if they occur in the dewatering flows). The Project plans to contain and route water from dewatering operations to its wastewater treatment plant for treatment and discharge under the Refinery NDPES permit.

Local

City of Benicia General Plan

The *City of Benicia General Plan* (City of Benicia, 1999) addresses water resources goals and policies for local water bodies including the Carquinez Strait, Lake Herman, and Suisun Marsh. Specifically, the following policy and programs may apply to the components of the Project:

> ***Policy 3.22.1*:** Avoid development that will degrade existing lakes and streams.
>
> > *Program 3.22.1A*: Require that all development in watershed flowing into lakes and unchannelized streams include features to preserve run-off water quality.
> >
> > *Program 3.22.1B*: Require a minimum setback of 25 feet from the top of bank of streams and ravines. Development within the setback is not allowed.

***Policy 4.12.1*:** Regulate runoff from new development so that post-development site peak flow rates are not greater than pre-development levels.

***Policy 4.12.2*:** Upgrade existing drainage facilities as necessary to correct localized drainage problems.

***Policy 4.14.1*:** Implement non-point source pollution strategies.

Program 4.14.C: Provide information to the public on provisions of the City's Stormwater Pollution Prevention Plan (SWPPP) program and preparation of SWPPPs for all construction projects of five acres or more. Implement Best Management Practices (BMPs) for stormwater runoff and erosion controls for all developments.

Additionally, the General Plan identifies the Refinery as a hazardous waste site. When handling any hazardous substances involved with the groundwater extraction at the site or during construction of the components of the Project, the site must be in compliance with permitting and other regulatory requirements.

City of Benicia Grading Ordinance

Chapter 15.28: Grading and Erosion Control

- Section 15.28.070 Application Contents: Applications for excavating, grading and filling permits shall be accompanied by two sets of plans and specifications 24 inches by 36 inches in size prepared at a scale of 1 inch = 40 feet or greater. Unless waived by the City Engineer, the plans shall be prepared by an engineer licensed by the State of California.

- Section 15.28.070 Application Contents: A Storm Water Pollution Prevention Plan for sites over five acres and a copy of the Notice of Intent (NOI) form required for the State Water Resources Control Board's General Construction Activity Storm Water Permit.

- Section 15.28.070 Application Contents: For all grading work an erosion control plan shall be submitted to include the placement of structural and nonstructural storm water controls that prevent erosion during construction and post-construction.

- Section 15.28.130 Excavating, Grading, and Filling – Regulations: All graded surfaces and materials, whether filled, excavated, transported or stockpiled, shall be wetted, protected, covered or contained in such a manner as to prevent any nuisance from dust, sediment site runoff, or spillage upon adjoining property or streets. Best Management Practices incorporating erosion controls and other controls (i.e. dust palliative) shall be applied to the site when directed by the City Engineer. Equipment and materials on the site and on hauling routes should be used in such a manner as to avoid excessive dust, site runoff, or spillage upon streets or storm drain inlets. This may include limiting work during windy periods.

- Sediment controls and other Best Management Practices shall be constructed on all developments, as determined by the City Engineer, to manage runoff into biologically sensitive areas or onto adjacent property and to control sediment during construction until permanent erosion controls have been established. The sediment and silt collected on site shall then be removed and the resulting material hauled from the site or used as topsoil.

City of Benicia Flood Hazard Reduction Ordinance

Chapter 15.48 of the City's Municipal Code sets forth provisions for flood hazard reduction with specific requirements applicable to the Project for construction projects designed to minimize the risks of flood hazards.

- Section 15.48.010 Standards of construction - Anchoring. In all areas of special flood hazard, all new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

- Section 15.48.010 Standards of construction - Construction Materials and Methods. In all areas of special flood hazard, all new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage and also shall be constructed using methods and practices that minimize flood damage. Electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. All new construction and substantial improvements within Zones AH, AO or VO[3] shall have adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

- Section 15.48.010 Standards of construction - Elevation and Floodproofing. New construction and substantial improvement of any structure in Zone AH, AO or VO shall have the lowest floor, including basement, elevated six inches above the highest adjacent grade to a height equal to or exceeding the depth number specified in feet on the FIRM, or at least two feet if no depth number is specified. Upon the completion of the structure the elevation of the lowest floor, including basement, shall be certified by a registered professional engineer or surveyor to be properly elevated. Such certification shall be provided to the floodplain administrator.

- Section 15.48.010 Standards of construction - Elevation and Floodproofing. Nonresidential structures, together with attendant utility and sanitary facilities, shall:

  - be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;

  - have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and,

  - be certified by a registered professional engineer or architect that the standards of subsection (C)(3) of Section 15.48.010 of the City's Municipal Code are satisfied. Such certifications shall be provided to the floodplain administrator.

- Section 15.48.010 Standards of construction - Elevation and Floodproofing. For all new construction and substantial improvements, fully enclosed areas below the lowest floor that are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria:

[3] Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding or sheet flow where on sloping terrain) where average depths are between one and three feet.

- either a minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves or other coverings or devices; provided, that they permit the automatic entry and exit of floodwaters; or
- be certified to comply with a local floodproofing standard approved by the Federal Insurance Administration.

- 15.48.050 Floodways. Located within areas of special flood hazard (established in Section 15.40.070 of the City's Municipal Code) are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles, and erosion potential, the following provisions apply:
  - all encroachments, including fill, new construction, substantial improvements, and other development are prohibited within the floodway unless certification by a registered professional engineer or architect is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge and, if satisfied, shall comply with all other applicable flood hazard reduction provisions of the City's Municipal Code.

Suisun Marsh Protection Plan

The Suisun Marsh Protection Plan, adopted in 1976, contains policies which regulate the marsh's primary management area of 89,000 acres of tidal marsh, managed wetlands, adjacent grasslands, and waterways, as well as a secondary management area of approximately 22,500 acres of significant buffer lands. The Suisun Marsh Local Protection Program was also subsequently adopted by Solano County in the 1980s to implement the Suisun Marsh Protection Plan. Neither the Refinery nor the Project site is located within the boundaries of the SMLPP (see Section 4.9, *Land Use*, for further explanation of the Suisun Marsh Local Protection Program).

4.8.2.4 Project Baseline

Baseline conditions reflect the ongoing operation of the Refinery as it existed at the time of the issuance of the NOP (August 2013), as an oil Refinery, including ongoing operations and maintenance activities.

4.8.3 Significance Criteria

Based on California Environmental Quality Act (CEQA) Guidelines Appendix G, the Project would cause adverse impacts to hydrology and water quality if it would:

a) Violate any water quality standards or waste discharge requirements;

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface run-off in a manner which would result in flooding on-or off-site;

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

f) Otherwise substantially degrade water quality;

g) Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows;

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or

j) Result in or cause inundation by seiche, tsunami, or mudflow.

4.8.4 Discussion of No Hydrology and Water Quality Impacts

g) Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

The Project does not include the construction of housing. No impact would result from the Project.

j) Would the project result in or cause inundation by seiche, tsunami, or mudflow?

The Project would be limited to earthmoving, grading and changes to dikes, addition of rail spurs and a loading rack, as well as modifications to piping that would allow crude oil to be delivered by tank car; these actions would not expose people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow. The influence of an ocean-borne tsunami wave would dissipate prior to reaching the City of Benicia, because of the distance of the Project area from the Golden Gate in San Francisco Bay. The Refinery site is not located within a designated tsunami inundation area (CEMA, 2009). Additionally, the chances of a tsunami generated east of the Golden Gate are very low because the fault structures in the Bay Area displace laterally. Seiches form in enclosed bodies of water. The risk from seiche is considered minimal because there are no enclosed water bodies in the immediate vicinity of the Project site. Lake Herman, the closest enclosed large water body is approximately 1.5 miles north of the Project site. The possibility of mudflow is minimal because the Project area is relatively flat with no steep slopes in the immediate vicinity. The Project would not exacerbate nor be subject to the risks of tsunami, seiche, or mudflows.

4.8.5 Discussion of Impacts and Mitigation Measures

a, f) Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality?

Impact 4.8-1: The Project would not violate any water quality standards or otherwise substantially degrade water quality. (*Less than Significant with Mitigation*)

Construction activities associated with the Project would require land disturbing activities such as grading, earthmoving, backfilling, and compaction. Additionally, Project construction would involve use of chemicals and solvents such as fuel and lubricating grease for motorized heavy equipment. Such construction activities could dislodge soil and cause sedimentation or inadvertent spills of construction related chemicals into waterways resulting in adverse water quality impacts. Sulphur Springs Creek is directly adjacent to the Project and these impacts could be significant in the immediate vicinity of construction activities as well as further downstream if Best Management Practices (BMPs) are not employed to minimize or avoid release of pollutants. Construction or grading activities occurring on land parcels of one acre or more in size are subject to a General Construction Permit under the NPDES permit program under section 402(p) of the federal Clean Water Act. However, the SFRWQCB confirmed that storm water runoff generated during Project construction activities would not require coverage under the General Permit for Construction Activities based on measures currently contained and required in Valero's SWPPP (RWQCB, 2013) for the Refinery property. Implementation of a storm water management plan (SWMP) as described below in Mitigation Measure 4.8-1 would ensure that the Project would not substantially degrade water quality, water quality standards, or waste discharge requirements during construction. Implementation of standard construction procedures and precautions would also ensure that the water quality impacts related to the handling of chemicals from Project construction would be less than significant.

Based on geotechnical information developed for the Project site (Valero, 2013), encountering groundwater during grading and excavation is not anticipated. As described in Section 4.8.2.2, Project Setting, the groundwater table varies across the Project area[4] (URS, 2001; Stantec, 2010), but in general is approximately 10 feet below existing grade at the Project site. Additionally, the groundwater levels are likely to be lower than 10 feet below grade during summer months when the grading and excavation work are scheduled to occur (Valero, 2013). Therefore, it is anticipated that interception of the groundwater table during excavation and grading would be minimal. However, excavation during Project construction could intercept the shallow groundwater table at some locations and could require dewatering. Where groundwater is intercepted during construction, it will be extracted and contained in holding tanks and subsequently processed at the facility's wastewater treatment plant and discharged into the Carquinez Strait via a wastewater effluent outfall regulated under the Refinery NPDES permit. Impacts to water quality, water quality standards, or waste discharge requirements relating to construction dewatering of groundwater would be less than significant.

[4] Depth to water at the Refinery ranges from 2 to 50 feet below ground surface (bgs) (URS, 2001).

The majority of the Project site is developed and is an operating Refinery; the Project would not result in any substantial increase in impervious area or storm runoff. The SFRWQCB regulates water quality in the Project area. The Refinery operates under a NPDES permit administered by the RWQCB. Wastewater produced on the Refinery site by Refinery operations is currently treated at the Refinery's wastewater treatment plant and discharged into the Carquinez Strait via a waste water effluent outfall regulated under the Refinery NPDES permit. Long-term storm runoff generated at the Project site would be similar to the existing runoff on-site. Storm water runoff would continue to be discharged through the storm water outfalls that service the Refinery property.[5] The storm water outfalls are permitted under the Refinery NPDES permit, which sets storm water outfall discharge limits and monitoring requirements. Storm water discharges and water quality at the Refinery's 16 storm water outfalls are managed through application of an existing SWPPP, which incorporates the NPDES discharge limits and monitoring requirements as well as incorporates procedures, pollution prevention strategies, and BMPs used to meet these discharge limits. The SWPPP was originally prepared to comply with SFRWQCB Order Number 2002-0112 (NPDES Permit No. CA0005550) adopted in October, 2002 (URS, 2002). In 2011, the SWPPP was revised to comply with Order Number R2-2009-0079, issued by the SFRWQCB in 2009 to be effective from January 1 through December 31, 2014. In the event of an incident that results in the accidental spill or release of oil on-site, including release of crude oil from a train on the Refinery property, the Refinery has an existing efficient and flexible response plan for spills associated with the operation of its facilities (discussed in detail in Section 4.7, *Hazards and Hazardous Materials).* Impacts to water quality, water quality standards, or waste discharge requirements related to long-term operations would be less than significant.

The Suisun Marsh is crossed by Union Pacific Railroad (UPRR) mainline railroad tracks that would be used to transport crude feedstocks to the Refinery. The accidental spill or release of crude oil from a train during long-term operations related to this transport route crossing Suisun Marsh could result in potential indirect Project impacts relating to water quality. The approximately 730 trains that would transport crude oil through the Marsh each year would introduce a risk of an oil spill if a train was to derail *and* the integrity of the tank car was compromised in a manner resulting in a breach and the accidental release of oil. As discussed in detail in Section 4.7, *Hazards and Hazardous Materials*, the risk of a release of crude oil from a train carrying crude oil to the Refinery is not significant because the likelihood is extremely low. The layout of the track through Suisun Marsh is flat and reasonably straight, without tight turns. This reduces the potential for derailments or runaway train incidents. Based on the layout of the track through the Suisun Marsh and the safe transport record for UPRR trains through the Roseville to Benicia corridor, as well as the comprehensive analysis for Impact 4.7-2, presented in Section 4.7.5, the likelihood of a derailment resulting in indirect impacts to water quality, water quality standards, or waste discharge requirements is very low. Therefore, the impact would be less than significant.

> **Mitigation Measure 4.8-1:** The Applicant and/or its contractor shall prepare and implement a storm water management plan (SWMP) for construction of the Project. The proposed project is covered under the Applicant's National Pollutant Discharge Elimination System (NPDES) permit and storm water pollution prevention plan (SWPPP). A notice of

[5] Storm water outfalls in the vicinity of the Project include EFF-003 through -004 and EFF-007 through -010.

intent (NOI) application and notice of termination (NOT) application are not required. Implementation of the SWMP shall start with the commencement of construction and continue through the completion of the Project. The SWMP shall identify pollutant sources (such as sediment) that may affect the quality of storm water discharge and implement best management practices (BMPs) consistent with the California Stormwater Quality Association's BMP Handbook for Construction to reduce pollutants in storm water. The Applicant or the construction contractor shall install erosion and storm water control measures on the construction site such as installation of a silt fence and other BMPs, particularly at locations close to storm drains and water bodies. The BMPs shall also include practices for proper handling of chemicals such as avoiding fueling at the construction site and overtopping during fueling and installing spill containment pans.

Significance after Mitigation: Less than significant.

---

b) Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

Impact 4.8-2: The Project could require withdrawal of groundwater or result in a substantial increase in impervious surface area within the Refinery. (*Less than Significant*)

The Project would not require withdrawal of groundwater. The Project would not result in a substantial increase in impervious surface area within the Refinery. The Project site is currently predominantly paved. The Refinery is not located in a water supply groundwater basin and, although groundwater in the region is used for agriculture and domestic use, the volume and extent of groundwater underlying the Refinery is minimized by a lack of thick alluvial deposits (URS, 2001). Additionally, the potential use of groundwater underlying the Refinery site is restricted due to existing groundwater contamination (Stantec, 2010). As discussed in a, f) above, excavation during Project construction could intercept the shallow groundwater table and could require dewatering, but such dewatering activities would be minimal and temporary in nature and as such, there would be no impacts to groundwater supplies or aquifers. The impact would be less than significant.

---

c) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

Impact 4.8-3: The Project could alter streams or the existing drainage within the Refinery. (*Less than Significant*)

The Project site is predominantly paved. The Project elements would be built in an area that is currently graded and would not substantially alter the existing drainage pattern of the site. Storm

water runoff would continue to be collected by the existing storm drains and discharged through the Refinery's NPDES-permitted outfalls. There would be no substantial change above the current baseline in runoff flow rates nor would the Project increase erosion or siltation off-site. Proposed Project construction activities could cause soil erosion in the vicinity of soil disturbing activities [see a, f), above]. However, construction would be short-term and, as addressed above, would employ BMPs to minimize or avoid the release of sediment from the construction site. There would be no alteration of streams or the existing drainage patterns that could result in substantial erosion or siltation on- or off-site. The impact would be less than significant.

---

d) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

Impact 4.8-4: The Project could substantially change runoff flow rates or increase the potential for flooding. (*Less than Significant*)

There would be no substantial change in runoff flow rates nor would the Project increase the potential for flooding. As stated in c) above, there would be no alteration of streams or the existing drainage patterns. Within the Refinery property, addition of new Project components would not substantially increase the impervious surface areas or increase the storm runoff generated at the Project site. Storm water runoff would be collected by the existing on-site storm drains and discharged through the existing NPDES-permitted outfalls servicing the Refinery site. The runoff produced at the location of the Project would be accommodated within the existing capacity of the storm water conveyance system. Therefore, there would be no increase in the rate or volume of surface runoff that could result in on- or off-site flooding. The impact would be less than significant.

---

e) Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Impact 4.8-5: The Project could increase storm water runoff. (*Less than Significant*)

As discussed in items a, c, d, and f) above, storm water runoff would be collected by the existing storm conveyance system and discharged through the NPDES-permitted outfalls or treated at the Refinery wastewater treatment plant and discharged into Carquinez Strait. The runoff would be accommodated within the existing storm water drainage system and would be similar in nature to the existing site runoff quantities. The impact would be less than significant.

---

h) Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?

Impact 4.8-6: The Project could place structures within a 100-year flood hazard areas at risk. (*Less than Significant*)

Review of the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Maps (FIRM) for the Project area indicate that the majority of the Project site along Sulphur Springs Creek and north of Bayshore Road is designated as "Zone RF", a Special Flood Hazard Area (SFHA) that is within the 100-year flood zone (FEMA, 2013). The southern portions of the proposed rail alignment are in areas of minimal flood hazard or in Zone X, with some sections crossing Zone RF and Zone AE in the vicinity of Bayshore Road (FEMA, 2013). Construction of aboveground facilities within a flood hazard zone could potentially impede or redirect flood flows. Aboveground facilities that are not designed to withstand inundation can be damaged during flood events. Due to the Project being within a 100-year flood zone, Project components would be required to include in the design criteria flood hazard mitigation measures in accordance with the City of Benicia Floodplain Management Policy (City of Benicia, 1999). The flood hazard mitigation measures incorporated into the design criteria for the Project would comply with construction standards established by the California Building Code. Further, the Project elements are not habitable structures for human occupancy. Additionally, construction of new unloading facilities and rail track within the mapped 100-year flood hazard zone would be unlikely to displace floodwaters, raise flood elevations, create new flooding impacts (e.g., by causing flooding of existing facilities or structures that previously would not have been inundated), and/or exacerbate existing flooding problems (e.g., by increasing the severity or frequency of flooding relative to pre-Project conditions). Therefore, it is unlikely that the Project would substantially displace or redirect flood flows. The impact would be less than significant.

---

i) Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

Impact 4.8-7: The Project could place people or structures within inundation areas for flooding. (*Less than Significant*)

The Project area is within the mapped dam inundation zone for Lake Herman Dam (ABAG, 1995). Although unlikely, catastrophic failure of this dam would potentially expose people or structures to a significant risk of loss, injury, or death involving flooding. However, all dams are routinely inspected and evaluated for seismic integrity as overseen by the California Division of Safety of Dams (DSOD). When a dam is found to have a failure potential, the water level behind the dam is reduced to allow for partial collapse without loss of water as required by DSOD (ABAG, 2013). Thus, the probability of dam failure resulting in significant loss, injury, or death is low (ABAG, 2013). Given the low risk of dam failure, and because the proposed facilities would be designed to withstand natural hazards, potential impacts related to dam failure are considered less than significant. According to maps compiled by the San Francisco Bay Conservation and Development Commission (BCDC), a projected sea-level rise of 55 inches by

the year 2100 would affect large areas around the Bay perimeter. The maps indicate that the Project site would be located within an area of anticipated inundation that is consistent with the 100-year flood zone designated by FEMA (BCDC, 2011). Flooding hazards to people or structures related to the 100-year flood zone designated by FEMA are discussed under Impact 4.8-6, above. The impact would be less than significant.

4.9 Land Use and Planning

4.9.1 Introduction

This section discusses land use planning issues, including the Project's consistency with local land use and zoning and applicable local plans, policies, and regulations. The applicable plans and their relevant policies discussed in this section include the *City of Benicia General Plan* (General Plan), Benicia Zoning Ordinance, and the San Francisco Bay Conservation and Development's *San Francisco Bay Plan* (Bay Plan) and *Suisun Marsh Protection Plan*.

4.9.2 Setting

4.9.2.1 Regional Setting

The City of Benicia is located in the southernmost section of Solano County, overlooking the Carquinez Strait, which connects San Pablo Bay to the west and Suisun Bay and the Sacramento Delta to the east. Benicia is located adjacent to the Interstate 680 corridor and to Interstate 80 (I-80) via Interstate 780 (I-780). The City is also home to the Port of Benicia, a deep water privately operated port. Benicia is forty miles from Oakland International and fifty miles from San Francisco International Airports. Union Pacific Railroad operates two major rail lines and related trackage serving Benicia businesses. The City of Benicia encompasses 14 square miles, and is located 35 miles northeast of San Francisco and 57 miles southwest of Sacramento.

4.9.2.2 Project Setting

The Refinery is located at 3400 East Second Street, within an industrial area (Benicia Industrial Park) in the eastern portion of the City of Benicia. The Refinery lies in a general north-south orientation near and west of Interstate 680. The Refinery is located along the northern edge of the Suisun Bay below a low range of coastal hills. Figure 3-1 in Chapter 3, *Project Description* shows the map of the region.

The Refinery occupies approximately 330 acres of the 880-acre Valero property; the remaining portion of which is undeveloped. The Refinery consists of four primary areas: the main Refinery area, which includes the process block and tank farm where raw materials are converted into gasoline and other products and where intermediate and finished products are stored; a crude tank farm, located south and east of the process block area, where raw materials are stored; an administrative area, including the Refinery's main entry and parking lot along East Second Street; and the Refinery's wastewater treatment plant, separated from the main Refinery area by I-680. Additionally, the Refinery's wastewater effluent outfall discharges approximately 1,100 feet offshore into Suisun Bay. The Project site is adjacent to the northeastern boundary of the Valero property, between the lower tank farm and Sulphur Springs Creek.

The Union Pacific Railroad Company (UPRR) line serves the Refinery as well as other businesses within the Benicia Industrial Park east of the Refinery, via Track 700. The Refinery

dock, located on the Carquinez Strait between the Benicia-Martinez Bridge and the Port of Benicia wharf, provides Refinery access to bulk transport by ship. Coke shipments from Valero are loaded from Berth 3 at the Port of Benicia. The lands and facilities of the existing Refinery are shown in Figure 3-2 in Chapter 3, *Project Description*.

Surrounding Land Uses

The Refinery is immediately bordered by approximately 550 acres of mostly undeveloped Valero property to the south and west, and general industrial uses to the north and east. Industrial uses in the Benicia Industrial Park are located east of the Project site. This area consists largely of single-level warehouse and manufacturing buildings interspersed with parking areas and materials storage yards. As noted above, a spur of the UPRR rail line serves the Benicia Industrial Park. This line branches off from the line serving Valero and passes through Valero's property.

Residential uses are located approximately 3,000 feet to the south and west of the Refinery, and approximately 2,100 feet to the northwest. The nearest residential area to the Project site is located approximately 0.4-mile to the northwest of the terminus of the proposed unloading rack and rail spurs. This neighborhood is separated from the Project site by undeveloped hills, including areas owned by Valero.

4.9.2.3 Regulatory Setting

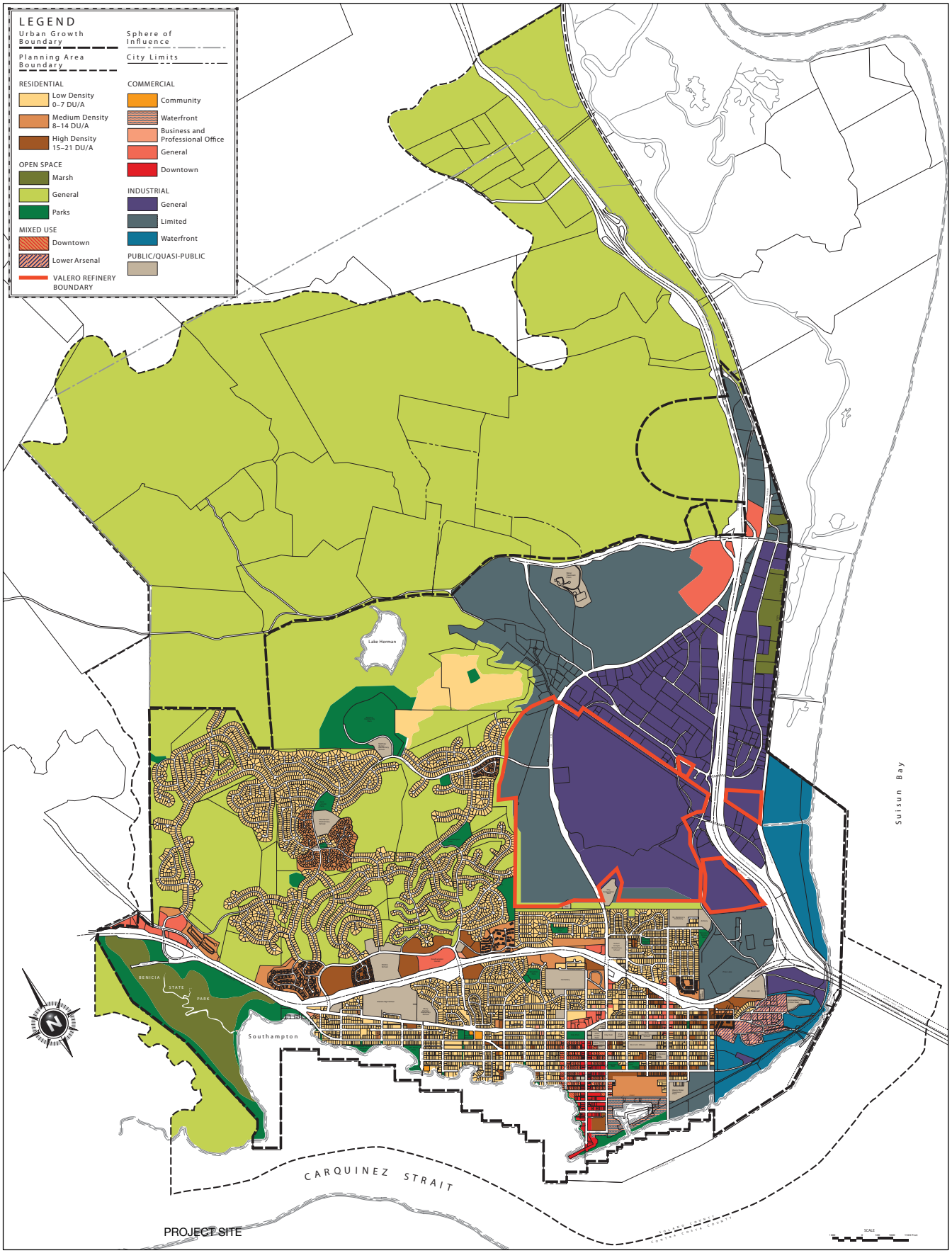
City of Benicia

Land Use Designation

The project site exists within the geographic area named in the *City of Benicia General Plan* as the Benicia Industrial Park, which is the major industrial area in the City. Benicia's industrial land is divided into three General Plan Land Use categories: General Industrial, Limited Industrial, and Water-related Industrial. The land use designation for the project site is General Industrial, which is the least restrictive of the three categories, and is intended to allow flexibility for industrial development. Over half of the Benicia Industrial Park is designated General Industrial. This includes nearly all of the area north of I-780 and east of East Second Street (City of Benicia, 1999 and 2003). Existing General Plan land use designations are shown on Figure 4.9-1.

General Plan

To meet the requirements of state law, all cities and counties in California are required to prepare and adopt a general plan. Pursuant to state law, the general plan is a comprehensive, long-term plan for the physical development of the City, and any land outside its boundaries that bears relation to its planning. The *City of Benicia General Plan*, adopted in 1999, includes specific policies to preserve and enhance existing development and to provide for orderly and appropriate new development of the City of Benicia until approximately the year 2020. Actions and approvals required by the City of Benicia Community Development Department must be consistent with the General Plan.



SOURCE: City of Benicia

Benicia Valero CBR . 202115.01

Figure 4.9-1

Existing Land Use Designations

The General Plan contains the Community Development and Sustainability chapter (Chapter 2), which includes a discussion of the various types of land uses in Benicia. It also features goals and policies addressing growth management, economic development, circulation (i.e., transportation and traffic), community/public services, and public facilities. The General Plan's Community Identity chapter (Chapter 3) covers historic and cultural resources, visual character, and open space and conservation of resources. The Community Health and Safety chapter (Chapter 4) addresses options for developing a more healthy community, hazards to the community, emergency response plans and community safety measures, and community noise sources and related effects.

General Plan goals and policies applicable to the Project are included below. Policies pertaining to other environmental topic areas, such as traffic and circulation, hazards and public safety, and hydrology, are included in their respective sections of this EIR.

Growth Management

***Policy 2.1.1*:** Ensure that new development is compatible with adjacent existing development and does not detract from Benicia's small town qualities and historic heritage, (and to the extent possible, contributes to the applicable quality of life factors noted above).

***Policy 2.1.4*:** Strive to preserve significant areas of vegetation and open space when approving development projects.

Economic Development

Goal 2.5: Facilitate and encourage new uses and development which provide substantial and sustainable fiscal and economic benefits to the City and the community while maintaining health, safety, and quality of life.

***Policy 2.6.1*:** Preserve industrial land for industrial purposes and certain compatible "service commercial" and ancillary on-site retail uses.

***Policy 2.6.4*:** Link any expansion of industrial use to the provision of infrastructure and public services that are to be developed and in place prior to the expansion.

***Policy 2.6.5*:** Establish and maintain a land buffer between industrial/commercial uses and existing and future residential uses for reasons of health, safety and quality of life.

Goal 2.7: Attract and retain industrial facilities that provide fiscal and economic benefits to—and meet the present and future needs of—Benicia.

Open Space and Conservation of Resources

Goal 3.15: Provide buffers throughout the community.

***Policy 3.15.4*:** Use open space as a buffer against natural and man-made hazards.

***Program 3.15.F*:** Require open space buffers around known hazardous areas such as the Exxon (Valero) Refinery and the Interpretive Trail Site.

(City of Benicia, 1999)

Zoning Ordinance

The City of Benicia Zoning Ordinance is the primary tool for achieving the objectives of the General Plan. The zoning ordinance provides detailed specifications for allowable development within areas designated by the General Plan. The Refinery process unit, and the Project site, are designated General Industrial (IG) by the zoning ordinance. Other areas within the Benicia Industrial Park, east of the Refinery, are also zoned IG. General Industrial uses are permitted by right under the zoning ordinance, except that a use permit is required for all oil and gas refining. Valero's undeveloped land, which serves as a buffer between the Refinery and adjacent land uses to the north, south, and west, is zoned Limited Industrial (IL) (City of Benicia, 2012 and 2013). Existing zoning is shown on Figure 4.9-2.

San Francisco Bay Conservation and Development Commission

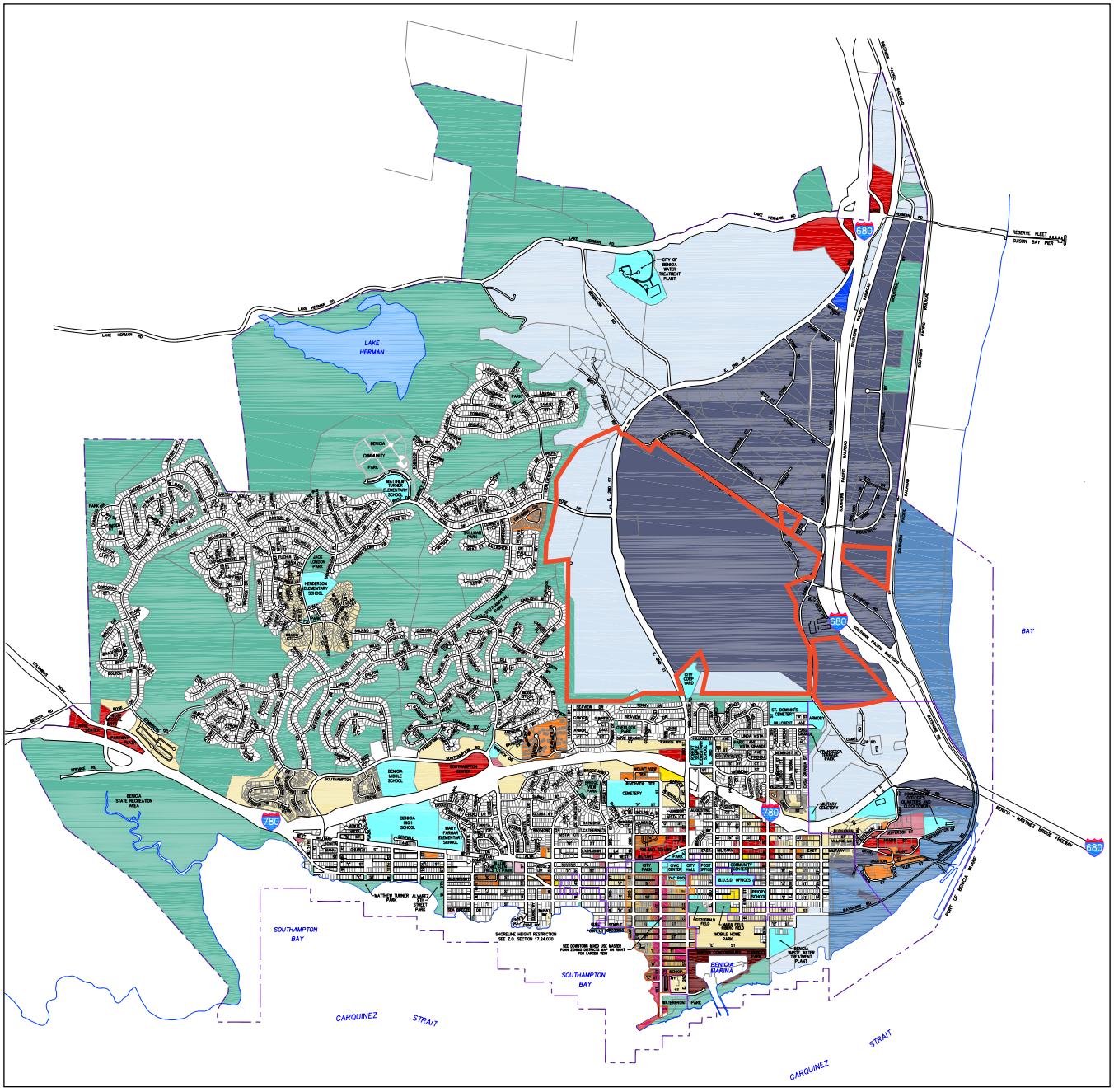
The San Francisco Bay Conservation and Development Commission (BCDC) is a state agency with permit authority over the Bay and its shoreline. Created by the McAteer-Petris Act in 1965, BCDC regulates filling, dredging, and changes in use in San Francisco Bay. BCDC also regulates new development within the 100 feet of the shoreline to ensure that maximum feasible public access to and along the Bay is provided. BCDC is also charged with ensuring that the limited amount of shoreline property suitable for regional high priority water-oriented uses is reserved for these purposes. Land-side uses and structural changes are governed by policies regarding public access. BCDC planning documents applicable to the Refinery and the Project site include the *San Francisco Bay Plan*, *Bay Area Seaport Plan*, *Benicia Waterfront Special Area Plan*, and *Suisun Marsh Protection Plan*.

San Francisco Bay Plan (Bay Plan)

The Bay Plan specifies goals, objectives, and policies for existing and proposed waterfront land use and other BCDC jurisdictional areas. The Bay Plan identifies high-priority uses of the Bay and shoreline for which shoreline areas should be reserved. These "priority uses" include ports, water-related industry, airports, wildlife refuges, and water-related recreation areas. Plan Map 2 of the Bay Plan designates the Refinery, including the Project site and UPRR tracks in the vicinity of the Refinery, as water-related industry. Water-related industry is defined as an industry that requires "a waterfront location on navigable, deep water to receive raw materials and distribute finished products by ship, thereby gaining a significant transportation cost advantage." Certain segments of the UPRR tracks outside the city limits of Benicia pass through, or are adjacent to, units of the Grizzly Island Wildlife Area in the Suisun Marsh. The primary purposes of wildlife refuges according to the Bay Plan are: "(1) the protection of threatened or endangered native plants, wildlife, and aquatic organisms; (2) the preservation and enhancement of unique habitat types or highly significant wildlife habitat; or (3) the propagation and feeding of aquatic life and wildlife." (BCDC, 2006)

Benicia Waterfront Special Area Plan

The *Benicia Waterfront Special Area Plan* (Waterfront Plan) was adopted by the San Francisco Bay Conservation and Development Commission (BCDC) and the City of Benicia to provide



ZONING MAP LEGEND:

- OS OPEN SPACE
- PS PUBLIC & SEMI-PUBLIC
- RS SINGLE FAMILY RESIDENTIAL • 0 – 7 DU/ACRE
- RM MEDIUM DENSITY RESIDENTIAL • 8 – 14 DU/ACRE
- RH HIGH DENSITY RESIDENTIAL • 15 – 21 DU/ACRE
- PD PLANNED DEVELOPMENT
- CC COMMUNITY COMMERCIAL
- CO OFFICE COMMERCIAL
- CG GENERAL COMMERCIAL
- CW WATERFRONT COMMERICAL
- I L LIMITED INDUSTRIAL
- I G GENERAL INDUSTRIAL
- I W WATER RELATED INDUSTRIAL
- I P INDUSTRIAL PARK

DMUMP MAP LEGEND:

- TOWN CORE
- TOWN CORE-OPEN
- NEIGHBORHOOD GENERAL
- NEIGHBORHOOD GENERAL-OPEN

VALERO REFINERY BOUNDARY

GENERAL LEGEND:

- BENICIA CITY LIMITS BOUNDARY
- HISTORIC OVERLAY DISTRICT
- LOT / PROPERTY LINE
- STREET / ROAD / HIGHWAY RIGHT-OF-WAY LINE
- SHORE LINE / EDGE OF WATER BODY
- DMUMP BOUNDARY

0 400 800 1200 1600 2400
Graphic Scale in Feet

SOURCE: City of Benicia

Benicia Valero CBR . 202115.01

Figure 4.9-2
Existing Zoning

detailed planning and regulatory guidelines for the Benicia shoreline between West Second Street and the Benicia-Martinez Bridge. The Refinery dock, which provides access to bulk transport by ship, and the Port of Benicia, where coke shipments from Valero are loaded for marine transport, are both located within the boundaries of the Waterfront Plan. The Waterfront Plan area is divided into three geographic sections: Historical Business District, Marina District, and the Port District. The Refinery dock and the Port of Benicia are both located within the Port District. Permitted uses within the Port District include ports, water-related industry, and limited public access (BCDC, 1977).

Bay Area Seaport Plan

The San Francisco *Bay Area Seaport Plan* (Seaport Plan) was prepared in conjunction with the Metropolitan Transportation Commission (MTC) and serves as BCDC's overall policy for long-term growth and development of the Bay Area's six seaports, which includes the Port of Benicia. Areas determined to be necessary for future port development are designated as "port priority use areas" by the Seaport Plan. These areas are reserved for port-related and other uses that will not impede development of the sites for port purposes. The Port of Benicia, including the Refinery dock, is located within the port priority use area (BCDC, 1996).

Suisun Marsh Protection Plan

The *Suisun Marsh Protection Plan*, prepared by BCDC, contains policies which regulate the marsh's Primary Management Area of 89,000 acres of tidal marsh, managed wetlands, adjacent grasslands, and waterways, as well as a Secondary Management Area of approximately 22,500 acres of significant buffer lands. Solano County was required to prepare and adopt a component of the local protection program required under the Suisun Marsh Preservation Act to implement the *Suisun Marsh Protection Plan* within the Suisun Marsh Management Area. The Suisun Marsh Local Protection Program (SMLPP) was subsequently adopted by Solano County (as well as the cities of Fairfield and Suisun City) in the 1980s. Neither the Refinery nor the Project site is located within the boundaries of the SMLPP, although the UPRR tracks cross the Primary Management Area of the SMLPP. This area consists of tidal marshes, seasonal marshes, managed wetlands, and lowland grasslands. It is the intent for this area to remain in its existing marsh and related uses (BCDC, 1976; Solano County, 2012).

Conservation Plans

Bay Delta Conservation Plan

The Bay Delta Conservation Plan (BDCP) is a proposed 50-year habitat conservation plan (HCP) and natural community conservation plan (NCCP) that would help secure California's water supply by building new water infrastructure and investing in habitat restoration to improve the ecological health of the Sacramento-San Joaquin River Delta, while minimizing impacts to local communities and farms. The BDCP includes a series of conservation measures to enhance ecosystem processes and function, such as increased seasonal floodplain habitat, intertidal and associated subtidal habitat, improved hydrologic conditions, and improved salinity within the Delta estuary, as well as reduced direct losses of fish and other aquatic organisms. The Public

Draft of the BDCP and the Draft Environmental Impact Statement (EIS)/EIR were published in December 2013. The UPRR tracks that would be used to deliver crude oil to the Refinery cross the Suisun Marsh, which is included in the BDCP area (DNR, 2013).

Suisun Marsh Habitat Management, Preservation, and Restoration Plan

The Suisun Marsh Habitat Management, Preservation, and Restoration Plan (Suisun Marsh Plan [SMP]) has management oversight by a group of agencies with primary responsibility for Suisun Marsh management, and is intended to balance the benefits of tidal wetland restoration with other habitat uses in the Suisun Marsh. The principal agencies with primary responsibility for management of the Suisun Marsh are the U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, California Department of Fish and Wildlife, California Department of Water Resources, National Marine Fisheries Service, Suisun Resource Conservation District, and CALFED Bay-Delta Program. The Final Environmental Impact Statement (EIS) / EIR was published in November 2011. The UPRR tracks that would be used to deliver crude oil to the Refinery cross the Suisun Marsh (USBR, 2011).

Solano County Habitat Conservation Plan

The U.S. Bureau of Reclamation (USBR), the Solano County Water Agency (SCWA), and other participating governments and agencies within Solano County have agreed to implement conservation measures to ensure the protection of threatened and endangered species and their habitat within the SCWA contract service area by implementation of conservation measures outlined in the Solano Project Water Service Contract Renewal Biological Opinion (Solano Project Biological Opinion). To support those measures, the SCWA and participating governments and agencies have developed a HCP for the Solano Project contract service area. The Solano HCP is intended to support the issuance of an “incidental take permit” under the Federal Endangered Species Act (FESA) for activities associated with future water use in the SCWA service area. Entities participating in the HCP also intend to secure incidental take authorization from the California Department of Fish and Wildlife for State-listed species. The City of Benicia and the unincorporated areas of Solano County outside the SCWA service area have elected not to participate in the HCP. However, the UPRR tracks that would be used to deliver crude oil to the Refinery cross portions of the HCP area. In addition, as of publication of this EIR, the HCP has not been formally adopted by the plan participants (SCWA, 2012).

Yolo County Natural Community Conservation Plan/Habitat Conservation Plan

The Yolo Natural Heritage Program (NHP) is a comprehensive, county-wide plan designed to provide for the conservation and management of sensitive species and the natural communities upon which those species depend, while accommodating other important uses of the land. The NHP will further replace the existing project-by-project approach to mitigation and conservation, thereby providing greater benefits to species covered by the NHP and a more streamlined mitigation process for activities covered by the NHP. The NHP serves as a HCP pursuant to FESA and a NCCP under the California Natural Community Conservation Planning Act. The UPRR tracks that would be used to deliver crude oil to the Refinery cross Yolo County near

Sacramento. The Yolo County NCCP/HCP has not been formally adopted by the plan participants; the First Administrative Draft was published in July 2013 (YNHP, 2013).

4.9.2.4 Project Baseline

Baseline (existing) conditions reflect the ongoing operation of the Refinery as it existed at the time of the issuance of the NOP (August 2013), as an oil refinery, including ongoing operations and maintenance activities as described in detail in Section 3.3.

4.9.3 Significance Criteria

Based on California Environmental Quality Act (CEQA) Guidelines Appendix G, a project would cause adverse land use impacts if it would:

a) Physically divide an established community;

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or

c) Conflict with any applicable habitat conservation plan or natural community conservation plan.

4.9.3.1 Approach to Analysis

Section 15125(d) of the CEQA Guidelines states that "the EIR shall discuss any inconsistencies between the Project and applicable general plans and regional plans" as a part of the discussion of the existing setting of the project. However, inconsistency with an adopted plan does not necessarily indicate a significant impact. This section considers adopted plans and the policies that are applicable to the Project, and determines whether the Project conforms to those plans and policies. While potential policy inconsistencies resulting from the project would not qualify as significant environmental impacts, physical environmental impacts were identified elsewhere in this document.

4.9.4 Discussion of No Land Use or Planning Impacts

Review and comparison of the setting circumstances and Project characteristics with the significance criteria stated above, clearly show that no impact would result for the third land use criterion. The following discusses the reasoning supporting this conclusion:

c) Conflict with an adopted habitat conservation plan or natural community conservation plan.

The Refinery is located outside the boundaries of the *Bay Delta Conservation Plan*, the *Solano County Habitat Conservation Plan* and the *Yolo County Natural Community Conservation Plan/Habitat Conservation Plan*, none of which has been formally adopted by their respective

plan participants. Although the UPRR tracks that would be used to deliver crude oil to the Refinery crosses portions of these areas, no physical changes would occur to the existing railroad tracks as a result of the Project. Therefore, the Project would not conflict with any adopted conservation plan and no impact would result. Furthermore, the Project would not conflict with the current draft plans, and no impact would result.

4.9.5 Discussion of Impacts and Mitigation Measures

The Project was evaluated for consistency with the *City of Benicia General Plan* and other relevant local and regional plans and policies, which are described above in the Regulatory Setting. Although they would not be considered land use impacts, construction-related activities that could affect adjacent land uses are discussed in Sections 4.1, *Air Quality*; 4.6, *Greenhouse Gas Emissions*; and 4.10, *Noise*. Construction activities are scheduled to begin in 2014 and are expected to take approximately 25 weeks. Construction-related impacts would be relatively short-term in duration and would not continue after the Project begins operating. In general, the physical construction-related effects on adjacent land uses would be less-than-significant impacts. Certain physical construction-related effects would require the mitigation measures identified in the relevant sections of this document to reduce those impacts to less than significant. For analyses and discussions of these construction-related impacts, please refer to the above-identified sections.

a) Physically divide an established community.

Impact 4.9-1: The Project would not physically divide an established community. (*Less than Significant*)

Land uses in the vicinity of the Project include general industrial uses in the Benicia Industrial Park east of the Refinery. This area consists largely of single-level warehouse and manufacturing buildings interspersed with parking areas and materials storage yards. The nearest residential area is located approximately 0.4-mile to the northwest of the terminus of the proposed unloading rack and rail spurs. This neighborhood is separated from the Project site by undeveloped hills, including areas owned by Valero. The Project is surrounded by other areas of the Refinery to the west and south. The Project would be constructed within the existing footprint of already-developed portions of the Refinery, in physically discrete areas occupied by existing Refinery and tank storage operations. Although the Project would increase the frequency of 8-minute crossings of Park Road by trains delivering crude oil to the Refinery, the increased crossing frequency is within the current range of crossing variability (see Section 4.11, *Transportation and Traffic*). The blockage of Park Road would be temporary and would not physically divide Benicia. Development on the Refinery property would be contained within the footprint of the existing Refinery and tank farm, and would not physically divide Benicia. The impact would be less than significant.

b) Conflict with any applicable land use plan, policy, or the regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.

Impact 4.9-2: The Project would be in conformance with applicable regional or local plans and policies adopted for the purpose of avoiding or mitigating environmental effects. (*Less than Significant*)

The Project site is designated General Industrial by the *City of Benicia General Plan* and General Industrial (IG) by the Benicia Zoning Ordinance. General Industrial uses are permitted by right under Benicia's Zoning Ordinance, except that a use permit is required for all oil and gas refining. The Project would be consistent with the uses designated for the site by the General Plan and would not conflict with any applicable policies contained in the General Plan.

The entire Refinery is located in an area designated by the *San Francisco Bay Plan* for water-related industry. The Project would be consistent with this use. The Project site is not located within the boundaries of the *Benicia Waterfront Special Area Plan* or the *Bay Area Seaport Plan* (*Benicia Port Plan*); no conflict would result from implementation of the Project.

The Refinery is located outside the Marsh Protection Area identified in the Suisun Marsh Local Protection Program (SMLPP) of the *Suisun Marsh Protection Plan*. Although the UPRR tracks cross the Primary Management Area of the SMLPP, no physical changes would occur to the railroad tracks as a result of the Project. The Project would not conflict with the SMLPP and no impact would result.

Therefore, the Project would not conflict with any applicable land use plan or policy adopted for the purpose of avoiding or mitigating an environmental effect. The impact would be less than significant.

This page intentionally left blank

4.10 Noise

4.10.1 Introduction

This section addresses noise impacts associated with the Project. It analyzes both potential noise impacts caused by construction and operation of the Project on the ambient noise environment. Background information on environmental acoustics, including definitions of terms commonly used in noise analysis, is provided below.

4.10.2 Setting

4.10.2.1 Noise Background

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). Some typical A-weighted sound levels are presented in Figure 4.10-1.

Noise Exposure and Community Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. In fact, community noise varies continuously with time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. Background noise levels change throughout a typical day, but do so gradually,

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL (dBA)	COMMON INDOOR ACTIVITIES
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower at 100 feet	70	Vacuum Cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

SOURCE: Caltrans, 2013

Benicia Valero CBR . 202115.01

Figure 4.10-1

Typical Noise Levels

corresponding with the addition and subtraction of distant noise sources and atmospheric conditions. The addition of short duration single event noise sources (e.g., aircraft flyovers, horns, sirens) makes community noise constantly variable throughout a day.

These successive additions of sound to the community noise environment vary the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. Noise descriptors discussed in this analysis are summarized below:

L_{eq}: The equivalent sound level is used to describe noise over a specified period of time, in terms of a single numerical value. The L_{eq} is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

DNL: The day-night noise level (DNL; also referred to as L_{dn}) or the energy average of the A-weighted sound levels occurring during a 24-hour period and which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- **Interference with activities such as speech and sleep.** The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors, the thresholds are about 15 dBA higher. Interior residential standards for multi-family dwellings are set by the State of California at 45 DNL. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses.

- **Subjective effects of annoyance, nuisance, and dissatisfaction.** Based on attitude surveys used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas, the main causes for annoyance are interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL as a measure has been found to provide a valid correlation of noise level and the percentage of people annoyed. Three aspects of community noise are most important in determining subjective response – the level of sound, the frequency composition or spectrum of the sound, and the variation of sound level with time.

- **Physiological effects such as hearing loss or sudden startling.** While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

Environmental noise typically produces effects in the first two categories. Workers at industrial plants often experience effects described in the last category. There is no completely satisfactory

way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way the new noise compares to the existing noise levels to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise would be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1-dBA cannot be perceived;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference when the change in noise is perceived but does not cause a human response;
- A change in level of at least 5-dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. A ruler is a linear scale: it has marks on it corresponding to equal quantities of distance. One way of expressing this is to say that the ratio of successive intervals is equal to one. A logarithmic scale is different in that the ratio of successive intervals is not equal to one. Each interval on a logarithmic scale is some common factor larger than the previous interval. A typical ratio is 10, so that the marks on the scale read: 1, 10, 100, 1,000, 10,000, etc., doubling the variable plotted on the x-axis. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather they combine logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Sound level naturally decreases with more distance from the source. This basic attenuation rate is referred to as the *geometric spreading loss*. The basic rate of geometric spreading loss depends on whether a given noise source can be characterized as a point source or a line source. Point sources of noise, including stationary mobile sources such as idling vehicles or on-site construction equipment, attenuate (lessen) at a rate of 6.0 dBA per doubling of distance from the source. In many cases, noise attenuation from a point source increases by 1.5 dBA from 6.0 dBA to 7.5 dBA for each doubling of distance due to ground absorption and reflective wave canceling. These factors are collectively referred to as *excess ground attenuation*. The basic geometric spreading loss rate is used where the ground surface between a noise source and a receiver is reflective, such as parking lots or a smooth body of water. The excess ground attenuation rate (7.5 dBA per doubling of distance) is used where the ground surface is absorptive, such as soft dirt, grass, or scattered bushes and trees.

Widely distributed noises such as a street with moving vehicles (a “line” source) would typically attenuate at a lower rate of approximately 3.0 dBA for each doubling of distance between the source and the receiver. If the ground surface between source and receiver is absorptive rather than reflective, the nominal rate increases by 1.5 dBA to 4.5 dBA for each doubling of distance. Atmospheric effects, such as wind and temperature gradients, can also influence noise attenuation rates from both line and point sources of noise. However, unlike ground attenuation, atmospheric effects are constantly changing and difficult to predict.

Vibration

Vibration is an oscillatory motion through a solid medium in which the motion’s amplitude can be described in terms of displacement, velocity, or acceleration. There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is the average of the squared amplitude of the signal. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration (FTA, 2006).

4.10.2.2 Environmental Setting

Sensitive Receptors

The Project would be constructed within the Refinery in an area designated for General Industrial uses by the City of Benicia General Plan. Construction noise could impact residences in the vicinity of the Refinery, and this potential impact is considered below.

The Project would also result in four additional daily train trips along the Union Pacific main line from Roseville to the Refinery. The incremental increase in train noise caused by four additional trains is an indirect impact of the Project. Train noise could potentially impact sensitive receptors along the route from Roseville to the Refinery. The analysis of indirect noise impacts from trains herein considers impacts in the City of Benicia in detail. Indirect impacts outside the City are considered in general terms. Potential impacts on biological resources are considered in Section 4.2.

Noise-sensitive uses do not immediately adjoin the developed part of the Refinery. In general, the Refinery complex is bordered by approximately 470 acres of mostly undeveloped Valero property to the south and west, and general industrial uses to the north and east. Residential uses are located to the south (Hillcrest neighborhood) and west (Southampton neighborhood) of the Valero buffer land boundaries. The closest sensitive receptors to the Project site are residences off Lansing Circle, approximately 2,100 feet northwest of the proposed northern extent of the new unloading tracks, and approximately 2,250 feet northwest of the proposed northern extent of the unloading racks. The buffer lands separating the neighborhoods from the Refinery are designated for non-noise sensitive uses by the Benicia General Plan - designated as General Industrial, Limited Industrial, and General Open Space (City of Benicia, 1999). Areas to the northeast and southeast of the Refinery are also non-noise sensitive land uses, consisting of Interstate 680 and the Benicia Industrial Park.

Noise Sources and Ambient Noise Levels

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of noise in the urban environment. Along major transportation corridors, noise levels can reach 80 DNL, while along arterial streets, noise levels typically range from 65 to 70 DNL. Industrial and commercial equipment and operations also contribute to the ambient noise environment in their vicinities. The ambient noise environment at the project site is dominated by existing operations at the Refinery, and vehicular traffic on Interstate 680 and Interstate 780.

Existing rail noise in the City of Benicia is generated along the Union Pacific rail line, which extends along the eastern City boundary near the Suisun Bay shoreline. Existing operations along the Union Pacific rail line total approximately 42 daily headways with 35 of those occurring during daytime hours and seven during nighttime hours. The City of Benicia General Plan Noise Element indicates that the 60 dBA, L_{dn} noise contour extends approximately 100 feet from either side of the right of way (City of Benicia, 1999).

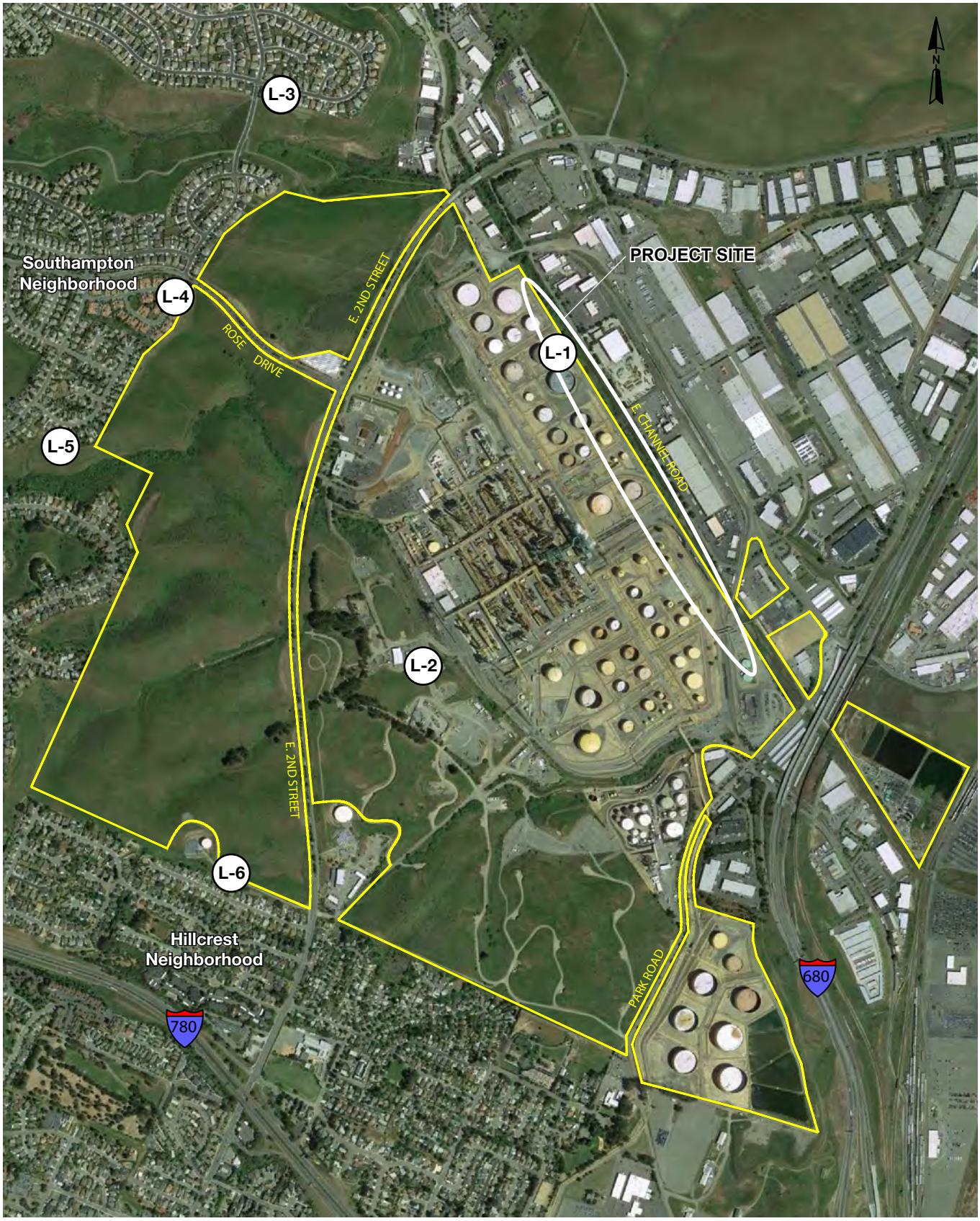
To provide the basis for evaluating potential impacts of the Project on the nearest noise-sensitive uses, long-term noise measurements were conducted between Wednesday, February 20, and Monday, February 25, 2013. Precision, calibrated, Type 1 logging sound level meters measured noise pressure levels and logged hourly statistical noise data continually over the entire measurement period. Measurements were taken at six locations, four of which represent noise-sensitive residential receivers in the area and the other two characterize existing noise levels near and inside the Refinery. Table 4.10-1, below, lists the six noise monitoring locations and summarizes the range of average daytime, evening, and nighttime ambient noise levels measured at each of these locations. For the purpose of estimating average noise levels, the daytime period is from 7:00 a.m. to 7:00 p.m., the evening period is from 7:00 p.m. to 10:00 p.m., and the nighttime period is from 10:00 p.m. to 7:00 a.m. Noise monitoring location L-1 is at the Project site, L-2 is within the Refinery, but outside the Project site, and monitoring locations L-3, L-4, and L-5 at Lansing Circle, Columbia Circle, and Allen Way, respectively, are located within the Southampton neighborhood to the west of the Refinery. L-6, a utility pole in the buffer zone, is just north of residences in the Hillcrest neighborhood, south of the Refinery. These noise-monitoring locations are illustrated in Figure 4.10-2.

TABLE 4.10-1
AVERAGE EXISTING L_{eq} IN THE PROJECT AREA FOR DAYTIME, EVENING, AND NIGHTTIME PERIODS (dBA)

Location		L-1	L-2	L-3	L-4	L-5	L-6
Description		Project Site	Pole near Repeater Tower	Lansing Circle	Columbia Circle	Allen Way	Utility Pole in Buffer
L_{eq}	Daytime	60	72	54	56	54	53
	Evening	59	72	55	53	51	51
	Nighttime	59	72	52	53	53	54

NOTE: Locations correspond to those illustrated in Figure 4.10-2.

SOURCE: Wilson, Ihrig & Associates, 2013.



Aerial Photo Source: © 2012 Google Earth Pro Ver 6.2.2.6613

LEGEND

PROPERTY BOUNDARY

0 1/8 1/4 1/2

MILE

SOURCE: ERM

Benicia Valero CBR . 202115.01

Figure 4.10-2

Noise Monitor Location and Sensitive Receptors

4.10.2.3 Regulatory Setting

Federal, State, and local agencies regulate different aspects of environmental noise. Federal and State agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans tend to identify general principles intended to guide and influence development plans; local noise ordinances and codes establish standards and procedures for addressing specific noise sources and activities.

Federal

Federal regulations establish noise limits for medium and heavy trucks (i.e., more than 4.5 tons, gross vehicle weight rating) under the Code of Federal Regulations, Title 40, Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters (approximately 50 feet) from the vehicle pathway centerline. These standards are implemented through regulatory controls on truck manufacturers.

The Noise Control Act required the U.S. Environmental Protection Agency (USEPA) to establish noise control standards for trains and railway stations engaged in interstate commerce, and it authorized the Federal Railroad Administration (FRA) to enforce them. Federal laws and regulations addressing rail operations include:

- Surface Transportation Board environmental regulations at 49 Code of Federal Regulations (CFR) 1105.7;
- USEPA Railroad Noise Emission Standards (40 CFR 201);
- FRA Railroad Noise Emission Compliance Regulations (49 CFR 210); and
- FRA Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings (49 CFR Parts 222 and 229)

There are separate standards for locomotives, railway cars, and railway station activities such as car coupling. For locomotives built before 1980, the level of noise is limited to 73 dBA in stationary operation and at idle speeds, and is limited to 96 dBA at cruising speeds. The standards for locomotives built after 1979 are more stringent and limit noise in stationary operation and at idle speeds to 70 dBA and at cruising speeds to 90 dbA. Noise from railway cars must not exceed 88 dBA at speeds of 45 miles per hour (mph) or less and must not surpass 93 dBA at speeds greater than 45 mph. Noise from car coupling activities at railway stations is limited to 92 dBA (Bearden, 2000).

State of California

The State of California establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dBA. The State pass-by standard for light trucks and passenger cars (i.e., less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters from the vehicle pathway centerline. These standards are

implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by State and local law enforcement officials.

City of Benicia

The Community Health and Safety Element of the *City of Benicia General Plan* regulates noise in the city limits with noise performance standards, which are directly applicable to the Project. These performance standards are used for determining the compatibility of proposed noise sensitive land uses with stationary noise sources. The standards also apply to new projects that include stationary noise sources, which may affect an existing noise sensitive development. The intent of these performance standards is both to prevent new noise sources from encroaching on existing noise sensitive developments and to prevent new noise sensitive development from encroaching on existing uses. The noise limits set by these performance standards are shown in Table 4.10-2. Noise sources evaluated relative to these performance standards should be considered with respect to their standard daily or weekly operating conditions. Noise sources may produce unusual noise levels due to temporary equipment malfunction, or unusual atmospheric conditions. Noise levels associated with these infrequent conditions are exempt from the performance standards contained in Table 4.10-2. In addition, the performance standards are not applicable to safety signals or warning devices.

TABLE 4.10-2
NOISE LEVEL PERFORMANCE STANDARDS FOR NOISE-SENSITIVE LAND USES

Noise Level Performance Standards, dBA Land Use	Exterior Hourly L_{eq}		Interior Hourly L_{eq}	
	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
Residential	55	50	40	35
Transient Lodging	55	50	40	35
Hospitals	--	--	40	35
Nursing Homes	55	50	40	35
Theaters, Auditoriums	--	--	35	35
Churches	55	50	40	40
Schools	55	50	45	45
Libraries	55	50	45	45

NOTES:
- Stationary noise sources include industrial operations, outdoor recreation facilities, HVAC units, loading docks, etc.
- The above standards may be adjusted upwards to allow for an increase in the existing ambient hourly L_{eq} caused by a project. An increase of less than 3 dB is permitted, even if the standards in Table 4.10-2 are exceeded; an increase of 3 dB or greater constitutes a significant environmental impact, unless the increase does not cause the standards in Table 4.10-2 to be exceeded.
- The noise level standards contained above shall be applied to a typical hour of operation. When a peak hour of operation is expected to occur consistently during daily or weekly operations, the standards shall also be applied to those operations.
- Each of the noise standards specified above shall be lowered by 5 dB for tonal noises (humming, high pitched tones, speech music, or recurring impulsive noises). This lowering of the standard does not apply to residential units established in conjunction with industrial or commercial caretaker dwellings.
- The City may choose to apply the noise level performance standards at designated outdoor activity areas, in lieu of the property line.
- The above standards do not apply to safety signals or warning devices.
- For noise sources that occur on an infrequent basis and are considered to be safety equipment (such as flaring or pressure relief valves), a maximum noise level of 75 dB is acceptable, as measured from the receiver's property line. Noise levels that are projected to exceed this maximum are considered a significant environmental impact.
- Where outdoor activity areas do not exist and/or are not expected to be affected, the City may choose to only apply the interior noise level criteria.

SOURCE: City of Benicia, 1999.

Title 8, Chapter 8.20 of the Benicia Municipal Code contains noise regulations that apply to the Project. Section 8.20.140 addresses noise from the operation of machinery, equipment, fans, and air conditioning units. This section limits noise increases from such mechanical devices to a maximum of 5 dBA over ambient base noise levels at the property line of any property generating the noise. Section 8.20.150 prohibits construction activities within any residential zone, or within a radius of 500 feet from a residential zone between the nighttime hours of 10:00 p.m. of any one day and 7:00 a.m. of the following day in such a manner that a reasonable person of normal sensitivity residing in the area would feel discomfort or annoyance unless a permit has been obtained from the City Manager or his/her designee (City of Benicia, 2013). This Municipal Code section would not apply to the Project as construction activities would take place more than 2,000 feet from the nearest residential zones. Therefore, there are no standards established in the local general plan or noise ordinance that would be applicable to construction noise that would be associated with the Project.

4.10.2.4 Project Baseline

Baseline conditions for this noise analysis reflect pre-Project conditions at the existing Refinery in February 2013, when ambient noise levels represented by the long-term noise measurements were collected. The baseline conditions include residences that would be as close as 2,100 feet to the north of the new unloading tracks on the Project site.

4.10.3 Significance Criteria

Based on California Environmental Quality Act (CEQA) Guidelines Appendix G, a project would cause adverse noise impacts if it would result in:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

b) Exposure of persons to or generation of, excessive ground borne vibration or ground borne noise levels;

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels; or

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.

4.10.3.1 Approach to Analysis

The significance of Project-related noise impacts were determined based on the following specific significance thresholds.

Short-Term Construction Noise Impacts

Short-term maximum construction-related noise levels have been estimated for the Project based on the types of equipment that would be required to construct the Project. It is assumed that Project-related construction activities would occur at all hours. Although the City's noise level performance standards are technically not applicable to short-term construction activities, for a conservative analysis, Project-related construction noise levels that would exceed the City's outdoor nighttime noise level performance standard of 50 dBA at the closest residences would be considered substantial, and would result in a significant impact (see Table 4.10-2). If nighttime noise levels already exceed the City performance standard, an increase of 3 dBA or more at a sensitive receptor location would be considered significant.

Long-Term Operational Noise Impacts

A noise assessment was conducted for Valero by Wilson, Ihrig &Associates to evaluate noise level increases at noise sensitive uses in the vicinity of the Refinery due to the train trips and operations of pumps that would be associated with the Project (Wilson, Ihrig & Associates, 2013). This assessment was reviewed by the City's environmental consultant, Environmental Science Associates (ESA), and was found to be technically accurate with the exception of the distance used to estimate unloading rack pump and train trip noise levels at the closest residences along Lansing Circle. The noise assessment utilized preliminary Project siting information. The noise assessment estimated a distance of 2,700 feet to the closest residence. Utilizing Google Maps and a review of aerial photos with respect to the proposed site plan (see Figure 3-3) ESA estimates that the closest residence on Lansing Circle would be approximately 2,100 feet from the closest portion of the proposed unloading tracks and approximately 2,250 feet from the closest portion of the proposed unloading racks. Therefore, using the same methods as the noise assessment, ESA made adjustments to the pump and train trip noise values to reflect the actual distances from the closest Project component locations to the residences on Lansing Circle. In addition, to address concerns expressed by one commenter during the Initial Study comment period, ESA conducted an additional analysis to assess worst case Project-related horn noise impacts at the nearest residences to the Park Road railroad crossing.

To assess changes in the ambient noise environment due to the Project, the following significance criteria take into account both the absolute change in noise levels due to the Project and the relationship between the resultant noise level and the City's noise level performance standards. Operational noise generated by the Project would cause a significant impact if it would cause ambient noise levels that already exceed the City's noise performance standards summarized in Table 4.10-2 to increase by 3 dBA or more at a sensitive receptor location; or if it would generate an increase in ambient noise 5 dBA or greater at a sensitive receptor location where the resulting noise level would remain below the City's performance standards.

Vibration Impacts

Maximum construction-related vibration levels have been estimated for the Project based on the types of equipment that would be required to construct the Project. A numerical threshold to identify the point at which a vibration impact occurs has not been identified by City standards or codes. Thus, the Project would be considered to result in a significant construction vibration impact if buildings or sensitive individuals would be exposed vibration levels equivalent to or higher than the California Department of Transportation (Caltrans) PPV vibration threshold level of 0.2 inches per second (in/sec) (Caltrans, 2004). This PPV level has been found to be annoying to people in buildings and can pose a risk of architectural damage to buildings.

For operational train-related vibration, a qualitative analysis was conducted using the Federal Transit Authority (FTA) screening assessment for residential locations. The vibration screening assessment indicates that residences within 200 feet of a conventional commuter railroad or a rapid transit railroad could experience adverse vibration impacts (FTA, 2006). For the Project, locomotive and railcar speeds in the Project area would be substantially less than those that would be associated with conventional commuter and rapid transit trains; therefore, although crude tank cars may be heavier than transit railcars, this screening distance is appropriate to assess the significance of potential tank car vibration impacts.

4.10.4 Discussion of No Noise Impacts

Review and comparison of the setting circumstances and Project characteristics with the significance criteria stated above, clearly show that no impact would result related to criterion a), associated with construction noise, and related to the criteria e) and f) for both construction and operations, including operation of the new equipment at the Refinery and the incremental increase in train noise from four additional train trips. The following discusses the reasoning to support this conclusion:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Construction

The City of Benicia General Plan does not contain standards or policies that are applicable to construction noise. However, as discussed above, Section 8.20.150 of the Benicia Municipal Code prohibits construction activities within any residential zone, or within a radius of 500 feet from a residential zone between the nighttime hours of 10:00 p.m. of any one day and 7:00 a.m. of the following day (City of Benicia, 2013). This Municipal Code section would not apply to the Project because construction activities would take place more than 2,000 feet from the nearest residential zones. As a result, there are no standards established by the City of Benicia related to construction noise that would be applicable to construction of the Project; and therefore, construction activities would result in no impact associated with exceeding local general plan or municipal code standards.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

The Project is not located within 2 miles of a public airport. Therefore, there would be no impact associated with this criterion.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.

The Project is not located within the vicinity of a private airstrip. Therefore, there would be no impact associated with this criterion.

4.10.5 Discussion of Impacts and Mitigation Measures

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Impact 4.10-1: Operation and maintenance of the Project could result in exposure of persons to noise levels in excess of standards established by the City of Benicia. (*Less than Significant*)

The Project would result in four additional daily train trips along the Union Pacific main line from Roseville to the Refinery. The incremental increase in train noise caused by four additional trains is an indirect impact of the Project. Train noise could potentially impact sensitive receptors along the route from Roseville to the Refinery. The analysis of indirect noise impacts from trains herein considers impacts in the City of Benicia in detail. Indirect impacts outside the City are considered in general terms.

The noise performance standards established by the *City of Benicia General Plan* listed in Table 4.10-2 are directly applicable to operation of the Project. Noise associated with operation of the Project would primarily be related to movement of tank cars and operation of the unloading rack pumps. Based on the noise assessment conducted for the Project and adjustments made by ESA to account for the corrected distances of the proposed unloading tracks and racks to the nearest residence (i.e., 2,100 feet and 2,250 feet, respectively), the unloading rack pumps and the tank car movements would generate worst-case maximum noise levels of up to 23 dBA and 60 dBA, respectively, at the nearest residence at Lansing Circle. These noise levels equate to hourly average L_{eq} levels of 3 dBA for unloading rack pump noise and 33 dBA for train movement noise (Wilson, Ihrig & Associates, 2013; and ESA, 2014), which would not exceed the City's nighttime hourly L_{eq} limit of 50 dBA.

An additional source of Project-related noise would be locomotive horn noise associated with trains that would approach the Park Road railroad crossing. Assuming a reference horn noise level of 110 dBA at 100 feet (USGPO, 2014), the maximum instantaneous horn noise that would be associated with trains approaching Park Road at the nearest residences approximately

3,400 feet to the southwest would be approximately 62 dBA. Given that train horns would only sound for up to 25 seconds as the locomotive would approach the road crossing (FRA, 2014), the hourly L_{eq} would be approximately 40 dBA, and would not exceed the City's nighttime hourly L_{eq} limit of 50 dBA.

The existing average hourly L_{eq} noise levels for day, evening, and nighttime hours at the nearest residences to the Project site range between 51 dBA and 56 dBA. Therefore, although tank car movements at the Refinery and train horn soundings would be audible at the nearest residence locations, the associated noise levels would not exceed City standards and would be less than ambient hourly average noise levels measured in the Project area (see Table 4.10-1). The associated impact would be less than significant. It should be noted that east of Park Road the mainline railroad tracks within the City of Benicia are in an industrial area with no noise-sensitive receptors in the vicinity. Therefore, Project-related train noise outside of the Refinery along the mainline railroad tracks within the City of Benicia would result in less than significant impacts.

The project-generated four additional daily train trips along the Union Pacific main line would also have indirect noise impacts in other communities outside of Benicia. These communities would include Fairfield, Dixon, Davis, West Sacramento, and Sacramento. Receptors within the City of Fairfield are as close as 50 feet from the rail line. These additional rail trips would represent an increase of less than 10% of existing rail operations and would therefore be less than a doubling of sound energy associated with a 3 dBA increase in noise levels. Consequently, cumulative rail noise increases at other communities would also be less than significant.

---

b) Exposure of persons to or generation of, excessive ground borne vibration or ground borne noise levels.

Impact 4.10-2: The Project would result in the generation of ground borne vibration. (*Less than Significant*)

Construction

Some types of construction equipment can produce vibration levels that can cause architectural damage to structures and be annoying to nearby sensitive receptors. Vibration levels generated during construction of the Project would vary during the construction period, depending upon the construction activity and the types of construction equipment used. Typical PPV vibration levels at various distances for the construction equipment type that would generally result in the highest vibration levels (i.e., large bulldozers) are presented in Table 4.10-3.

Given that the nearest residences to any Project-related construction equipment would be at distances of over 2,000 feet, construction equipment PPV levels would be substantially less than the 0.20 in/sec significance threshold. Therefore, short-term construction-related vibration impacts would be less than significant.

TABLE 4.10-3
VIBRATION SOURCE LEVELS FROM CONSTRUCTION EQUIPMENT

Distance (feet)	Peak Particle Velocity (in/sec)
	Large Bulldozer
15	0.191
25	0.089
50	0.031
75	0.017
100	0.011
150	0.006

SOURCE: FTA, 2006.

Operations and Maintenance

Operation and maintenance of the Project would increase the daily number of trains accessing the Project site, which would produce groundborne vibration in the immediate area of the railroad. However, given that the nearest residences to any portion of the proposed new unloading track would be at distances that would easily exceed the FTA's railroad vibration screening distance of 200 feet for residences (FTA, 2006), vibration impacts from the proposed new unloading rails would be less than significant. The proposed addition of two trains per day along the mainline tracks would increase the frequency of trains, but would not increase the peak vibration levels along the railroad because freight trains already pass along the mainline track. Therefore, impacts from vibration on the mainline track would be less than significant.

---

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

Impact 4.10-3: Operation of the Project could result in exposure of persons to a permanent increase in ambient noise levels. (*Less than Significant*)

As described above in Impact 4.10-1, although tank car movements and train horn soundings would be audible at the nearest residences, the associated noise levels would be less than the ambient hourly average noise levels measured in the Project area during both daytime and nighttime hours (Wilson, Ihrig & Associates, 2013). Therefore, the Project would not result in a substantial permanent increase in ambient noise levels above levels existing without the Project. The associated impact would be less than significant.

---

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Impact 4.10-4: Construction of the Project would not result in a substantial temporary or periodic increase in ambient noise levels. (*Less than Significant*)

Project-related construction activities would result in temporary increases in noise levels in the Project area. Construction of the Project would begin in 2014 and last approximately 25 weeks. It would include installation of a new tank car unloading rack within the Refinery, modifications to the existing Refinery rail infrastructure, and construction of a new aboveground pipeline within the Refinery. It is estimated that construction of these Project components would require the use of the types of construction equipment presented in Table 4.10-4. As indicated in the table, the maximum average noise levels of the individual pieces of construction equipment would be as high as 88 dBA at 50 feet (FTA, 2006). Assuming that two of the loudest pieces of construction equipment would operate at the same location simultaneously, the combined maximum construction noise level would be up to 91 dBA at 50 feet.

TABLE 4.10-4
TYPICAL MAXIMUM NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, L_{eq} at 50 feet)
Backhoe	80
Flatbed Truck	88
Air Compressor	81
Dozer	85
Air Compressor	85
Grader	85
Front End Loader	85
Water Trucks	88
Cranes	83
Concrete Trucks	88

SOURCE: FTA, 2006.

As discussed above, the closest sensitive receptors to the Project would be residences off Lansing Circle, approximately 2,100 feet northwest of the northern extent of the new unloading tracks on the Project site. At this distance, it is estimated that the combined maximum construction noise level would be attenuated to approximately 45 dBA (ESA, 2014), which would not exceed the City's nighttime hourly L_{eq} limit of 50 dBA, and would be less than the hourly average nighttime ambient noise levels measured in the Project area (see Table 4.10-1). As a result, this impact would be less than significant.

4.11 Transportation and Traffic

4.11.1 Introduction

This Section considers whether any traffic delays caused by the Project, as compared to existing conditions, would amount to a significant impact. Under existing conditions, freight trains cross Park Road each day. Each train crossing impedes the flow of traffic across Park Road to some degree. In addition, long train crossings create extended vehicle queues that can impede traffic at the five nearby study intersections, the I-680 freeway Bayshore Road off-ramp, and the I-680 freeway itself. Train crossings can also impede emergency vehicles such as ambulances, fire trucks, and police cars. Lastly, the Project could have indirect effects on other at-grade crossings along the rail line between the Refinery and Roseville.

The Project would add four train crossings per day -- two “loaded” trains inbound to the Refinery and two “empty” trains outbound from the Refinery. Each crossing would last approximately eight minutes. The crossings will be scheduled to avoid the hours of 6:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Thus, up to four times per day, the Project could increase the time that it takes drivers to cross Park Road, pass through one of the 5 study intersections, and/or travel on the I-680 freeway and its off-ramp near the Bayshore Road exit. The train crossings could also potentially delay emergency vehicles such as ambulances, fire trucks, and police cars.

While the Project would add approximately 20 new permanent employees (four crews of five employees), spread among different work shifts and on different days, these new employees would add very few vehicle trips during peak traffic hours. Truck traffic associated with the Refinery operations would not change as a result of the Project. Thus, the analysis herein focuses on the impacts of train crossings rather than the small amount of new vehicle trips.

The analysis considers the existing conditions, existing-plus-project conditions, and cumulative conditions (without and with the project) in 2035. The analysis is based on 2013 traffic counts, and a projected growth rate of 1.5 percent per year. This growth rate is similar to that used in the *Benicia Business Park EIR*) to derive cumulative 2035 traffic volumes.

The analysis is based on the Transportation Impact Analysis Report prepared by Fehr and Peers in October 2013 (“Traffic Study”), and additional analysis by City staff, the EIR consultant, and Fehr and Peers. The analysis applies the relevant policies and objectives of the *City of Benicia General Plan* Circulation Element and the Congestion Management Program (CMP) of the Solano Transportation Authority (STA).

4.11.2 Setting

4.11.2.1 Current Conditions

Existing Roadway Network

Regional access to the Project site is provided primarily from Interstate 680 (I-680), while local access is provided via Park Road, Bayshore Road, and Industrial Way.

Interstate 680

I-680 is a four-lane, north-south freeway in the Project vicinity. From the Benicia-Martinez Bridge, I-680 extends north to Interstate 80 (I-80) in Cordelia. Limited access interchanges are located at Bayshore Road (northbound off-ramp and southbound on-ramp only) and Industrial Way (northbound on-ramp and southbound off-ramp only).

Bayshore Road

Bayshore Road is a two-lane road that connects the Refinery to the industrial port area along the southeastern edge of the City of Benicia, following the Suisun Bay shoreline; a partial interchange with I-680 provides access to and from the south.

Park Road

Park Road is a two-lane road that connects the industrial port area along the southeastern edge of the City of Benicia to the industrial areas to the northeast. Park Road serves as the connection between the split interchange ramps at Industrial Way (southbound off-ramp and northbound on-ramp) and Bayshore Road (southbound on-ramp and northbound off-ramp). It intersects the existing Union Pacific Railroad (UPRR) track at an at-grade railroad crossing located just east of Bayshore Road.

Industrial Way

Industrial Way is a two-lane road that loops through the industrial area where the Refinery is situated, providing access to numerous industrial parcels either directly or via connections with local streets; a partial interchange with I-680 provides access to and from the north.

Existing Alternative Transportation

Pedestrian and Bicycle Facilities

The study area lacks substantial pedestrian facilities (sidewalks are not provided along any of the roads), which is typical of industrial areas.[1] No designated bicycle facilities are currently provided within the study area, although the *City of Benicia General Plan* includes a planned Class III bike route along Park Road southwest of Industrial Way.[2]

Public Transit

Fairfield and Suisun Transit (FAST) operates an express intercity route—Route 40—that connects the City of Vacaville to the Bay Area Rapid Transit (BART) station in the City of Walnut Creek. Route 40 has one stop in each direction at the intersection of Park Road and Industrial Way. From here, the northbound route continues via I-680 to the City of Fairfield, and the southbound route continues via I-680 to the Pleasant Hill BART Station; both utilize the I-680 interchanges at Industrial Way and Bayshore Road. The City of Benicia proposes to build the Benicia Industrial Park Bus Hub at the intersection of Park Road and Industrial Way (City of Benicia, 2013). The facility would accommodate up to 50 parking spaces and other transit-related

1 Although new sidewalks would not extend to Bayshore Road, the City of Benicia has plans to install sidewalks on Park Road adjacent to a Bus Hub facility proposed at the Park Road / Industrial Way intersection.

2 Class III bike routes are signed routes where bicycle share the roadways with vehicular traffic; no separate right-of-way is provided for bicyclists.

amenities (e.g., bicycle storage area, and space for "kiss and ride"); the existing on-street bus stops for Route 40 would be improved with designated bus pull-out areas, new sidewalks and covered benches.

4.11.2.2 Regulatory Setting

Solano County

The Solano Transportation Authority (STA) operates as the Congestion Management Agency (CMA) for Solano County. One of the CMA's responsibilities is to analyze the impacts of local land use decisions on the regional transportation system (the Congestion Management Program [CMP] system). The Solano County CMA comments on environmental impact reports prepared for proposed land use development projects, and requires that analysis of CMP system facilities be performed with the STA travel demand model. If a proposed project is projected to cause a segment of the CMP system to deteriorate below the adopted LOS standard, a deficiency plan must be prepared to provide mitigation for that impact. The CMA's adopted LOS standard is LOS E for roadways and freeways in the CMP system.

There are no CMP local roads (i.e., non-freeways) in the immediate vicinity of the Project site; the only CMP local roads are Military East and Military West, which are southwest of I-780.

City of Benicia

The *City of Benicia General Plan* contains goals, policies, and programs intended to facilitate the movement of people and goods throughout the city. The following General Plan goals and are relevant to the Project.

> **Goal 2.20:** Provide a balanced street system to serve automobiles, pedestrians, bicycles, and transit, balancing vehicle-flow improvements with multi-modal considerations.
>
> > ***Policy 2.20.1*:** Maintain at least Level of Service D on all city roads, street segments, and intersections.
>
> **Goal 2.24:** Continue to provide safe and direct access to the Industrial Park.
>
> > ***Policy 2.24.1*:** Continue to ensure public access to private roads in the industrial and Port areas.

4.11.2.3 Project Baseline

For purposes of analyzing the Project's impacts on traffic congestion, this analysis uses a baseline of August 13, 2013, the day that the City issued the Notice of Preparation. The baseline conditions presumed to exist as of that date are described in detail in Section 2.0 of the Traffic Study. Under existing conditions, sporadic rail crossings degrade the level of service from A to D or F at the five study intersections.

4.11.3 Significance Criteria

California Environmental Quality Act (CEQA) Guidelines Appendix G, states that a project would have a significant impact on transportation conditions if it would:

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);

e) Result in inadequate emergency access; or

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

4.11.3.1 Approach to Analysis

Most traffic analyses prepared by the City involve projects that add new vehicle trips to the existing roadway system. The Project here, however, involves a different scenario: the Project would add new freight train crossings rather than any significant new vehicle trips to the system. The train crossing scenario here is different from the standard scenario in two key respects.

First, in the standard scenario, the peak traffic volumes occur regularly, once or perhaps twice a day, at the same time or times of day – usually in the morning and/or late afternoon/early evening when commuters travel to and from work. In contrast, freight train crossings at Park Road are sporadic. The same freight trains do not cross Park Road every day. In fact, during seven days of videotaping in April 2013, the total number of daily train crossings varied widely, from four to 18 each day. In addition, trains do not cross at the same time of day. The videotaped crossings occurred at various times between 9:30 AM and 7:15 PM, but did not reveal any pattern, other than there were no crossings observed during the AM peak traffic period. The duration of each crossing varied widely, from 40 seconds to 16 minutes, 17 seconds.

Second, unlike the standard scenario, the Project is in an industrial area. Any driver that crosses Park Road or travels through one of the study intersections is traveling to or from some industrial use – either the Refinery or some other business in the adjacent Benicia Industrial Park. These industrial uses rely on the railroad to transport both raw materials and finished products to and from their facilities. Thus, unlike commuters traveling to and from work in commercial and residential areas, drivers that travel in the industrial area have an expectation that train crossings

will, occasionally, result in delays that can be, in some cases, somewhat lengthy. This analysis takes into account the industrial character of the area because, under CEQA, the significance of an impact varies with the setting. An impact that might be significant in one setting may not be considered significant in another setting.

Because of the differences between the standard scenario and the situation here, the approach used herein is, necessarily, a modified form of the standard approach. Pursuant to General Plan Policy 2.20.1, the analysis assumes that a Project impact on traffic would be significant if it would cause an intersection to degrade below LOS D. As in the standard approach, the analysis compares the peak traffic volume under baseline conditions with the peak traffic volume under baseline-plus-project conditions. Unlike the standard approach, however, neither the baseline peak nor the baseline-plus-project peak occurs at a particular time of day. Rather, the analysis compares the longest train crossing under baseline conditions with the longest train crossing under baseline-plus-project conditions. Other things being equal, the longest train crossing creates the longest queues and therefore the longest delays at nearby intersections and on the freeway off-ramp (and possibly on the freeway mainline). Therefore, the "peak" is not a time of day, but rather the longest train that crosses, regardless of the time of day.

If the Project were approved, Valero would ask Union Pacific to schedule Valero's unit trains so that none of them cross Park Road during the weekday commute hours of 6:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Thus, the analysis focuses on baseline conditions and baseline-plus-project conditions outside of those time periods. The analysis uses conditions measured and projected during the 2:45 to 3:45 PM hour, (as representative of conditions from 9:00 AM to 4:00 PM and 6:00 to 7:00 PM) and the 9:00 to 10:00 PM hour (as representative of conditions from 7:00 PM to 6:00 AM).

In light of the forgoing, this analysis assumes that the Project would have a significant impact if the Project's additional train crossings during the designated study hours would:

- Cause any intersection's operations to degrade from LOS D or better to LOS E or F;
- Substantially increase delays at an intersection that currently operates at LOS E or F; or
- Increase the average vehicle delay by one second or more at a train crossing that currently operates at LOS F (or by two seconds or more at a train crossing that currently operates at LOS E).

4.11.4 Discussion of No Transportation and Traffic Impacts

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.

The Project would not involve aircraft, would not be near an airport, nor would the Project construct anything that would intrude into aircraft flight paths or air traffic spaces. Therefore, the Project would have no impact on air traffic patterns.

4.11.5 Discussion of Impacts and Mitigation Measures

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.

Impact 4.11-1: The Project would not cause intersection operations to degrade to worse than LOS D, would not cause a substantial increase in traffic volumes at intersections already operating at LOS F with the Project, would not cause a substantial increase in average vehicle delay a train crossings, and would not cause an increase in the queue length caused by trains crossing Park Road that substantially impedes other traffic (such as traffic on the I-680 mainline, or at an adjacent upstream intersection wherein traffic not destined over the Park Road crossing is unable to continue along the travel way). (*Less than Significant*)

Existing Train Crossings

The City of Benicia serves as the terminus for what is commonly referred to as the Overland Route for UPRR. The Refinery is served by a spur off the Overland Route mainline that runs between the industrial port area along the southeastern edge of the City of Benicia and the Refinery itself, terminating north of Park Road. This spur features an at-grade crossing at Park Road, east of Bayshore Road. The spur also serves the industrial areas northeast of the Refinery. Switching activity between tracks typically occurs just south of the Park Road at-grade railroad crossing. The Park Road crossing is controlled by two gates and mast-mounted flashing lights.

Train crossing counts (using video cameras placed adjacent to the at-grade crossings) were collected at the Park Road at-grade crossing in addition to the at-grade crossing at the Iron Workers Union Driveway 700 feet southeast of Park Road, for the week of Monday, April l5 through Sunday, April 21, 2013 (see results of the counts Table 4.11-1). The reason for there being a higher number of train crossings at Park Road than at the Iron Workers Union driveway is because the majority of switching activity between tracks serving the Refinery and tracks serving other industrial areas northeast of the Refinery occur on the segment just south of Park Road and north of the Iron Workers Union Driveway. It is common for UPRR trains to access the Refinery, then exit the Refinery, cross Park Road, perform the track switching, and cross Park Road again to access the other industrial areas northeast of the Refinery, and vice versa.

The back and forth seen with current daytime switching operations is required for UPRR to “cut” the train into the various segments needed within the Refinery and then over on the Industrial Way siding. UPRR pulls out onto Park Road to get the tail end of the train ahead of the switch needed to redirect the train to the Industrial way siding.[3]

[3] Such a switching operation would not occur for Project trains because the first half of 50 railcars would be led by a locomotive, and the last half would be pushed by one (called “buried power”). The train would be “cut” in the middle all within the Refinery as the two 25-car segments are aligned at the rack. No back and forth across Park Road would be required for this operation.

TABLE 4.11-1
EXISTING AT-GRADE RAIL OPERATIONS

Attribute	Park Road At-Grade Crossing	Iron Workers Union Driveway At-Grade Crossing
Range of Crossings Per Day	4 - 18	4 - 6
Weekdays		
Average Crossings Per Day	10	5
Average Crossing Duration	02:50	03:15
Average Number of Railcars Per Day	95	69
Average Number of Railcars Per Crossing	10	15
Range of Number of Railcars Per Crossing	2 - 35	2 - 43
Maximum Observed Crossing Duration	16:17	24:50
Percent of Crossings With Duration Under 5 Minutes	86%	87%
Weekends		
Average Crossings Per Day	7	5
Average Crossing Duration	01:42	00:18
Average Number of Railcars Per Day	45	40
Average Number of Railcars Per Crossing	7	8
Range of Number of Railcars Per Crossing	2 - 18	2 - 18
Maximum Observed Crossing Duration	05:56	03:21
Percent of Crossings With Duration Under 5 Minutes	92%	100%

SOURCE: Fehr & Peers, 2013.

The week-long videotaped train crossings at both at-grade intersections occurred at various times between 9:00 AM and 7:30 PM on weekdays, and between 12:00 Noon and 6:30 PM on weekends, not revealing any pattern, other than there were no crossings observed during the AM peak traffic period. An average of 10 train crossings totaling 95 railcars during the weekdays were observed on Park Road, with the average crossing duration estimated at 2 minutes and 50 seconds. About 86 percent of all crossings on Park Road had a duration of less than 5 minutes. The majority of train crossings on Park Road had a duration of typically less than 2 minutes, though a maximum crossing duration was observed at 16 minutes and 17 seconds on Wednesday, April 17, 2013 around 2:00 PM, and the shortest crossing duration was observed at 40 seconds on Friday, April 19, 2013 around 10:45 AM.

Similarly, the majority of train crossings on the Iron Workers Union Driveway had a duration of less than 2 minutes, though a maximum crossing duration was observed at 24 minutes and 50 seconds on Wednesday, April 17, 2013 around 2:00 PM, and a shortest crossing duration of less than 15 seconds multiple times. The average number of train crossings and duration of each crossing is generally lower on weekends compared to weekdays.

Existing Intersection Level of Service Operations

The highest traffic volumes at area intersections generally occur during the weekday AM peak hour (7:15 to 8:15 AM) and the PM peak hour (4:15 to 5:15 PM). The evaluation of intersection level of service conditions without and with existing train crossings at Park Road focused on weekday off-peak hours at the intersections of Park Road / Bayshore Road and Bayshore Road / I-680 Northbound Off-Ramp, specifically the 2:45 PM to 3:45 PM hour (representative of conditions from 9:00 AM to 4:00 PM and 6:00 PM to 7:00 PM) and the 9:00 PM to 10:00 PM hour (representative of conditions from 7:00 PM to 6:00 AM). Detailed LOS calculations were completed only for the 2:45 PM to 3:45 PM hour, however, because hourly volumes between 9:00 PM and 10:00 PM are about 90 percent lower than the AM peak hour (i.e., too low to require detailed evaluation in order to draw conclusions about acceptable operating LOS).

As shown in Table 4.11-2, the study intersections currently operate at acceptable service levels (LOS A) during off-peak hours when no train crossing occurs at Park Road. However, if a train crossing with a duration of about 12 minutes occurs, then the intersection service levels degrade to LOS F, and vehicle queues extend upstream on Park Road to Industrial Way, and on Park Road – Bayshore Road to (and onto) the I-680 Northbound Off-Ramp (but do not extend onto the I-680 mainline). If a train crossing occurs during the AM or PM peak traffic hours, then drivers experience LOS F conditions as well. Nighttime traffic volumes are low enough to avoid unacceptable LOS conditions if a train crossing occurs.

TABLE 4.11-2
EXISTING OFF-PEAK HOUR INTERSECTION LEVEL OF SERVICE (LOS)

Intersection	Traffic Control	Without Train Crossing		With Train Crossing	
		Delay	LOS[a]	Delay	LOS[a]
Park Road / Bayshore Road	All-Way stop	6 sec.	A	236 sec.	F
Bayshore Road / I-680 Northbound Off-Ramp	Side-Street stop	10 sec.	A	212 sec.	F

[a] Level of service at all-way stop-controlled intersections represent overall intersection conditions; level of service at side-street stop-control intersections represent the turning movement with the worst condition.

SOURCE: Fehr and Peers, 2013.

Existing-Plus-Project Conditions

If the Project were approved and became operational, four additional trains would cross Park Road each day. As explained in Section 3.4.3.1, the trains would be scheduled so that none of them cross Park Road during the commute hours of 6:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Each train would carry 50 railcars, and each railcar would be about 60 feet long. Each locomotive would be about 60-70 feet long with the typical length of all the locomotives about 200 feet long. The trains would cross Park Road at an average speed of 5 mph. A minimum headway (interval) of 12 hours would occur between Project train deliveries. All switching activity between tracks would occur within the Refinery site north of Park Road.

A train with 200 feet of locomotives and 50 railcars in length would take about 7.3 minutes to cross Park Road at a speed of 5 mph. The at-grade crossing traffic controls provide a 30-second buffer time before and after each train crossing on Park Road. Therefore, each 50-railcar train delivery would block traffic on Park Road for approximately 8.3 minutes. The estimated blockage time on Park Road due to the Project is less than some other existing observed train crossings. The April 2013 maximum observed train crossing duration was 16 minutes and 17 seconds, which is nearly double the blockage time of the train crossings due to the Project.

The off-peak hours of 2:45 – 3:45 PM and 9:00 – 10:00 PM were evaluated assuming a 50-railcar train crossing at Park Road. During the hour of 2:45 – 3:45 PM (representing 9:00 AM – 4:00 PM and 6:00 PM - 7:00 PM), a Project-related train would generate queues on the west side of the tracks that could extend back onto Bayshore Road and affect the operations of the I-680 ramp-terminal intersections, but would not extend back onto the I-680 mainline. Queues on the east side of the tracks would be contained within the Park Road segment between the tracks and Industrial Way, affecting access to and from Refinery driveways and the U-Store-It driveway. The segment of Park Road between the at-grade railroad crossing and Industrial Way provides a two-way left-turn lane (TWLTL), and because the great majority of westbound traffic approaching Bayshore Road on Park Road turns left, those drivers would be expected to use the TWLTL as a queue storage lane, and other westbound drivers would use the through lane as a means to turn right into the Refinery (or as a queue storage lane if they intend to go straight on Park Road or to turn right onto Bayshore Road).

Traffic volumes from 9:00 PM – 10:00 PM hour (representing 7:00 PM to 6:00 AM), are much lower within the study area compared to the peak traffic periods. A Project-related train crossing would not create any queues longer than four vehicles. These queues would be contained within the provided intersection storage capacity at Park Road / Bayshore Road.

The change in average vehicle delay at the Park Road crossing associated with the 8.3-minute duration when the Project's trains would block traffic at that crossing was evaluated by dividing the total vehicle delay caused by the project trains passing over Park Road by the number of vehicles on Park Road passing over the crossing in an hour. The 8.3-minute train crossing (i.e., 500 seconds) divided by the approximate 640 vehicles on Park Road during the AM peak hour equates to an average vehicle delay of about 0.8 second per vehicle.

Cumulative Conditions

A 1.5 percent per year growth rate was applied to existing traffic volumes, which is similar to the 1.6 percent per year rate used in the *Benicia Business Park EIR* for the period between 2006 and 2030. It is noted that according to 2006 and 2013 count data collected at the intersection of Park Road / Bayshore Road, traffic volumes have not increased during the seven-year period, potentially due to the recent economic downturn.

Under cumulative volume conditions, vehicle queues associated with the 50-railcar crossing again would extend back onto the northbound I-680 off-ramp, but not onto the I-680 mainline. Queues also would extend back to the Park Road / Refinery Driveway, but would not reach Industrial Way. Traffic volumes in the evenings and late nights are much lower within the study area compared to the

peak traffic periods. During the 9:00 – 10:00 PM hour, the resulting queues during a train crossing would be no longer than five vehicles. Although the proposed 50-railcar train crossing would block Park Road for over 8 minutes, the resulting queues would be contained within the provided intersection storage capacity at Park Road / Bayshore Road during the 9:00 – 10:00 PM hour.

Project train crossings occurring during the 9:00 AM – 7:00 PM period would generate queues on the west side of the tracks that would extend back onto Bayshore Road and affect the operations of the I-680 ramp-terminal intersections, but would not extend back onto the I-680 mainline. Queues on the east side of the tracks would be contained within the Park Road segment between the tracks and Industrial Way, affecting access to and from Refinery driveways and the U-Store-It driveway. As described above, the segment of Park Road between the at-grade railroad crossing and Industrial Way provides a TWLTL, and because the great majority of westbound traffic approaching Bayshore Road on Park Road turns left, those drivers would be expected to use the TWLTL as a queue storage lane, and other westbound drivers would use the through lane as a means to turn right into the Refinery (or as a queue storage lane if they intend to go straight on Park Road or to turn right onto Bayshore Road).

As described above, an 8.3-minute delay (road blockage) would increase the average vehicle delay in an hour by less than one second per vehicle.

If the proposed train crossings occur during the 7:00 PM – 6:00 AM period, resulting queues on the west side and east side of the tracks would not exceed the provided storage capacity, and would not extend back and affect the operations of other study intersections.

Project Impacts

The Project’s freight train crossings would not degrade any intersection currently operating at LOS D or better to a level worse than LOS D. Under existing baseline conditions, the longest daily train degrades the level of service at each study intersection from LOS A to LOS F, and vehicle queues extend upstream on Park Road to Industrial Way, and on Park Road – Bayshore Road to (and onto) the I-680 Northbound Off-Ramp. Under baseline-plus-project conditions, the longest train would have the same effect. Therefore, there would be no change to the peak daily episode of delay.

The Project’s freight train crossings would not increase the length of delay at any intersection that currently operates at LOS E or F. Under existing baseline conditions, the longest daily train is longer than Valero’s unit trains. Therefore, the delay caused by each Valero unit train at each intersection would be less than the delay caused by the longest daily train under current conditions.

In addition, the 8.3-minute Project train crossing would increase the average vehicle delay in an hour by about 0.8 second, which is less than the one-second threshold of significance when the train crossing currently operates at LOS F. This is considered a less-than-significant impact.

In addition to impacts caused by Project-generated crossings of Park Road, there would be indirect Project impacts at the at-grade crossings elsewhere along the rail line between the Refinery and the Roseville Yard. Using Google Earth aerials, other than Park Road, there are 24 at-grade crossings of

public roadways (6 of which are in urban areas), plus 9 at-grade crossings of private roads (all in rural areas). Although Project trains would increase the frequency of trains crossing these roads by four crossings per day, the number generally would fall within the range of crossings per day under existing conditions, and therefore, for the following reasons, the Project's impact on the 33 above-noted at-grade crossings would be less than significant: (1) traffic volumes at all but the 6 crossings of public roads in urban areas most-likely are low, and (2) the duration of the crossing would be short because Project trains would be travelling at a speeds faster than the 5 mph at Park Road (and generally would fall within the range of durations of crossings by other trains under existing conditions.

---

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.

Impact 4.11-2: The Project would not conflict with the Solano County Congestion Management Program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways. (*Less than Significant*)

As described above, the Project would generate very few new vehicle trips on area roadways during peak traffic hours (except for the potential for temporary and intermittent traffic generated during Project construction), as the new permanent employees (four crews of five employees) would be spread among different work shifts and on different days. In addition, the increase in peak-hour traffic would be minimal on any one road, being spread over different roads and highways that provide access to and from the Project site. Lastly, vehicle queues caused by train crossings on Park Road (current and future) would not affect any roads or highways on the Solano County Congestion Management Program (CMP) network.

---

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

Impact 4.11-3: The Project would not substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment), or due to the proposed increased frequency/length of train crossings. (*Less than Significant*)

The Federal Railroad Administration (FRA) provided collision history data for the Park Road at-grade crossing. According to the FRA, the last reported collision at the Park Road at-grade crossing was in April 1995 when a train collided with a truck.

Neither Project construction nor Project operations would alter the physical configuration of the existing roadway network serving the area (or outside the Project area), and would not introduce unsafe design features. The Project also would not introduce uses that are incompatible with existing uses already served by the road system that serves the Project area (or outside the Project

area). As described under Impact 4.11-1, the Project would have a less-than-significant impact on traffic LOS and on impedance to traffic flow caused by backups during train crossings. Therefore, in sum, the Project would have a less-than-significant traffic hazard impact.

---

e) Result in inadequate emergency access.

Impact 4.11-4: The Project would not result in inadequate emergency access. (*Less than Significant with Mitigation*)

The Benicia Fire Department has a response time goal of 7 minutes for all emergency calls, 90 percent of the time, and they routinely achieve that goal. According to the 2012 data, the average response time within the entire City was about 5.2 minutes (2,099 total incidents), and the average response time to the Park Road / Bayshore Road area was about 6.6 minutes (27 total incidents). The City of Benicia Fire Department also has a contract with the Solano County Emergency Medical Service Authority to provide an advance life support staffed engine to all emergency medical calls within 7 minutes from the time the station is received in Benicia Dispatch.

Although the Project would increase the train frequency within the study area by four train crossings per day (two trips into the Refinery and two trips out of the Refinery), the proposed crossing duration of each Project train trip would be lower than train crossing durations that already exist today without the Project. The proposed increased crossing frequency is within the current range of crossing variability. According to the 2012 emergency response data provided by the Fire Department, an average of about two emergency incidents a month occurred along the industrial areas of Park Road and Bayshore Road. The probability of an emergency incident occurring at the same time as a Project train crossing is low. It is unlikely that the Project would cause the average emergency vehicle response time to increase to over 7 minutes for the Park Road and Bayshore Road industrial areas. However, the following measures would minimize potential Project impacts in regards to emergency vehicle access:

Mitigation Measure 4.11-4:

- Coordinate with the City of Benicia Fire Department to finalize the City of Benicia Fire Department/Valero Benicia Refinery Fire Department Operation Aid Agreement (“Agreement”) to be implemented in the event an emergency occurs during a Project train crossing. The “Agreement” shall provide methods of adequately informing the Fire Department of the expected train crossing schedule and alternate routes to access the Park Road and Bayshore Road industrial areas during the event that a train crosses Park Road. In order to inform Benicia Dispatch of a train crossing during an emergency, Valero shall provide, install, and maintain camera(s) at specified location(s) determined by the City, with coordination from Valero. The camera shall meet the City’s standards and have a real-time connection to Benicia Dispatch. The camera connection will signal to Benicia Dispatch that emergency responders shall use East 2nd Street as the identified alternative route to the Park Road and Bayshore Road industrial areas. East 2nd Street was identified for its direct access to area and the Opticom system in place at all signalized intersections. The camera must be installed and operational prior to commencement of the Project or certificate of

occupancy. In order to minimize potential impacts associated with utilizing the alternative route, Valero shall provide the necessary devices for the City's emergency response vehicles that are not equipped for the Opticom system. The emergency response vehicles identified to receive a device shall be those without the necessary device as of the date the "Agreement" is executed. Valero shall be responsible for the maintenance of the camera during the life of the Project.

- Utilize the Refinery's existing onsite emergency response team to assist with responding to off-site emergencies within the Park Road and Bayshore Road industrial areas as requested by the City of Benicia Fire Department under the existing mutual aid agreement, if an emergency occurs during the event of a train crossing on Park Road. The procedures for the occurrence of this support by the Valero Refinery Fire personnel are outlined in the proposed Benicia Fire-Valero Fire Operational Aid Agreement.

Significance after Mitigation: Less than significant.

---

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Impact 4.11-5: The Project would not conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities. (*Less than Significant*)

Implementation of the Project would neither directly nor indirectly eliminate existing or planned alternative transportation corridors or facilities, include changes in policies or programs that support alternative transportation, nor construct facilities in locations in which future alternative transportation facilities are planned. The Project would not conflict with adopted policies, plans, and programs supporting alternative transportation.

As described above, FAST operates one weekday transit route (Route 40) on Park Road within the study area; the nearest bus stops are located at the intersection of Park Road / Industrial Way. Route 40 provides four buses in each direction during the AM commute period between 5:30 and 9:00 AM, and five buses in each direction during the PM commute period between 3:30 and 8:00 PM. Valero would not schedule Project train crossings during the AM or PM peak traffic period. It is anticipated that Project train crossings could occur during the 6:00 to 8:00 PM period, and on average, about one bus travels along Park Road in each direction during that period. The chances of buses attempting to cross Park Road in the event of a Project train crossing are small, but possible. Although the Project would increase the frequency of trains crossing Park Road by four crossings a day, the number of crossings per day under Project conditions generally would fall within the range of crossings per day under existing conditions. In addition, the proposed crossing duration of each Project train trip would be shorter than the longer train crossings that already occur today without the Project. The potential increase in transit delay incurred by the Project is within the delay variability already experienced by Route 40 during the PM peak commute period. The Project impacts would be less than significant.

This page intentionally left blank

CHAPTER 5
CEQA Statutory Sections

The California Environmental Quality Act (CEQA) requires an Environmental Impact Report (EIR) to consider the significant environmental effects of a Project (CEQA Guidelines §15126.2). Chapter 4 considers direct and indirect, short- and long-term effects of the Project. This Chapter considers significant and unavoidable impacts in Section 5.1, significant irreversible environmental effects in Section 5.2, growth-inducing impacts in Section 5.3, cumulative impacts in Section 5.4, and effects found to not be significant in Section 5.5.

5.1 Significant Unavoidable Environmental Impacts

Section 15126.2(b) of the CEQA Guidelines requires an EIR to identify any significant environmental effects of a project that cannot be avoided through feasible mitigation and/or alternatives. As described in Section 4.1, *Air Quality*, there would be two significant unavoidable air quality environmental impacts as an indirect result of the Project (See Impacts 4.1-1b and 4.1-2).

5.2 Significant Irreversible Environmental Effects

Under Section 21100(b)(2)(B) of CEQA, an EIR must identify any significant irreversible effects of the project. Section 15126.2(c) of the CEQA Guidelines describes irreversible environmental changes as follows:

> *Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also irreversible damage can result from environmental accidents associated with the project.*

Construction and operation of the Project would require use of some non-renewable resources, including diesel and gasoline for construction vehicles and equipment. However, this use would be limited to the approximate 25-week construction period. These temporary construction-related increases would not result in significant use of non-renewable resources and would not commit future generations to similar uses.

The Project would involve the continued use of nonrenewable crude oil supplies by the existing Refinery. At some point in the future, the supply of crude oil available by railcar would presumably become exhausted. This will occur, however, with or without the Project. The Project

would not involve any increase in the use of crude oil by the Refinery. Rather, the Project would merely substitute North American crude oils for other crude oils from around the world.

During Project operations, diesel fuel would be used by trains bringing crude oil to the Refinery and returning empty tank cars to North American source locations for refilling. This Project-related diesel fuel consumption, however, would be offset by the reduced consumption of lower-grade fuels used by marine vessels that currently deliver crude oil to the Refinery. Given that distances to potential crude feedstock sources over the life of the Project for both marine vessel and rail transport are likely to vary and depend on future market forces, it would be speculative to estimate or compare exact fuel usage differences between the two modes of transport. Although exact distances to potential crude feedstocks are not known for either marine vessel or rail transport[1], it is likely that rail transport of North American sourced crude would tend to be much shorter than crude brought from more distant global sources by marine vessels.

As explained in sections 4.2, *Biological Resources*, and 4.7, *Hazards and Hazards Materials*, a release of crude oil from a railcar could potentially affect nearby residents, sensitive habitat, and the quality of surface water and groundwater. The probability of such an occurrence, however, is quite low. In addition, as explained in Section 4.7, *Hazards and Hazardous Materials*, there are a variety of state and federal regulations designed to ensure that any releases are contained and remediated, and any resulting damage is mitigated. Therefore, the risk of irreversible damage from accidental releases is not considered significant.

5.3 Growth-Inducing Impacts

Section 15126.2(d) of the CEQA Guidelines states that an EIR should discuss “the ways in which the Project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment.” Growth can be induced in a number of ways, including through the elimination of obstacles to growth, through the stimulation of economic activity within the region, or through precedent-setting action. CEQA requires a discussion of how a project could increase population, employment, or housing in the areas surrounding the project as well as an analysis of the infrastructure and planning changes that would be necessary to implement the project.

The temporary increase in the local labor force of approximately 121 construction workers at its peak over the approximate 25-week construction period would not contribute to any significant increase in the local population as there is a well-established worker base in the area that serves the five Bay Area refineries for projects similar to the Project. Operation of the Project would require approximately 20 new permanent employees at the Refinery. It is possible that these employees would be new residents of the area. However, the potential number of new residents would be insignificant given the total population of the area and the housing vacancy rate.

[1] Currently, vessels carrying crude from Alaska to the Refinery travel 2,000 miles (from the terminus of the TransAlaska pipeline). Vessels carrying crude from South America to the Refinery travel roughly 4,000-miles. Vessels carrying crude from the Middle East to the Refinery travel roughly 8,500 miles. By comparison, a train carrying North American crude oil to the Refinery could travel roughly 1,500 miles to locations in the mid west.

Therefore, construction and operations associated with the Project would not encourage new development or induce population growth and the Project would neither directly nor indirectly induce short-term or long-term population growth.

5.4 Cumulative Impacts

Public Resources Code section 21083(b)(2) states that a significant effect on the environment includes the possible effects of a project "that are individually limited but cumulatively considerable." An impact is "cumulatively considerable" when "the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (*Id*.) "A cumulative impact is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts" (CEQA Guidelines § 15130(a)(1)). The CEQA Guidelines require that:

- Cumulative impacts shall be discussed when they may be significant;
- The discussion may be more general than that for the individual project impacts, but that the discussion should reflect the potential extent, severity, and probability of the impact;
- The cumulative impact analysis may be based on either a list of past, present, and probable future projects or a summary of projections from an adopted General Plan or other adopted planning document; and
- Reasonable options for mitigating or avoiding the project's contribution to significant cumulative impacts shall be discussed, noting that for some cumulative impacts the only feasible mitigation may involve the adoption of ordinances or regulations rather than the imposition of conditions on a project-by-project basis.

This EIR uses a combination of a plan-based approach and a list-based approach to determine whether any significant cumulative impact would occur. From a plan-based perspective, a technical analyst for each resource area considered the Project in light of its consistency or conflict with the assumptions and projections of the *City of Benicia General Plan* and other applicable planning documents identified in Section 5.4.1. From a list-based perspective, Project impacts were analyzed in combination with the impacts of other Valero Benicia Refinery projects, other crude by rail projects in California, and other local refinery and pipeline projects.

The technical analysts for each resource area considered the following: (i) the geographic scope of the cumulative impact area for that resource; (ii) the time frame within which Project-specific impacts could interact with the impacts of other projects; (iii) whether a significant adverse cumulative condition presently exists to which Project impacts could contribute; (iv) the significance of the incremental Project-specific contribution to cumulative conditions; (v) whether the incremental Project-specific impact to an existing adverse cumulative condition is cumulatively considerable; and finally, (vi) whether additional mitigation is available to reduce the Project's cumulatively considerable contribution to an existing cumulative impact. If a resource area has no Project-specific impacts, the Project could not contribute to any existing adverse cumulative impacts.

The analyses of the cumulative impacts for each environmental resource area that was analyzed in Sections 4.1 through 4.11 of this document are presented in Section 5.4.3.

5.4.1 General and Regional Plans Considered in the Cumulative Analysis

To determine the effects of projects that may not be well-defined or are unforeseen, this analysis considered the following planning documents:

- City of Benicia General Plan
- Solano County General Plan
- Solano Congestion Management Program
- City of Benicia 2012 Water System Master Plan
- Bay Conservation and Development Commission Plans
- San Francisco Bay Area Regional Water Quality Control Board (RWQCB) Basin Plan
- Bay Area 2010 Clean Air Plan
- City of Benicia Climate Action Plan

These adopted plans have been prepared and adopted by the City and other local agencies. These plans are comprehensive, long-term visions for physical development within the region. The 1999 *City of Benicia General Plan*, for example, includes specific goals and policies to preserve and enhance existing development and to provide for orderly and appropriate new development. City land use approvals must be consistent with the General Plan.

5.4.2 Specific Projects Considered in the Cumulative Analysis

The cumulative impacts analysis herein considers related projects that may results in impacts similar to those created by the Project. The analysis considers recent projects at the Refinery, specified projects at other refineries in the Bay Area, other crude by rail projects within the State, and certain other projects within the City of Benicia that are unrelated to oil refining or transportation.

5.4.2.1 Other Recent Valero Benicia Refinery Projects

The following projects have been undertaken or permitted within the last five years at the Refinery (See Table 5-1, below, for greater detail):

- NPDES Permit Reissuance, issued 2009
- Maintenance Dredging at Valero Refinery Crude Dock Project, approved 2008
- Valero Improvements Project (VIP), approved 2003

The VIP, approved in 2003, consisted of a number of changes to Refinery process units to be implemented over an extended period. All of the approved components of the VIP project are

constructed and operational except for the hydrogen plant. See 3.3.3, *Recent Projects / Current Status of Refinery*, for more detail about the VIP Project.

5.4.2.2 Other Crude by Rail Projects in California

Table 5-1 includes other crude-by-rail projects that have been undertaken or permitted within the State in the last five years.

5.4.2.3 Other Relevant Local Projects

Table 5-1 includes other relevant projects along the Carquinez Straight that have been undertaken or permitted within the last five years.

5.4.2.4 Other City of Benicia Projects

Table 5-1 includes other relevant projects in the City of Benicia along the Carquinez Straight that have been undertaken or permitted within the last five years.

5.4.3 Areas of Potential Cumulative Impacts

5.4.3.1 Air Quality

In 2009, the BAAQMD identified significance thresholds for emissions that contribute to regional and global impacts. Regional impacts include elevated levels of ozone precursors and other criteria pollutants, as measured within a particular air basin. Global impacts result from the emission of greenhouse gases. Emissions are considered to be “cumulatively considerable” or “cumulatively significant” under the BAAQMD, YSAQMD, SMAQMD, and PCAPCD guidance if, and only if, the emissions exceed the applicable identified significance thresholds (BAAQMD, 2009; YSAQMD, 2007; SMAQMD, 2014; PCAPCD, 2012), also see Section 4.1.3 for more detail on these significance thresholds. This analysis applies the BAAQMD, YSAQMD, SMAQMD, and PCAPCD thresholds based on the evidence relied upon by those agencies in developing them.

Construction

Construction activities would be confined to within the Bay Area Basin. As described in Section 4.1.5, Project construction exhaust emissions would not exceed the BAAQMD regional mass emissions thresholds and Mitigation Measure 4.1-1 would be implemented to ensure that impacts associated with fugitive dust emissions would be reduced to a less-than-significant level. Consequently, construction of the Project facilities would not be considered to make a cumulatively considerable contribution to regional air quality impacts. The cumulative impact would be reduced to a level that would be less than significant.

TABLE 5-1
POTENTIAL PROJECTS FOR CUMULATIVE EFFECTS EVALUATION

Project Name	Location	Description	Status/Schedule	Approximate Distance From Project
Recent Valero Benicia Refinery Projects (2008-2013)				
Maintenance Dredging at Valero Refinery Crude Dock	Valero Benicia Refinery	Periodic maintenance dredging of a maximum of 80,000 cubic yards of sediment per year through 2023	Originally approved in 2008. Permit has been renewed through 2023.	Project location is on the northeast side of the Valero Benicia Refinery
Valero Refining Company - California, Valero Benicia Refinery NPDES Permit Reissuance	Valero Benicia Refinery	National Pollutant Discharge Elimination System (NPDES) permit reissuance. An on-site wastewater treatment plant treats process wastewater and stormwater prior to discharge to Suisun Bay. The refinery also discharges stormwater to Carquinez Strait and Suisun Bay through several additional outfalls. The reissued permit regulates both treated wastewater and stormwater discharges.	NPDES NO. CA0005550: Adopted November 18, 2009,Effective Jan 1, 2010 Expires Dec 31st, 2014 Currently undergoing renewal.	Project location is on the northeast side of the Valero Benicia Refinery
Valero Improvement Project	Valero Benicia Refinery	The project made changes and installed new equipment at the Valero Refinery to: allow the refinery to process lower grade of crude oil and gas oil; allow the refinery to switch between crude and gas oil, as desired; and optimize operations for efficient production. The project included an increase in crude processing capacity, while significantly reducing emissions, which mitigated project-related impacts to avoid detrimental effects on the Community.	Approved in 2003, amended in 2008 then completed construction in 2011 except for the construction of the hydrogen plant. The Refinery currently has sufficient hydrogen to process the wide range crudes it now uses and consequently Valero is in the process of determining whether to implement the VIP-proposed replacement hydrogen plant as it is not essential to refinery operations or to this Project.	Project location is on the northeast side of the Valero Benicia Refinery
Other Crude by Rail Projects in California				
WesPac Pittsburg Energy Infrastructure Project	City of Pittsburg	WesPac Energy-Pittsburg LLC (WesPac) proposes to reactivate the existing oil storage and transfer facilities located at the NRG Energy, Inc. Pittsburg Generating Station. The WesPac Terminal would be designed to receive crude oil and partially refined crude oil from trains, marine vessels, and pipelines, store the oil in existing or new storage tanks, and then transfer oil to nearby refineries. The WesPac Terminal would connect to two third-party common-carrier pipelines, including the KLM (Kettleman-Los Medanos) Pipeline (currently owned and operated by Chevron Pipeline Company) that currently provides crude oil to the Valero Benicia Refinery and other Bay Area refineries. The project would allow for an average throughput of 242,000 barrels of crude oil or partially refined crude oil per day, with a maximum of 375,000 barrels per day. The proposed rail transload facility would be capable of receiving and transloading up to one 104-car unit train per day.	Recirculated Draft EIR in July, 2013. According to the City of Pittsburg website, as of March 2014 the project is undergoing additional review. The City does not currently have a timeframe available for this additional review.	14 miles

TABLE 5-1 (Continued)
POTENTIAL PROJECTS FOR CUMULATIVE EFFECTS EVALUATION

Project Name	Location	Description	Status/Schedule	Approximate Distance From Project
Other Crude by Rail Projects in California (cont.)				
Phillips 66 Company Rail Spur Extension Project	San Luis Obispo County	Phillips 66 is proposing to modify the existing rail spur currently on the southwest side of the Santa Maria Refinery (SMR). The rail spur extension is proposed entirely on the SMR property and would be located east of the Union Pacific Railroad and the existing refinery facilities. The project would include an eastward extension of the existing rail spur by approximately 7,000 feet as well as a railcar unloading facility. Trains would deliver crude oil to the SMR for processing. The unloaded material would be transferred from the proposed unloading facility to existing crude-oil storage tanks via a new on-site above-ground pipeline.	Public review period for Draft EIR ended on January 27, 2014. County will be recirculating the DEIR – no date set.	265 miles
Alon Bakersfield Refinery Crude Flexibility Project	Kern County	This project is a modification of a Precise Development Plan that would allow greater flexibility for the Refinery to utilize a variety of crude oils that can be processed onsite. The project proponent is requesting: 1) expansion of rail, transfer and storage facilities including an addition of up to three boilers; 2) process unit upgrades and/or modifications; 3) repurposing of existing tankage; and 4) relocation and modernization of existing Liquefied Propane Gas (LPG) truck rack and upgrades to sales rack. The rail expansion would consist of the construction of a double rail loop from a new spur connection off of the existing Burlington Northern and Santa Fe Railway (BNSF) and would be fully contained onsite. Most of the proposed process unit changes are minor in scope. The Refinery's 70,000 barrels per day (BPD) maximum crude processing capacity would not be increased.	NOP certified September 2013, to prepare Draft EIR.	270 miles
Relevant Local Projects (refinery related pipelines, infrastructure, or marine oil terminals)				
Chevron Richmond Revised Renewal Project	City of Richmond	This project is a reduced scope of the Hydrogen and Energy Renewal Project Proposed in 2005. In 2008, the City of Richmond certified the EIR and issued permits for the project. In 2010, a court ordered that the EIR be set aside. Chevron has reduced the overall scope of the original project. The Revised Project would complete construction and make operational the Hydrogen Plant Replacement and Hydrogen Purity (sulfur removal) Improvement of the Original Project. The Revised Project would not include the Catalytic Reformer Replacement, Power Plant Replacement, and Other New and Replacement Facilities (storage tanks, control building and central maintenance building) that were part of the original project.	The City is currently preparing a revised EIR.	6.8 miles

TABLE 5-1 (Continued)
POTENTIAL PROJECTS FOR CUMULATIVE EFFECTS EVALUATION

Project Name	Location	Description	Status/Schedule	Approximate Distance From Project
Relevant Local Projects (refinery related pipelines, infrastructure, or marine oil terminals) (cont.)				
Chevron Tank Replacement Project	City of Richmond	The project would replace five existing petroleum storage tanks with five newly constructed tanks, and construct a new firewater tank in its quarry tank field. The five petroleum storage tanks will be field-fabricated within existing refinery tank fields. Total capacity of new petroleum tanks will be 541,000 barrels. Total capacity of petroleum tanks removed from service is 366,000 barrels. The petroleum tanks will be provided with secondary containment in accordance with state and federal law, and will be covered to minimize air emissions. The firewater storage tank will store recycled water from plant operations to increase the fire management capabilities at the refinery.	MND Approved March 2011. Tanks are being permitted and constructed individually: Tank 1 constructed, Tank 2 under construction, Tanks 3-5 to be permitted and constructed.	16.8 miles
Phillips 66 Propane Recovery Project	Contra Costa County	Phillips 66, proposes modify existing facilities at their Rodeo, California Refinery and add new facilities to recover propane and butane from refinery fuel gas (RFG) and then ship it by rail for sale. The Project involves hydrotreating a portion of the RFG and would reduce the amount of sulfur in the fuel gas, reducing the Refinery's sulfur dioxide (SO2) emissions to the atmosphere.	The Draft EIR was published in June 2013, and the Final EIR in November 2013.	7 miles
Shell Crude Tank Replacement Project	City of Martinez	This project would increase crude oil storage capacity at the refinery to facilitate future operations at current production levels despite anticipated changes in the source of crude oil feed stocks with no increases in crude oil throughput at the Refinery. The project would maintain current operation and production levels of California Air Resources Board mandated cleaner-burning gasoline and ultra-low sulfur diesel fuels at the Refinery substituting imported crude oil by vessel for diminishing San Joaquin Valley crude by pipeline.	Approved October, 2011. Complete.	5.6 miles
California State Lands Commission Marine Terminal Lease – for Shell Martinez Refinery	City of Martinez	The California State Lands Commission (CSLC) recently granted the Shell Martinez Refinery a new 30-year lease for its marine terminal operations. The CSLC certified the EIR prepared for the consideration of the new 30-year lease describes the marine terminal operations and evaluates the impacts of the new lease, including evaluation of future vessel traffic impacts. The assumptions and basis for the proposed Project are aligned with the forecasted activity of the marine terminal lease operations.	The new lease was granted by the CSLC on June 23, 2011.	5.6 miles
California State Lands Commission Marine Terminal Lease – for NuStar Selby Marine Terminal	Contra Costa County	The California State Lands Commission (CSLC) recently granted the NuStar Selby Marine Terminal a new 30-year lease for its marine terminal operations. The CSLC certified the EIR prepared for the consideration of the new 30-year lease describes the marine terminal operations and evaluates the impacts of the new lease, including evaluation of future vessel traffic impacts. The assumptions and basis for the proposed Project are aligned with the forecasted activity of the marine terminal lease operations.	The new lease was granted by the CSLC in 2012.	7 miles

TABLE 5-1 (Continued)
POTENTIAL PROJECTS FOR CUMULATIVE EFFECTS EVALUATION

Project Name	Location	Description	Status/Schedule	Approximate Distance From Project
Relevant Local Projects (refinery related pipelines, infrastructure, or marine oil terminals) (cont.)				
Selby Slag Site Remediation	Contra Costa County	The Selby Slag Site is the location of a former smelting facility. Smelting is the process of extracting metals, such as lead or copper, from a mineral or rock through high-temperature melting or fusing. Asarco operated a smelting facility at the Selby Slag Site from 1872 to 1971. During the smelting operations, slag (a waste product from the smelting process containing metals) was produced and used to fill the adjacent tideland areas. Most of the area of the Site was created from this historical filling of tideland areas with slag. Department of Toxics Substances Control (DTSC) is the lead government agency overseeing the investigation and cleanup at the Selby Slag Site. The Selby Group, comprised of Asarco LLC, the California State Lands Commission, and C.S. Land, Inc., has been undertaking investigation and cleanup actions at the Site under the oversight of DTSC.	A CEQA document is currently being prepared by DTSC.	7 miles
Tesoro Amorco Marine Oil Terminal	Contra Costa County	The Tesoro Refining and Marketing Company (Tesoro), a wholly owned subsidiary of Tesoro Petroleum Corporation, leases 16.6 acres of sovereign public land from the CA State Lands Commission for the Tesoro Amorco Marine Oil Terminal (Amorco MOT) (PRC 3453.1). The Applicant is seeking approval from the CSLC for a new 30-year lease. The MOT exists and is currently operating, and no changes to the facilities or operations are proposed; however, issuance of a new 30-year lease will require the preparation of an EIR because, among other potentially significant impacts, there is an inherent risk of spills at any facility where petroleum product is routinely transferred over water.	The CSLC is currently preparing two EIRs for the new leases.	3 miles
Plains All American Pipeline Martinez Marine Terminal 20-year Lease Consideration	City of Martinez	Proposed new 20-year lease of 5.04 acres of California sovereign lands would allow Plains All American Pipeline to continue its marine oil terminal operations for vessel transfers of crude oil and petroleum products. The terminal enables transfers to on-land storage facilities approximately two miles east of the City of Martinez, south shore of Carquinez Strait, and approximately one mile east of the Benicia Bridge.	NOD filed August 2005	3 miles
Air Products Local Area Pipeline Network Project	City of Martinez	Air Products and Chemicals Inc. (Air Products) owns and operates a hydrogen plant located within the Shell Martinez Refinery. In September 2009, a Draft EIR was published describing a local area pipeline network project proposed by Air Products. The proposed pipelines would originate at another existing Air Products hydrogen plant at the Tesoro Golden Eagle Refinery and travel westward about 2.6 miles in an unpopulated area along Waterfront Road, where they would connect with the existing Air Products Hydrogen Plant at the Shell Martinez Refinery. The two pipelines, one for hydrogen and the other for fuel gas, would be installed in the same trench to minimize impacts. The primary objective of this project is to maintain adequate, available, and efficient supply of hydrogen for the two refineries (Tesoro and Shell) by allowing the	The EIR for the project was certified in May 2011 by the County. Construction of the Air Products pipeline is proposed over a 3-month period was scheduled for 2012. This did not occur. The current construction schedule is to be determined.	3 miles

TABLE 5-1 (Continued)
POTENTIAL PROJECTS FOR CUMULATIVE EFFECTS EVALUATION

Project Name	Location	Description	Status/Schedule	Approximate Distance From Project
Relevant Local Projects (refinery related pipelines, infrastructure, or marine oil terminals) (cont.)				
Air Products Local Area Pipeline Network Project (cont.)		transfer of hydrogen and fuel gas (hydrogen plant feed and fuel) and connecting the existing Air Products hydrogen plants at both refineries. The project would provide for hydrogen supply at the Martinez Refinery for the processing of products to meet the cleaner-burning fuel standards. The CTRP does not involve changes to the process units that would affect hydrogen demand.		
Praxair Contra Costa Pipeline Project	Contra Costa County and the Cities of Richmond, Martinez, Hercules, and potential San Pablo	Praxair is proposing to develop an approximately 21.3-mile hydrogen pipeline from the Chevron Richmond Refinery to the Shell Martinez Refinery. This pipeline would include a 1.1-mile lateral pipeline extension to the Phillips66 Refinery in Rodeo, California. The pipeline would transport hydrogen that is produced at the Chevron Refinery and not required for Chevron's own operations. The Praxair Contra Costa Pipeline Project would consist of construction of approximately 13.5 miles of new pipeline and the reuse of approximately 7.8 miles of an existing Chevron pipeline previously used to transport natural gas. The project would also include the construction of approximately 2.2 miles of natural gas pipeline. Although the hydrogen pipeline is proposed to terminate at the Shell Martinez Refinery, Shell currently has no agreement in place with Praxair for future hydrogen supply. As stated previously, the CTRP does not involve changes to the process units that would affect hydrogen demand.	A Draft EIR was released in 2010 and Contra Costa County is currently preparing a Final EIR for the project.	5 to7miles
Other City of Benicia Projects and Projects that Include Benicia Subject to CEQA Review (as of May, 2014)				
Solano County Draft General Plan Update	County of Solano	The proposed project is the 2008 update of the Solano County General Plan.	Adopted August, 2008.	Encompasses City of Benicia and Project location.
Lower Arsenal Mixed Use Specific Plan - Recirculation	City of Benicia	Recirculation of Noise and Global Climate Change, Energy Use and Sustainability Sections. Recirculated the proposed project includes implementation of a Specific Plan for the Lower Arsenal site, which is designated for mixed use in the Benicia General Plan. The Specific Plan covers four distinct zones, each of which exhibits a unique physical character. The Specific Plan would implement a form based code to shape future development on the project site, with primary emphasis on the physical form and character of the new development. After build-out of the Specific Plan, the area would contain approximately 741,865 square feet of mixed uses, 22 residential units, and 6.39 acres of open space. The Specific Plan area currently contains approximately 525,000 square feet of mixed uses.	Draft EIR originally circulated in 2007. Draft EIR recirculated August, 2009. This project is currently on hold and the EIR will be revised again by the City.	Between 1 to 2 miles- Project is not within planning area.

TABLE 5-1 (Continued)
POTENTIAL PROJECTS FOR CUMULATIVE EFFECTS EVALUATION

Project Name	Location	Description	Status/Schedule	Approximate Distance From Project
Other City of Benicia Projects and Projects that Include Benicia Subject to CEQA Review (as of May, 2014) (cont.)				
Housing Element, 2015-2023	City of Benicia	This project updated the Housing Element of the City of Benicia General Plan as required by Government Code Section 65580 - 65589.8. The Housing Element is a comprehensive statement by the City describing the housing needs of Benicia and how the City's plans, policies, programs and regulations facilitate the development, improvement and preservation of housing for all economic segments of the community.	Deadline for adoption / certification is January 31, 2015.	Project is within City limits.
Tannery Bay Trail	City of Benicia	The proposed project is to construct a shoreline public pathway with amenities as part of San Francisco Bay Trail System. The project would include approximately 350 cubic yards of solid fill over a 2,260 sf area; Construction of an 8 foot wide, 275 foot long path way; Construction of approximately 3,199 sf of landscaping area; Construction of approximately 3,310 sf of shoreline protection (rip rap system); Installation of four public benches; A series of concrete walkways from the existing building to the new pathway and decomposed granite (DG) along the west side of the new pathway, adjacent to the new shoreline revetment.	Initial Study/Mitigated Negative Declaration adopted 2013.	2 miles
New Harbor Church	City of Benicia	The proposed project would consist of constructing a new 20,244 sq. ft., multi-use, two-story church at the terminus of Blake Court, east of Rose Drive. Pursuant to a prior agreement with the City in June 2001, the land was dedicated to a church to be selected by the Benicia Council of Churches. New Harbor Community Church was the selected recipient of this land. However, the Church will still needs to get Use Permit approval from the Planning Commission since the location is in the City's Single Family Zone District.	EIR certified in 2001. Project under review and EIR Addendum certification pending.	3 miles
Jefferson Ridge LLC Assisted Living Care Complex	City of Benicia	Project proposes to build a two-building, 273-unit assisted-living and memory-care complex that may be built on a vacant lot on Jefferson Street near Park Road and Adams Street Benicia's industrial port, within the lower arsenal.	Submitted to the City in August 2012, project is currently under review for General Plan/zoning compliance. CEQA documentation TDB.	1 mile-adjacent to the Project.
Water States Agreement for Annual Transfers of a Quality of Solano ID Annual Allotment	Solano County, City of Benicia and City of Fairfield	The Project includes proposed agreements to accomplish annual transfers of a quantity of Solano Irrigation District's (District) annual allotment of Solano Project water to the city of Benicia (Benicia) is the amount of 2,000 acre feet per year and the city of Fairfield (Fairfield) in the amount of 2,000 acre feet a year, for a total of 4,000 acres feet per year. The cities will pay consideration to District for the transfer. If one of the cities does not execute the agreement, the District may proceed with the remaining city. The water quantities transferred will be delivered in Lake Berryessa (Berryessa) and transferred through the Putah South Canal and will be utilized by each city primarily to assure yield through drought periods for the existing city water service area compared to the quantity of water delivered from the State Water Project (SWP) to enhance water quality to city customers within the existing city water service area, to reduce water treatment by each city, and to provide supplies for replacement of reduced sources of SWP water die to SWP operating conditions.	Agreement approved in 2009.	Project is within City limits

Other related projects at the Refinery, including the Maintenance Dredging at Valero Refinery Crude Dock project, and the Refinery NPDES Permit Reissuance project, are ongoing and part of the baseline for the Project. The cumulative projects listed in Table 5-1 would occur more than 1,000 feet away from the Refinery and would not be a concern for cumulative localized impacts based on the prescribed BAAQMD methodology. Therefore, the combined cumulative impact of all construction activities would be less than significant.

Operation

As described in Impacts 4.1-1b and 4.1-2, after mitigations are applied, Project operational emissions generated within the Bay Area Basin would not exceed the BAAQMD regional mass emissions thresholds. Consequently, operation of the Project would not be considered to make a cumulatively considerable contribution to regional cumulative air quality impacts in the Bay Area Basin.

With regard to emissions of the Project generated within the Sacramento Basin, as discussed in Section 4.1.5 under Impact 4.1-2, Project-related emissions in the YSAQMD and SMAQMD would exceed the incremental project significance thresholds for NO_x and NO_x emissions generated in Placer County would exceed the PCAPCD cumulative 10 pounds per day significance threshold. Therefore, implementation of the Project would result in a cumulatively considerable increase of NO_x emissions in YSAQMD, SMAQMD, and PCAPCD, and the associated cumulative impact within the Sacramento Basin would be significant.

Health Risk

As noted above, the project health risk assessment modeling found the Maximum Exposed Individual Residence (MEIR) to be at a residence in Fairfield adjacent to the rail tracks primarily as a result of the increase in train traffic for the Benicia Refinery project. Cumulative risk has been evaluated for sources within 1,000 feet of that location (see below). Similarly, an additional cumulative assessment was performed to evaluate the combined risks at residences near the Refinery from DPM sources from the Project, I-680, and existing rail traffic on the tracks near the Refinery. As part of this cumulative assessment, the health risk assessed for the Valero Improvement Project (VIP) (City of Benicia, 2002) and VIP Amendments (City of Benicia, 2008) were also combined with the above sources to estimate the contribution to risk from existing sources at the Refinery.

Screening-level cumulative risk was evaluated in the vicinity of residences near the Refinery where the maximum risk and $PM_{2.5}$ concentration was modeled. This modeled residence is located to the southwest of the Refinery. The BAAQMD provides a Google Earth tool that displays the screening-level health risks and $PM_{2.5}$ concentrations from freeways and rail sources in each county (BAAQMD, 2014). The results of the near-Refinery residential cumulative risk from the Project, the recent VIP/VIP Amendments Project, the freeway, and rail sources obtained from the BAAQMD Google Earth tool are presented below in Table 5-2.

With respect to cumulative health risk impacts associated with localized air emissions, the VIP, which was essentially completed in 2011, is considered to be a past cumulative project. The only

component of the VIP that has not been constructed is a replacement hydrogen plant. The Refinery has sufficient hydrogen now to process the wide range of crudes that it now uses and Valero is in the process of determining whether or not to replace the hydrogen plant. The Permit-to-Construct the replacement hydrogen plant would expire in December 2014. Since the proposed replacement hydrogen plant would be a replacement project, this element would not likely result in an increase in emissions and would have no cumulative impact.

The VIP proposed a series of modifications and additions to the Refinery, including modification to existing equipment and installation of new refining equipment, such as piping, heat exchangers, instrumentation, catalytic reactors, fractionation equipment, pumps, compressors, furnaces, tanks, and flue gas scrubber. Health risk analyses were conducted for the VIP (City of Benicia, 2002 and 2008) that estimated health risks for all components of this cumulative project. The VIP health risk analysis concluded that the maximum incremental cancer risk at the nearest residential receptor would be 1.47 in a million and a maximum non-residential cancer risk would be 2.38 in a million. The non-cancer chronic hazard was found to be 0.007 for the maximally exposed resident and 0.018 for the maximally exposed worker. It should be noted that predominate wind direction in the vicinity of the Refinery is from the west, towards the east. There are no residences or other sensitive receptors immediately east of the Refinery. This predominant wind direction tends to limit exposure of the residences to the north, east, and south of the Refinery.

Combining the risks of the Project with the existing risks associated with I-160, the UPRR, and the VIP results in a cumulative combined cancer risk of 14.4 in one million to the maximally exposed residential receptor near the Refinery. This value is well below the cumulative threshold of 100 in one million for cancer risk. Combining the $PM_{2.5}$ concentrations of the Project with the existing concentrations associated with I-160, the UPRR, and the VIP results in a cumulative combined $PM_{2.5}$ concentration of 0.029 ug/m^3 to the maximally exposed residential receptor near the Refinery. This value is well below the cumulative threshold of 0.8 ug/m^3. Therefore, the combined risk and $PM_{2.5}$ concentrations would result in a less than significant cumulative impact and the incremental increases in the vicinity of the Refinery that would be associated with the Project would not be cumulatively considerable.

TABLE 5-2
CUMULATIVE HEALTH RISK AT NEAR THE REFINERY

Type of Estimated Health Impact	Source of Contribution to Risk and $PM_{2.5}$ Concentration				Total	Total with ASF*
	Crude by Rail Project	I-160 (at 1,000 feet)	UPRR Tracks (at 1,000 feet)	VIP Project		
Cancer Risk (per million)	0.99	3.47	1.65	2.38	8.49	14.4
$PM_{2.5}$ Annual Concentration (ug/m^3)	0.003	0.024	0.002	0.002	0.029	0.029

* Cancer risk includes the Age Sensitivity Factor (ASF)

SOURCE: ERM, 2014; see Appendix E.6

A screening-level cumulative risk analysis was also evaluated in the vicinity of the MEIR in Fairfield to estimate the combined exposure from the Project locomotives, existing locomotives using these tracks, and stationary sources of TACs within 1,000 feet of the MEIR. The BAAQMD Google Earth tool that displays the screening-level health risks and $PM_{2.5}$ concentrations from TAC sources in each county was used to obtain existing risk and concentrations data for sources in the vicinity of the MEIR (BAAQMD 2014). The stationary sources within 1,000 feet of the MEIR are described below:

- Commercial Business, 744 N. Texas Street;
- Commercial Business, 106 Railroad Avenue;
- Commercial Business, 110 Railroad Avenue;
- Commercial Business, 1350 N. Texas Street;
- Commercial Business, 890 E. Travis Boulevard; and
- Commercial Business, 409 Railroad Avenue, Suite B.

Though conservatively developed, the screening-level risk values can be compared to the modeled health risk and $PM_{2.5}$ concentrations from the locomotives to determine whether cumulative risk may be significant. The values shown in Table 5-3 below represent the modeled health risk with conservative screening risk levels imposed at that MEIR. The combined cumulative risks would be below 100 in one million for cancer and below the 0.8 ug/m^3 $PM_{2.5}$ concentration. Therefore, the incremental increase in risk and $PM_{2.5}$ concentrations that would be associated with the Project would not be cumulatively considerable at the MEIR. The cumulative impact would be less than significant.

TABLE 5-3
CUMULATIVE HEALTH RISK AT THE MAXIMUM EXPOSED INDIVIDUAL RECEPTOR

Type of Estimated Health Impact	Screening-level Cancer Risk per million (Location)	Screening-level PM2.5 Concentration (ug/m^3) (Location)
Maximum Exposed Individual Residential (MEIR) – Fairfield residential receptor	88.1 (Existing risk at 160 feet southeast of train tracks)	0.10 (Existing worst case Conc. at 160 feet southeast of train tracks)
	8.0 (Project incremental risk at 160 feet southeast of train tracks)	0.02 (Project worst case Conc. at 160 feet southeast of train tracks)
	88.0 (Cumulative risk at 160 feet southeast of train tracks)	0.12 (Cumulative worst case Conc. at 160 feet southeast of train tracks)
Significance Threshold	100	0.8 ug/m^3
Significant Impact?	No	No

SOURCE: ERM, 2014; see Appendix E.6

5.4.3.2 Biological Resources

The Project has potential impacts on biological resources in the Project area and along the railroad system between the Refinery and the City of Roseville. None of the impacts are significant in themselves.

As explained in Section 4.2, the Project would increase activity and nighttime lighting along a 0.7-mile (3,839 linear feet) stretch of Sulphur Springs Creek. A significant increase in activity and lighting in this area could potentially cause wildlife to avoid the corridor, travel on roads, and be harmed by traffic. The Project impact would not be significant because the lighting would be directed downward and away from the riparian corridor.

Other past, present, and future projects have and will increase activity and nighttime lighting along the riparian corridor, thus creating a cumulative impact. The Project's contribution to this impact, however, would not be cumulatively considerable. Even with a backdrop of heavy industrialization, the riparian corridor offers safe passage across Interstate 680 for animals moving between grasslands north of Second Street and shoreline marshes south/east of the Interstate. This is not expected to change even if activity and lighting were to increase as a result of projects identified in Table 5-1.

Along the railroad system, a state-wide increase in railcar traffic (frequency and/or duration) could result in a cumulatively considerable impact on biological resources. For example, the noise from a cumulatively significant increase in night traffic could drown out the nocturnal mating calls of marsh birds, or the noise and visual disturbance from a cumulatively significant increase in daytime traffic could discourage use of adjacent marshes by burrowing owls. A review of Table 5-1 suggests that other crude by rail projects in the State (WesPac Pittsburg Energy Infrastructure Project, Phillips 66 Company Rail Spur Extension Project, Alon Bakersfield Refinery Crude Flexibility Project) would increase railcar traffic along transportation systems serving those project areas, which may or may not overlap with the Project. Other relevant local projects (Shell Crude Tank Replacement Project, Shell Martinez Refinery Marine Terminal Lease, NuStar Selby Marine Terminal Lease) have the potential to increase railcar traffic in the future, and these may overlap geographically with the UPRR railroad mainline and spurs that UPRR could potentially use for the Project. The cumulative increase in railcar usage, however, would occur on existing mainline track where baseline usage is already the routine. Thus, the addition of Project-related railcars to the state-wide network would not involve a cumulatively considerable contribution to the impact on biological resources.

Lastly, regarding the cumulative potential for an oil spill during transport of crude oil, a region-wide increase in all types of vessel traffic (frequency and/or duration of ships, railcars, etc.), along with an increased number of conveyance pipelines planned under regional projects such as the Air Products Local Area Pipeline Network Project and the Praxair Contra Costa Pipeline Project, would increase the overall likelihood of a spill in the region. This could occur anywhere along a marine vessel route, a pipeline route, or a rail line route, though aquatic environments such as Suisun Marsh and San Francisco Bay are especially vulnerable locations for a spill. A spill would only occur under circumstances of an upset or accident, and the probability of

occurrence of any single event is small (see Section 4.7, *Hazards and Hazardous Materials*, for additional information); the probability of two or more events occurring at the same time (from the Project and another cumulative project) is even smaller. This potential is even further reduced by the fact that the current Project, and other similar projects, would switch modes of transportation from ship to railcar; thus, there wouldn't be an increase in traffic, just a switch in mode of transport. The switch from ship transport through the aquatic environment to railroad transport through the terrestrial environment may arguably reduce the likelihood for a spill, and/or reduce the environmental impacts resulting from a spill by being easier to contain and clean up in a terrestrial or diked, semi-vegetated marshland.

5.4.3.3 Cultural Resources

The construction and operation of the Project would result in no impacts to cultural resources or to lands designated for such use. Thus, the Project could not contribute to cumulative impacts to cultural resources that could be caused by implementation of other Refinery and non-Refinery projects. There would be no cumulative impacts to cultural resources as a result of the Project.

5.4.3.4 Energy Conservation

The construction and the operation of the Project, in addition to other cumulative Refinery projects and other non-Refinery cumulative development in the Project area, would not result in any cumulative impacts to energy resources. The energy required for the construction and operation of the Project would be a less-than-significant portion of the regional energy supplies, and would not place significant demands on the regional energy infrastructure. The Project does not involve construction of major new energy facilities off-site, or of facilities that would stimulate the Bay Area's economy, resulting in a cumulative increase in energy use. The construction and the operation of the Project, in addition to other cumulative refinery projects and other non-refinery cumulative development, would not result in any known cumulative impacts to energy.

5.4.3.5 Geology and Soils

The San Francisco Bay Area is within a seismically active region with a wide range of geologic and soil conditions. Impacts associated with geology and soils tend to be limited to individual project sites and the areas immediately adjacent. Projects from the cumulative projects table relevant to the cumulative analysis relating to geology and soils (Table 5-1) include the Valero Improvement Project and those projects immediately adjacent to the Project site. The combination of the Project and these projects on site and immediately adjacent constitutes the list of cumulative projects for Geology and Soils.

The Project, combined with the above-referenced cumulative projects, would not result in an increased population in an area subject to seismic risks and hazards. Additionally, any new project, including the Project, would be required to meet building code requirements that address the various seismic and geologic hazards present in the Bay Area region, which would reduce cumulative impacts related to geology, soils, and seismicity. Development projects are required to

meet the most recent geologic and seismic standards. Generally, compliance with applicable building and other codes, as would be required for all present and future cumulative projects, would reduce the potential for cumulative impacts.

Construction and operation of the various Project components, combined with past, present, and other foreseeable improvements within the Refinery property and development in the area, would adhere to current building code and other regulatory requirements and would not therefore result in a cumulatively significant impact related to exposing people or structures to risk related to geologic hazards, soils, and/or seismic conditions. No mitigation is required.

5.4.3.6 Greenhouse Gas Emissions

Both the BAAQMD and the California Air Pollution Control Officers Association (CAPCOA) consider greenhouse gas (GHG) emissions impacts to be exclusively cumulative impacts (BAAQMD, 2012; CAPCOA, 2008); as such, assessment of significance is based on a determination of whether the GHG emissions from a project represent a cumulatively considerable contribution to the global atmosphere. The Project would result in a net increase of 6,726 metric tons carbon dioxide equivalents (CO_2e) per year within the State of California (see Section 4.6.5). Therefore, when compared to the City's significance threshold of 10,000 metric tons CO_2e, the Project's contribution to GHG impacts would not be cumulatively considerable, and there would not be a significant cumulative impact associated with the Project.

5.4.3.7 Hazards and Hazardous Materials

As discussed in Section 4.7.6, routine operations of the Project, potential upsets, or accidents during transport of crude by rail would not result in any significant impacts associated with hazards or hazardous materials due to regulatory measures and the low probability of potential accidents (see Section 4.7, *Hazards and Hazardous Materials*, for additional information). For the Project to make a cumulatively considerable contribution to the impact of hazards, two or more events (from the Project and another cumulative project) would have to occur at the same time and affect the same places. The likelihood of such a cumulative accident event would be even smaller than the estimated low probability of a Project-related accident and spill. The impact of such a cumulative event would be less-than-significant. See also Section 5.4.3.1, *Air Quality*, above for additional discussion of cumulative health risk.

5.4.3.8 Hydrology and Water Quality

The geographic area for the analysis of cumulative hydrology and water quality and water quality impacts is the Lake Herman/Sulphur Springs Creek watershed, particularly the urbanized southern portion of the watershed in the vicinity of the Project, which drains into Suisun Bay. The cumulative analysis considers the relevant past, present, and probable future projects listed in Table 5-1 with regards to the cumulative geographic area.

Several other recent, current, and foreseeable future projects are located within the Refinery site, in the urbanized portion of the watershed, and along the margin of Suisun Bay and Carquinez Straits. The watershed in the vicinity of the Project outside of Refinery property has been

urbanized and no longer reflects historic conditions in terms of stormwater quality, volume, and drainage. The majority of the surfaces within the Refinery, including most locations affected by the Project, are covered with impervious surfaces and as a result, stormwater runoff is generally rapid and surface infiltration rates are very low. Stormwater flows in the portion of the watershed adjacent to the Project are generated as runoff from paved surfaces and drain down gradient into stormwater conveyance systems and can contain pollutants typical of urbanized watersheds. Sulphur Springs Creek in the vicinity of the Project has been channelized to provide flood protection and convey stormflows to Suisun Bay.

Concurrent construction of the Project and other projects in the cumulative geographic area could result in increased erosion of exposed soils during land disturbing activities and subsequent sedimentation, which could have a cumulative effect on the water quality of receiving waters. Also, any inadvertent release of fuels or other hazardous materials during concurrent construction of projects could affect the water quality in the stream channels or storm drains that eventually flow into Suisun Bay and Carquinez Straits. As described under Impact 4.8-1 in Section 4.8.5, the applicant would minimize Project impacts relating to construction water quality by complying with the Valero SWPPP (RWQCB, 2013) for the Refinery property, applicable water quality regulations, and implementing a stormwater management plan employing best management practices (BMPs), and practicing control measures to manage and reduce erosion, stormwater runoff, and sedimentation downstream (Mitigation Measure 4.8-1). Adherence to these requirements would reduce potential cumulative impacts associated with stormwater runoff and water quality associated with construction of the Project.

Operation of the Project would not represent a substantial land use change within the watershed compared to current conditions at the site and in the surrounding area. The Project site is currently paved with impervious surfaces and storm runoff generated at the Project site would be similar to the existing runoff on-site. Stormwater runoff would continue to be managed as required by the Refinery NPDES Permit. The stormwater outfalls are permitted under the Refinery NPDES permit, which sets stormwater outfall discharge limits. The NPDES discharge requirements, established by the RWQCB, are themselves measures based on consideration of cumulative effect. The Project in combination with other projects at neighboring refineries and the non-refinery projects in the geographic area for the analysis of cumulative impacts have effluent discharges that contribute pollutants to Suisun Bay and the Carquinez Straits. Although other projects listed in Table 5-1 that are located along the waterfront could also involve similar activities that could affect water quality in Suisun Bay or Carquinez Straits, the Project's contribution to this cumulative impact would not be cumulatively considerable with compliance with existing regulations.

The Project would not result in adverse effects related to stormwater drainage and erosion, flooding, tsunami inundation, and would therefore not contribute to cumulative impacts related to these topics. Given the measures taken to reduce and avoid hydrologic and water quality impacts related to construction and operation of the Project, the Project would not be expected to make a considerable contribution toward any cumulative water quality or hydrology related impacts and there would be no cumulative impact associated with the Project. No mitigation is required.

5.4.3.9 Land Use and Planning

The construction and operation of the Project, in addition to other Refinery projects and other non-refinery development, would not result in cumulative impacts to land use. Development and its cumulative effects are considered in the *City of Benicia General Plan* (1999). As discussed in Impact 4.9-1, the Project would be consistent with the adopted General Plan and its applicable land use designations and policies adopted for the purpose of avoiding or mitigating environmental effects. The Project would not contribute to cumulative land use changes in the City of Benicia because the Project would not result in any change to existing land use or conflict with adopted plans at the Project site or surrounding area.

Cumulative impacts related to conflicts with BAAQMD and RWQCB regional plans for air quality and water quality are analyzed in Sections 5.4.3.1 and 5.4.3.8, respectively, above. The Project's contribution to those impacts would not be cumulatively considerable. No mitigation is required.

5.4.3.10 Noise

As described above, the VIP was completed in 2011 except for construction and operation of a replacement hydrogen plant. However, the Refinery has sufficient hydrogen now to process the wide range of crudes that it now uses and Valero is in the process of determining whether or not to implement this approved project. If implemented, this hydrogen plant could result in noise levels that could combine with those of the Project to result in a cumulative noise impact. According to the Draft EIR for the VIP, noise producing equipment that would be associated with the alkylation unit modifications and the selective hydrogeneration facilities would produce steady equipment noise levels of less than 30 dBA at the nearest residential receptors (City of Benicia, 2002). When combined with the loudest noise levels that would be associated with the Project (train horn soundings), the hourly L_{eq} associated with the hydrogen plant would not incrementally add to the train horn hourly L_{eq} of approximately 40 dBA, and would not exceed the City's nighttime hourly L_{eq} limit of 50 dBA. The existing average hourly L_{eq} noise levels for day, evening, and nighttime hours at the nearest residences to the Project site range between 51 dBA and 56 dBA, so the combined noise levels should not contribute to an adverse cumulative impact.

Other cumulative projects at the Refinery, including the Maintenance Dredging at Valero Refinery Crude Dock project, and the Refinery NPDES Permit Reissuance project are ongoing and part of the baseline for the Project. The other cumulative projects listed in Table 5-1 would occur more than a mile away from the Refinery and would not be a concern for cumulative noise impacts. There are no other approved or Projects at the Refinery or in the vicinity of the Refinery that would lead to cumulative noise impacts along with the Project. Therefore, the Project's less-than-significant individual noise impacts would not be cumulatively considerable, and would result in a less-than-significant cumulative impact.

5.4.3.11 Transportation and Traffic

A 1.5 percent per year growth rate was applied to existing traffic volumes, which is similar to the 1.6 percent per year rate used in the *Benicia Business Park EIR* for the period between 2006 and 2030. It is noted that according to 2006 and 2013 count data collected at the intersection of Park Road / Bayshore Road, traffic volumes have not increased during the seven-year period, potentially due to the recent economic downturn.

Under cumulative volume conditions, vehicle queues associated with the 50-railcar crossing again would extend back onto the northbound I-680 off-ramp, but not onto the I-680 mainline. Queues also would extend back to the Park Road / Refinery Driveway, but would not reach Industrial Way. Traffic volumes in the evenings and late nights are much lower within the study area compared to the peak traffic periods. During the 9:00 – 10:00 PM hour, the resulting queues during a train crossing would be no longer than five vehicles. Although the proposed 50-railcar train crossing would block Park Road for over 8 minutes, the resulting queues would be contained within the provided intersection storage capacity at Park Road / Bayshore Road during the 9:00 – 10:00 PM hour.

Project train crossings occurring during the 9:00 AM – 7:00 PM period would generate queues on the west side of the tracks that would extend back onto Bayshore Road and affect the operations of the I-680 ramp-terminal intersections, but would not extend back onto the I-680 mainline. Queues on the east side of the tracks would generally be contained within the Park Road segment between the tracks and Industrial Way, affecting access to and from Refinery driveways and the U-Store-It driveway. The segment of Park Road between the at-grade railroad crossing and Industrial Way provides a two-way left-turn lane (TWLTL), and because the great majority of westbound traffic approaching Bayshore Road on Park Road turns left, those drivers would be expected to use the TWLTL as a queue storage lane, and other westbound drivers would use the through lane as a means to turn right into the Refinery (or as a queue storage lane if they intend to go straight on Park Road or to turn right onto Bayshore Road).

If the proposed train crossings occur during the 7:00 PM – 6:00 AM period, resulting queues on the west side and east side of the tracks would not exceed the provided storage capacity, and would not extend back and affect the operations of other study intersections.

The change in average vehicle delay at the Park Road crossing associated with the 8.3-minute duration when the Project’s trains could block traffic at that crossing would increase the average vehicle delay in an hour by about 0.8 second, which is less than the one-second threshold of significance when the train crossing currently operates at LOS F. The Project impacts would be less than cumulatively significant.

5.5 Effects Found Not to Be Significant

The environmental effects of the Project are identified and discussed in detail in Chapter 4 and in the Initial Study / Mitigated Negative Declaration, included as Appendix A. All identified environmental effects of the Project would be less than significant, or less than significant after

implementation of the identified mitigation measures. The Initial Study and EIR further conclude that the Project would not have any effects in the following environmental areas:

- Agricultural and Forest Resources
- Mineral Resources

This page intentionally left blank

CHAPTER 6
Analysis of Alternatives

6.1 General Consideration of Alternatives

An EIR must identify and describe a reasonable range alternatives to a project that would avoid or substantially lessen significant project impacts and attain most of the project objectives. CEQA provides the following guidance for discussing project alternatives:

- An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation (CEQA Guidelines §15126.6(a)).
- An EIR is not required to consider alternatives that are infeasible (§15126.6(a)).
- The discussion shall focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly (§15126.6(b)).
- The range of alternatives shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects (§15126.6(c)).
- The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis and comparison with the proposed project (§15126.6(d)).

6.1.1 Identification of Alternatives

CEQA requires an EIR to evaluate a "no project" alternative to allow decision-makers to compare the impacts of approving a proposed project with the impacts of not approving it (CEQA Guidelines Section 15126.6(e)). The "no project" analysis evaluates the baseline or the conditions that existed at the time of the preparation of the Initial Study (Spring 2013) as an oil refinery. These conditions include ongoing operations, which include the shipment of crude oil by marine vessel, and maintenance activities as well as the activities that reasonably would be expected to occur in the foreseeable future if the proposed project were not approved, based on current plans, permits and available infrastructure and services. The "no project" alternative is analyzed in Section 6.4.1.

Once the significant impacts of the Project are known, it is possible to identify alternatives capable of reducing or eliminating the significant adverse impacts of the project.

If the significant adverse impacts are proportional to the size of a project, then reducing the size of the project may result in a suitable alternative. Given the nature of the Project, this analysis is focused on project impacts related to the Project footprint and design. The alternatives analysis identifies and evaluates scenarios under which various project designs and footprints are formulated to minimize specific impacts that otherwise would occur with the Project. These reduced project alternatives are analyzed in Section 6.4.2.

On the other hand, if a particular element of a project causes a significant adverse impact, eliminating or replacing that element may result in a suitable alternative. Also, a different site for the project may eliminate or reduce an impact. The “different site” alternative is analyzed in Section 6.4.3

If the "no project" alternative is the environmentally superior alternative, the EIR must identify the “environmentally superior” alternative among the rest of the alternatives. (CEQA Guidelines Section 15126.6(e)(2)). The “environmentally superior” alternative is identified in Section 6.4.4.

6.1.2 Alternatives Screening Methodology

The evaluation of alternatives to the Project was completed using a screening process that consisted of three steps:

Step 1: Clarify the description of each alternative to allow comparative evaluation.

Step 2: Evaluate each alternative using CEQA criteria (defined below).

Step 3: Determine the suitability of each alternative for full analysis in the EIR. Eliminate from further analysis all infeasible alternatives and alternatives that clearly offer no potential for overall environmental advantage.

Following the three-step screening process, the advantages and disadvantages of the remaining alternatives were carefully weighed with respect to CEQA’s criteria for consideration of alternatives:

- Does the alternative meet most of the basic objectives of the proposed project?
- Is the alternative feasible economically, environmentally, legally, socially, and technically?
- Does the alternative avoid or substantially lessen any significant effects of the Project (considering also whether the alternative could create significant effects potentially greater than those of the proposed project)?

6.1.3 Consistency with Project Objectives

The Project proposes to install rail spur tracks and new transfer equipment that would enable the Refinery to receive a portion of its crude oil deliveries by rail car. Valero has identified the following specific project objectives for the Crude by Rail Project:

1. Allow for the delivery of up to 70,000 barrels per day of North American-sourced crude oil by rail.

2. Replace marine vessel delivery with rail delivery of up to 70,000 barrels per day of crude oil.

3. Mitigate Project-related impacts.

4. Implement the Project without changing existing Refinery process equipment or Refinery process operations.

5. Continue to meet requirements of existing rules and regulations pertaining to oil refining including the State of California Global Warming Solutions Act of 2006 (AB 32).

CEQA Guidelines Section 15126.6 requires an EIR to describe a range of reasonable alternatives to the proposed project, or its location, that would feasibly attain most, but not necessarily all, of the basic objectives.

6.1.4 Feasibility

CEQA Guidelines Section 15364 defines "feasible" as:

> *. . . capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.*

In addition, CEQA requires that the Lead Agency consider site suitability, economic viability, availability of infrastructure, general plan consistency, other regulatory limitations, jurisdictional boundaries, and project proponent's control over alternative sites in determining the range of alternatives to be evaluated in the EIR (CEQA Guidelines Section 15126.6(f)). Feasibility can include three components:

- **Legal Feasibility:** Does the alternative have legal implications that may prohibit or substantially limit the feasibility of permitting the project?

- **Regulatory Feasibility:** Does the alternative have the potential to include lands that have regulatory restrictions that may substantially limit the feasibility of, or permitting of, the project within a reasonable period of time?

- **Technical Feasibility:** Is the alternative feasible from a technological perspective, considering available technology?

For the screening analysis, the legal, technical, and regulatory feasibility of potential alternatives must assessed.

This screening analysis does not eliminate potential alternatives based on relative economic factors or costs of the alternatives (as long as they are found to be economically feasible) since CEQA Guidelines require consideration of alternatives capable of eliminating or reducing significant environmental effects even though they may "impede to some degree the attainment of project objectives or would be more costly" (CEQA Guidelines Section 16126.6(b)).

For the Project, factors considered when addressing the feasibility of an alternative included, without limitation, site suitability, ability to support infrastructure, general plan consistency, consistency with other plans or regulatory limitations, jurisdictional boundaries, economic viability, and whether the Applicant reasonably can acquire, control, or otherwise have access to an alternative site. None of these factors alone establishes a fixed limit on the scope of alternatives (CEQA Guidelines §15126.6(f)).

6.1.5 Potential to Eliminate Significant Environmental Effects

CEQA requires lead agencies to identify alternatives that could "avoid or substantially lessen any of the significant effects of the project" (CEQA Guidelines §15126.6(a)). If an alternative was identified that clearly would not provide potential overall environmental advantage as compared to the Project, it was eliminated from further consideration. At the screening stage, it is neither possible, nor legally required, to evaluate all of the impacts of the alternatives in comparison to the Project with absolute certainty, nor is it possible to quantify impacts. It is possible, however, to identify elements of an alternative that are likely to be the sources of impact and to relate them generally to general conditions in the subject area.

6.2 Potentially Significant Impacts of the Project

As explained above, CEQA requires the lead agency to identify and evaluate a reasonable range of alternatives that could avoid or substantially lessen any of the significant adverse environmental impacts of the Project. This EIR evaluates the potential impacts of implementing the Project. As discussed in detail in EIR Chapters 4 and 5, after the implementation of the mitigation measures proposed in this EIR, there would still remain a significant and unavoidable impact to Air Quality (see Impacts 4.1-1b and 4.1-2) from indirect NOx emissions along the Union Pacific Railroad mainline. All other environmental impacts associated with the Project were determined to be insignificant.

6.3 Alternatives Considered but Dismissed from Further Consideration in this EIR

The alternatives listed below are those that have been eliminated from detailed analysis. These alternatives were not included for further consideration because they would not meet the basic Project objectives, would not be feasible, and/or would not avoid or substantially reduce potential environmental effects of the Project.

Each alternative considered is summarized below, along with an explanation as to why it was not carried forward for further evaluation.

6.3.1 Locate Tank car Unloading Racks at the Port of Benicia Valero Marine Terminal

The existing Valero Marine Terminal at the Port of Benicia was considered as a location for constructing the tank car transfer equipment; however, this location was rejected as infeasible due to insufficient space to locate the tank car offloading rack within limits of existing Valero property.

6.3.2 Locate Tank car Unloading Racks at the AMPORTS Property Near Benicia Marine Terminal

Constructing the transfer equipment on property now owned by AMPORTS in the vicinity of the Valero Marine Terminal was considered; however, this alternative would interfere with existing vehicle import offloading activities. In addition, similar to the Port of Benicia Valero Marine Terminal alternative, there is insufficient space to locate the tank car offloading rack. For these two reasons, this alternative was rejected as infeasible.

6.3.3 Receiving Crude from the Proposed WesPac Energy--Pittsburg Terminal

A third party project – a terminal for WesPac Energy–Pittsburg Terminal (WesPac Terminal) – is currently undergoing CEQA review by the City of Pittsburg. This project has the potential to offload crude oil from tank cars. The WesPac Terminal was historically used to berth and moor vessels, as well as to support the required equipment to transfer product between marine vessels and the onshore storage tanks; however, this facility was placed into “caretaker status” in 2003, and is not currently in service. However, WesPac Energy–Pittsburg LLC has proposed to reactivate the existing oil storage and transfer facilities located at the NRG Energy, Inc. Pittsburg Generating Station.

The WesPac Terminal project, if implemented as proposed, would receive crude oil and partially refined crude oil delivered by trains, marine vessels, and pipelines, store the oil in existing or new storage tanks, and then transfer oil to nearby refineries. In the WesPac Draft Environmental Impact Report (City of Pittsburg, 2013), all five Bay Area refineries are listed by WesPac as possible refineries to receive crude handled at the WesPac Terminal. According to the City of Pittsburg website, as of March 2014 the WesPac project is undergoing additional review. The City of Pittsburg does not currently have a timeframe available for this additional review. The WesPac Terminal as proposed would connect to two third-party common-carrier pipelines, including the KLM (Kettleman-Los Medanos) Pipeline (owned and operated by Chevron Pipeline Company) that currently provides crude oil to the Valero Benicia Refinery and other Bay Area refineries.

The alternative was considered whereby Valero would procure crude oil from WesPac by either delivering crude oil to the WesPac facility or simply purchasing crude oil from the WesPac facility that was delivered from other suppliers. The crude oil would then be delivered to the Refinery by the KLM pipeline.

Valero has no plans to utilize the proposed WesPac Terminal in Pittsburg because, according to Valero, there is insufficient pipeline capacity available to transport the additional crude to the Refinery through existing pipelines. Without additional pipeline capacity between the proposed WesPac facility and Valero (involving new crossings of the Carquinez Strait, and additional CEQA review), this alternative is infeasible because it would not fulfill the basic objective of allowing for delivery of as much as 70,000 barrels per day of North American crude oil.

6.3.4 Project with an Onsite Wye Rail Spur

Early designs of the project considered utilizing an existing rail spur located within the Refinery property to store empty tank cars prior to their departure from the Refinery. In this alternative, new track would be installed to connect the petroleum coke spur on the west side of the Refinery to the new spur for the Project in the form of a wye (referred to as "the wye connector"). This alternative was rejected because the operation would interfere with existing railway activity within the Refinery and because of concern for a potential safety risk from the storage of tank cars on an inclined track (the petroleum coke spur) within the Refinery.

6.4 Alternatives to the Project

6.4.1 No Project Alternative

CEQA requires an evaluation of the No Project Alternative so that decision makers can compare the impacts of approving the project with the impacts of not approving the project. According to CEQA Guidelines §15126.6(e), the No Project Alternative must include:

(a) the assumption that conditions at the time of the Notice of Preparation (i.e., baseline environmental conditions) would not be changed since the proposed project would not be installed, and

(b) the events or actions that would be reasonably expected to occur in the foreseeable future if the project were not approved.

The first condition is described in the EIR for each environmental discipline as the "environmental baseline," since no impacts of the Project would be created. This section defines the second condition of reasonably foreseeable actions or events.

The No Project alternative would consist of the existing Refinery configuration and operation, together with on-going maintenance activities and other projects planned or currently underway. The Refinery's regular maintenance turnarounds would continue to occur.

Under the No Project alternative, the Project would not be constructed, which would prevent crude oil from being transported to the Refinery via tank car. The Refinery's existing facilities would remain at the site of the proposed unloading racks and spurs and the Refinery would continue to use marine vessels to import crude oil. The amount of California crude oil delivered to the Refinery by pipeline would remain unchanged. Valero would not be able to achieve the

basic project objectives, including access to as much as 70,000 barrels per day of North American crude oil (see Section 6.1.2).

Air emissions (both criteria pollutants and greenhouse gases) from marine vessels that transport crude oil would remain unchanged, because there would be no reduction in marine vessel trips.

Emissions of greenhouse gases would be higher in the Bay Area Basin with the No Project alternative than with the Project because there would be no reduction from elimination of up to 82 percent of marine vessel trips annually. Global greenhouse gas emissions would be also higher with the No Project alternative than with the proposed project. Direct Project-related emissions of ROG, NOx, CO, PM and SO_2 would all be higher with the No Project alternative than with the Project, however because there would be no indirect emissions from crude by rail trains, the significant and unavoidable air quality impact (4.1-1b and 4.1-2) would not occur because NO_x emissions would not occur in the Sacramento Metropolitan Air Quality Management District or the Yolo-Solano Air Quality Management District.

6.4.2 Reduced-Project Alternatives

Reduced-project alternatives are usually considered as a means to reduce potentially adverse environmental effects of a project. A reduced-project alternative considers components of the Project that could potentially be eliminated or reduced from the full Project scope. Alternatives 1 and 2 both involve reduced operations.

6.4.2.1 Alternative 1 – Limiting Project to One 50-Car Train Delivery per Day

Under this alternative, the Project would operate with a 50% reduction in the proposed number of train deliveries to the Refinery per day.[1] Deliveries would be limited to a maximum of one 50-car train each day, containing a daily total of 35,000 barrels. This single train would be delivered during nighttime hours (between 8:00 p.m. and 6:00 a.m.) and once emptied, would depart the Refinery during nighttime hours and be returned to its origination point. All other aspects of this alternative would be the same as the Project.

Analysis

Alternative 1 would have essentially the same impacts as the Project except in the areas of air quality and climate change. Alternative 1 would reduce the emission of criteria pollutants, toxic air emissions, and greenhouse gases from trains as compared with the Project. At the same time, however, Alternative 1 would result in smaller reductions in the same pollutants from marine vessels. Overall, Alternative 1 would result in greater emissions of criteria pollutants, toxic air emissions, and greenhouse gases.

[1] Note: The Refinery has limited space in proximity to the proposed unloading rack. Therefore, it is capable of accepting delivery of only 50 railcars at a time.

As with the Project, under Alternative 1 locomotive emissions would have a significant NOx impact within the Yolo-Solano Air Quality Management District (AQMD). Alternative 1, however, would avoid the Project's significant NOx impact in the Sacramento Metro AQMD.

By eliminating two rail crossings per day, Alternative 1 would reduce local traffic impacts.

Alternative 1 would not allow Valero to fully achieve the primary Project objectives 1 and 2, which includes receiving as much as 70,000 barrels of North American crude oil by rail and achieving reductions in maritime deliveries and emissions (see Section 6.1.2, above), but would still fulfill Project objectives 3 through 5.

As explained in Section 3.7, Union Pacific has taken the position that any limitation on the volume of product it ships or the frequency, route, or configuration of such shipments is clearly preempted by federal law (See Appendix L). Thus, Alternative 1 may be legally infeasible.

6.4.2.2 Alternative 2 – Two 50-Car Trains Delivered during Nighttime Hours

Under Alternative 2, Valero would be required to schedule all Park Road train crossings during the nighttime hours between 8:00 p.m. and 6:00 a.m. This could be accomplished through sequencing two 50-car trains such that they are delivered and subsequently depart only during nighttime hours. All other aspects of this alternative would be the same as the Project.

Analysis

As with Alternative 1, for most environmental topics, this alternative would have essentially the same impacts as the Project. Alternative 1 would have different impacts in the areas of noise and traffic.

As compared with the Project, there would be more noise associated with the movement and unloading of trains at night because two trains would arrive and depart at night rather than just one. While the highest level of noise would be the same, Alternative 1 would achieve that level for longer periods of time.

As compared with the Project, under Alternative 1 train crossings at Park Road would affect fewer vehicles because there is substantially less traffic at night than during the day. The Project, however, will not have a significant effect on traffic; thus, Alternative 1 will not eliminate any significant effects. Alternative 2 would still allow Valero to achieve most of its Project objectives.

6.4.3 Alternative 3 – Offsite Unloading Terminal

As discussed above in Sections 6.3.1 through 6.3.3, several alternative sites were considered and rejected as being infeasible. Given the hilly site topography and generally congested nature of the Valero Benicia Refinery, there are no other areas onsite which could support the unloading facility and necessary rail lines. In general, siting the tank car unloading facility outside the Refinery boundary would carry with it the need for an unloading rack and a new pipeline to bring the crude from this offsite facility to the Refinery.

One possible alternative offsite loading facility, the WesPac Terminal in Pittsburg, was discussed and eliminated as infeasible for reasons discussed above in Section 6.3.3.

Alternative 3 would consist of a separate, offsite facility where crude oil could be shipped by either marine vessel or rail, and then transferred to the Refinery presumably by a new pipeline. There are two variations to this alternative: 1) the offsite terminal would be developed and operated by Valero, or 2) the offsite terminal would be independently developed and operated by a third party.

Regardless of ownership, environmental impacts would occur if such a facility were to be built.

If Valero were the operator and owner of an offsite terminal, all impacts (construction and operation including a pipeline to the Refinery) would have to be considered as part of the proposed Crude by Rail Project and considered in the current CEQA analysis of this Project. Most of the impacts identified for the proposed CBR Project would occur at a Valero owned offsite terminal, although potential impacts to local traffic flow could likely be reduced depending on where the terminal was located. Alternative 3 would involve greater construction impacts, based on the need to build additional infrastructure, than would occur if the unloading racks were constructed within the Refinery.

Under the third party operator[2] variant, new or existing infrastructure could be developed to receive crude oil and transfer it to Valero via new pipeline. In this case it is likely that new CEQA review would be required for the offsite facility and the pipeline to Valero would have to be considered within this analysis as a direct impact of the project.

Analysis

There are many unknowns under this alternative, including whether this would be a new facility or an existing one, and how far away this facility would be from the Refinery. The requirement for a new pipeline from this offsite facility alone would include substantive environmental impacts from all construction activities (e.g., air quality, greenhouse gas emissions, noise, biological and cultural resources), which could exceed those of construction of the Project. Regardless of method of shipping crude oil to any offsite terminal (marine vessel or tank car), both methods have potential for accidental release of crude into sensitive areas.

In the final analysis, any variation of Alternative 3 would simply add the impacts of the new pipeline construction and operation to the Project's impacts. Thus, the impacts of Alternative 3 would be at least somewhat greater than those of the Project. Although Alternative 3 would meet all objectives of the Project and could reduce the impacts to the local Refinery / Benicia area, many of these same impacts would be simply transferred to another location.

[2] Besides the proposed WesPac Terminal project discussed in Section 6.3.3, several of the nearby refineries and marine terminals could conceivably be configured to receive crude oil by rail and transfer this to the Valero Refinery via new pipeline.

6.4.4 Environmentally Superior Alternative

If the no project alternative is considered the environmentally superior alternative, CEQA Guidelines Section 15126.6(e)(2) requires an EIR to also identify an environmentally superior alternative among the other alternatives. Here, the no project alternative is not environmentally superior to the Project. Therefore, it is not necessary to identify an environmentally superior alternative from among the other alternatives. Nevertheless, this EIR identifies herein an alternative that may be superior to the Project in certain specific and limited respects, as discussed below.

CEQA does not provide specific direction regarding the methodology of comparing alternatives to a proposed project. Each project must be evaluated for the issues and impacts that are most important; this will vary depending on the project type and the environmental setting. Issue areas with significant long-term impacts are generally given more weight in comparing alternatives. Impacts that are short-term (e.g., construction-related impacts) or those that can be mitigated to less than significant levels are generally considered to be less important.

As explained above in Section 6.4.2, Alternative 1 is environmentally superior to the Project in a few respects. Alternative 1 would reduce the emission of criteria pollutants, toxic air emissions, and greenhouse gases from trains as compared with the Project, and avoid the Project's significant NOx impact in the Sacramento Metro AQMD. However, as explained above, this alternative may be legally infeasible because of federal preemption. Alternative 1 would also reduce the impacts of train crossings on traffic. Since the Project would not have a significant effect on traffic, however, Alternative 1 would not avoid any significant traffic effect.

The Project, however, is environmentally superior to Alternative 1 with respect to overall air quality. Alternative 1 would result in greater emissions of criteria pollutants, toxic air emissions, and greenhouse gases than the Project overall, because Alternative 1 involves 50% more emissions of these same pollutants from marine vessels.

Otherwise, the impacts of Alternative 1 and the Project are the same.

CHAPTER 7
Report Preparation

7.1 Report Authors

7.1.1 Lead Agency

City of Benicia
Community Development Department
250 East L Street
Benicia, CA 94510

Heather Mc Laughlin	City Attorney
Brad Kilger	City Manager
Amy Million	Principal Planner
Jim Lydon	Fire Chief
Mike Roberts	Principal Civil Engineer
Nancy Kaufman	Interim Land Use Manager
Alex Porteshawver	Climate Action Plan Coordinator

7.1.2 Consultants

Environmental Science Associates

550 Kearny Street, Suite 800
San Francisco, CA 94108

Chuck Bennett	Project Director
Tim Morgan	Project Manager; Energy Conservation; Hazards and Hazardous Materials; Alternatives
Cory Barringhaus	Deputy Project Manager; Land Use
Matt Fagundes	Air Quality; Greenhouse Gas Emissions; Noise
Chris Sanchez	Noise
Jack Hutchison	Transportation and Traffic
Justin Taplin	Geology and Soils; Hydrology and Water Quality
Natasha Dvorak	Biological Resources
Heidi Koenig	Cultural Resources
Kristina Tierney	Air Quality; Greenhouse Gas Emissions; Noise
Michelle Williams	Cumulative Impacts

Dave Powell, Consultant

Project Description

Bob Vranka, Ph.D., Consultant

Hazards and Hazardous Materials

University of Illinois at Urbana-Champaign Rail Transportation and Engineering Center (RailTEC), Consultant

Christopher P.L. Barkan, Ph.D.	Hazards and Hazardous Materials
M. Rapik Saat, Ph.D.	Hazards and Hazardous Materials
Xiang Liu, Ph.D.	Hazards and Hazardous Materials

Julia Lester, PhD, Environ, Consultant

Air Quality

Stephen J. McGovern. P.E., Ph.D, Consultant

Hazards and Hazardous Materials; Air Quality

7.2 Agencies and Organizations Contacted

Bay Area Air Quality Management District
Union Pacific Railroad

CHAPTER 8
Glossary and Acronyms

8.1 Glossary

A number of technical terms are used in the refining industry and at the Valero Benicia Refinery (Refinery) to describe the operations and equipment that are in use there. This glossary includes selected definitions and in some cases expanded descriptions of these terms that allow the reader of this document who is unfamiliar with the refining industry to understand the basic operations within a refinery. In addition, these expanded descriptions also present how these processes specifically take place at the Refinery.

API Gravity — The industry standard unit of measure of crude's density (heavy or light). The higher the *API gravity* number, the lighter the crude which means the barrel of crude contains more light (small) hydrocarbon molecules; heavy crudes contain more large hydrocarbon molecules and have lower API Gravity numbers.

Barrel — In the petroleum industry, a volume of 42 gallons.

Bottom-unload — Tank car unloading method in which tank cars would be emptied into a single pipeline located between the two rail spurs at slightly below ground level.

Catalyst — In classical chemistry terms, a *catalyst* promotes a chemical reaction without itself being consumed in the reaction. A catalyst accelerates a chemical reaction so it will proceed at a reasonable rate at lower temperatures and pressures than the reaction would without a catalyst. Typically, refinery catalysts are round or cylindrical in shape and are materials called zealots, or alumna, or are silica or elemental carbon, called coke. These catalysts deteriorate over time and require replacement or regeneration when their activity drops below a specified level.

Coker Unit — A type of *process unit* that converts residual oil into *petroleum coke* and lighter process streams.

Cracking — *Cracking* is used to produce more gasoline from each barrel of crude oil than naturally exists. The heavier cuts or *fractions* from the crude distillation unit and the *gas oils* that are produced as *feedstocks* consist of large, heavy *hydrocarbon* molecules, which are too large to have the desired properties. However, when hydrocarbons are heated to about 900°F they begin to break, or crack, into smaller molecules. *Cracking* converts some of the larger molecules of heavy oils into shorter-chained molecules.

Criteria Air Pollutant

An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include: ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), and PM_{10} and $PM_{2.5}$.

Crude oil

Crude oil is the basic petroleum feedstock that is processed at the Refinery. Crude oil contains many different hydrocarbon molecules, usually with a wide range of boiling points, representing many potential products such as propane, butane, gasoline, jet fuel, diesel oil, and fuel oil. Because crude oil is a natural product, there is a wide variation in the characteristics of a crude depending mostly on the wells from which it is obtained. Crude oils usually contain some sulfur; crudes that contain low percentages of sulfur, 0.5% or less, are called “sweet” crudes, while crudes that contain high percentages of sulfur, 2.5% or more, are called “sour” crudes. Crudes with sulfur percentages in between are called “intermediate”. Crude oils also may contain other organic compounds that include nitrogen and metals, along with inorganic salts and water, again, depending on the origin of the crude.

Crude oil consists mainly of hydrocarbons, chemical compounds made up of hydrogen and carbon atoms that are combined into molecules of different sizes, shapes, and configurations. The smallest hydrocarbon molecules, with only a few atoms of hydrogen and carbon, such as methane, ethane, propane and butane, are gases under normal conditions, while somewhat larger hydrocarbon molecules, such as gasoline and diesel, are liquids and very large hydrocarbon molecules, such as asphalt and tar, are solids. These basic physical properties result mainly from the number of carbon atoms in each compound and give the crude the name “light” or “heavy”, depending on the fractions of lighter and heavier hydrocarbons in the crude oil.

Cut points

During *distillation*, for example, a refiner must determine the particular range of hydrocarbon weights for each fraction produced. This is known as setting the “cut points” or boiling points of each range.

Distillation

Distillation is the first step in the refining process and is separating each of the chemical hydrocarbon compounds (*fractions*) in the crude oil mixture by heating the mixture.

Feedstock

The term *feedstock* (also called a “feed”) is commonly used to denote the fluid material that is fed into a refinery process unit. For example, *crude oil* is a *feedstock* for the crude distillation unit. In a similar vein, the term “stream” refers to the *feedstock* and also can refer to the output of the process.

Fluid Catalytic Cracking Unit

The *Fluid Catalytic Cracking Unit* and *Hydrocracker Unit* make heavier process streams lighter by breaking larger hydrocarbons into smaller ones. See *process units*.

Fraction	Components separated from crude oil through *distillation*. The components are commonly referred to as "fractions." *Fraction* is a generic name for the groups of hydrocarbon compounds that boil between any two temperatures. Lighter fractions have relatively lower boiling points, while heavier fractions have relatively higher boiling points. Common fractions include, from lightest to heaviest, petroleum gases, naphthas, kerosene, middle distillate, gas oil, and residue.
Gas Oil	*Gas Oil* is a material that has been processed in a refinery and is one of the heavier fractions resulting from the initial distillation and separation of crude oil.
Hydrocarbons	Molecules made up primarily of hydrogen and carbon atoms. *Hydrocarbons* range in "weight," measured by the number of carbon atoms present in each molecule. The lightest hydrocarbons, for example, are petroleum gases such as methane, ethane, propane, and butane. Each molecule of these gases 1 to 4 carbon atoms. The hydrocarbons in gasoline are heavier, with anywhere from 5 to 12 carbon atoms in each molecule. The hydrocarbons in tar and asphalt are much heavier, with more than 70 carbon atoms in each molecule.
Hydrofining Unit	A type of *process unit* used by refineries to remove sulfur and other impurities from refinery streams. *Hydrofiners* remove sulfur in the form of hydrogen sulfide, which is then converted into elemental sulfur in Sulfur Recovery Units. Impurities come out of the process as solids, or in the case of sulfur, as a hot liquid (or "molten sulfur").
Hydrocracker	*Hydrocrackers* make heavier process streams lighter by breaking larger hydrocarbons into smaller ones.
Linear programming	*Linear programming* involves the use of a mathematical model to determine the most profitable operating strategy for a particular refinery. The model "inputs" include variables such as the configuration and constraints of the refinery in question, the crudes available, market demand, product prices, and product specifications. The model "outputs" include the crudes that should be purchased, the product slate that should be produced, the cut points, and the manner in which each intermediate process stream should be treated and blended.
Management of Change (MOC)	One of the Refinery's safety programs that manages changes to process streams, chemicals, technology, equipment, and procedures.
Mechanical Integrity (MI)	One of the Refinery's safety programs that monitors and evaluates piping and other equipment to determine the actual condition of the equipment.
Petroleum Coke	A carbonaceous solid derived from oil refinery *coker units* or other *cracking* processes. Other coke has traditionally been derived from coal.
Pipestill Unit	Type of Refinery *processing unit* that separates crude blends into *fractions.*

Process Units After a *crude oil* is separated into *fractions* through *distillation*, the resulting streams are treated in various *process units* and ultimately blended into marketable products. Processing units include the *Pipestill Unit, Fluid Catalytic Cracking Unit, and Hydrocracker Unit, Hydrofiing Unit, Sulfer Recovery Unit, Coker Unit,* and *Reforming Unit.*

Reforming *Reforming* modifies the chemical structure of the feedstock hydrocarbons into more valuable hydrocarbon compounds. See *Catalyst.*

Sulfur Content The *sulfur content* of crude oil generally ranges anywhere from 0.5% to 3%. Generally, crudes with a sulfur content of less than 1% are known as "sweet" crudes and crudes with a sulfur content greater than 1% are known as "sour" crudes. As a general rule, heavier crudes require more processing than light crudes, and sour crudes require more processing than sweet crudes. Thus, the "quality" of a crude oil is generally considered to be a function of its weight and sulfur content.

Storage Tanks In the Refinery, large tanks are used to store incoming petroleum raw materials such as crude oil, which are unloaded and pumped via pipelines to crude oil storage tanks within the Refinery. All raw materials and products are pumped through pipelines that connect the tanks, refinery process units and refinery shipping terminals. The tanks typically are equipped with a special floating roof to reduce the evaporation of raw hydrocarbons into the air.

Sulfur Recovery Unit Type of *process unit* where *hydrogen sulfide* is absorbed from refinery gases to reduce their sulfur content so that they can be burned for heating refinery intermediate streams. The hydrogen sulfide is desorbed by steam heating the solution and the hydrogen sulfide is burned to form sulfur oxides which are absorbed and converted to molten sulfur using the Claus process.

Turnaround The term *turnaround* refers to scheduled maintenance actions when refinery equipment is not available to process *feedstocks*, as opposed to refinery equipment's typical 24 hour a day, 365 day a year operation. Turnarounds are termed major when significant portions of the refinery are shut down; minor turnarounds may affect only certain units, or parts of the total refinery.

8.2 Acronyms and Abbreviations Used in This EIR

AAR	Association of American Railroads
AB	Assembly Bill
ABAG	Association of Bay Area Governments
AISC	American Institute of Steel Construction
ANS	Alaskan North Slope
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
AB	Assembly Bill
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BART	Bay Area Rapid Transit
bbl	Barrel
BCDC	Bay Conservation and Development Commission
BDCP	The Bay Delta Conservation Plan
bgs	Below ground surface
BMP	Best Management Practice
BTU	British Thermal Unit
BO	Biological Opinion
CAA	Clean Air Act
CAP	Clean Air Plan
CAAQS	California Ambient Air Quality Standard
CalARP	California Accidental Release Prevention
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	California Governor's Office of Emergency Services
Cal/OSHA	California Occupational Safety and Health Program
Caltrans	California Department of Transportation
Cal/VPP	Cal/OSHAVoluntary Protection Program
CARB	California Air Resources Board
CBC	California Building Code
CBSC	California Building Standards Commission
CCR	California Code of Regulations
CDFW, or CDFG	California Department of Fish and Wildlife (formerly known as the Department of Fish and Game, or CDFG)
CDMG	California Division of Mines and Geology
CEC	California Energy Commission
CFR	Code of Federal Regulations
CGS	California Geological Survey (formerly California Division of Mines and Geology)
CEQA	California Environmental Quality Act
CH_4	Methane

CMA	Congestion Management Agency
CML	Condition monitoring locations
CMP	Congestion Management Plan
CNDDB	California National Diversity Data Base
CNPS	California Native Plant Society
CRHR	California Register of Historical Resources
CSLC	California State Lands Commission
CO	Carbon Monoxide
CO_2e	Carbon Dioxide Equivalents
Corps	U.S. Army Corps of Engineers
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DG	Decomposed granite
DNL	Day-Night Noise Level (L_{dn})
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPM	Diesel Particulate Matter
DPR	California Department of Parks and Recreation
DSOD	California Division of Safety of Dams
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMT	Emergency Response Technician
ESA	Endangered Species Act
ºF	Fahrenheit
FAST	Fairfield and Suisun Transit
FCCU	Fluid Catalytic Cracking Unit
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHSZ	Fire Hazard Severity Zone or Zoning
FIRM	Flood Insurance Rate Map
FRA	Federal Railroad Administration
FRP	Facility Response Plans
FTA	Federal Transit Administration
FTC	Federal Trade Commission
GHG	greenhouse gases
gpm	gallons per minute
HARP	Hotspots Analysis and Reporting Program

HCP	Habitat Conservation Plan
HFC	Hydrofluorocarbons
HMERP	Hazardous Materials Emergency Response Plan
HRM	Hazardous Materials Regulations
Hz	Hertz
IBC	International Building Code
ICCTA	Interstate Commerce Commission Termination Act
IS/MND	Initial Study/Negative Declaration
LCFS	Low Carbon Fuel Standard
L_{dn}	Also referred to as DNL- Day-night noise level
L_{eq}	The equivalent sound level is used to describe noise over a specified period of time, in terms of a single numerical value
LOS	Level of Service
LPG	Liquefied Petroleum Gas
LVW	Loaded Vehicle Weight
MBTA	Migratory Bird Treaty Act
MCE	Maximum Credible Earthquake
MEIR	Maximum Exposed Individual Residence
MEIW	Maximum Exposed Individual Worker
MI	Management Integrity
MLD	Most Likely Descendent
MM	Modified Mercalli (MM) intensity (MMI) scale
MOC	Management of Change process
MPH	Miles Per Hour
MSDS	Material Safety Data Sheets
MSR	Maximum Sensitive Receptor
MTC	Metropolitan Transportation Commission
M_w	(earthquake) Moment Magnitude
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NEHRP	National Earthquake Hazards Reduction Program
NFPA	National Fire Protection Association
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NHTSA	National Highway Safety Administration
NIIMS	National Interagency Incident Management System
NMFS	National Marine Fisheries Service
N_2O	Nitrous oxide
NOI	Notice of Intent
NOP	Notice of Preparation

NOT	Notice of Termination
NOx	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTSB	National Transportation Safety Board
NWIC	Northwest Information Center
OGV	Ocean going vessel
OSHA	Occupational Safety and Health Administration (Federal)
OSPR	California Office of Spill Prevention and Response
OSRO	Oil Spill Response Organizations
PFC	perfluorocarbons
PG&E	Pacific Gas & Electric Company
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM	Particulate Matter
PMAO	(Bay Area) Petrochemical Mutual Aid Organization
PMI	Positive Material Identification
PM_{10}	PM less than 10 microns in size
$PM_{2.5}$	PM less than 2.5 microns in size
ppb	Parts per billion
ppm	Parts per million
ppmw	Parts Per Million by Weight
PPV	Peak Particle Velocity
PRD	Permit Registration Documents
PRC	Public Resources Code
Project	Valero Benicia Crude by Rail project
PSD	Prevention of Significant Deterioration
PSHA	probabilistic seismic hazard assessment
PSM	Process Safety Management
PT-SRT	Process Team-Spill Response Team
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RF	Regulatory Floodway
RFG	Refinery Fuel Gas
RMP	Risk Management Plan or Regional Monitoring Program
RMS	Root Mean Square
ROG	Reactive Organic Gases
RQ	reportable quantities
RWQCB	Regional Water Quality Control Board
SEC	Securities and Exchange Commission
SB	Senate Bill

SCWA	Solano County Water Agency
SDC	Seismic Design Category
SDS	Safety Data Sheets
SF_6	Sulfur Hexafluoride
SFHA	Special Flood Hazard Area
SFRWQCB	San Francisco Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMLPP	Suisun Marsh Local Protection Program
SMT	Spill Management Team
SO_2	Sulfur Dioxide
SPP	Steam Power Plant
SPCC	Spill Prevention and Countermeasure Control Plan
STA	Solano Transportation Authority
SVP	Society of Vertebrate Paleontology
SWMP	Storm Water Management Plan
SWP	State Water Project
SWRCB	State Water Resources Control Board (State Board)
SWPPP	Storm Water Pollution Prevention Plan
TAC	Toxic Air Contaminants
TAN	Total Acid Number
TBACT	Best Available Control Technology for Toxics
TMDL	Total Maximum Daily Loads
tpy	Tons per year
UPRR	Union Pacific Railroad
USBR	U.S. Bureau of Reclamation
USDOE	U.S. Department of Energy
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
VIP	Valero Improvement Project
VOC	Volatile Organic Compounds

This page intentionally left blank

CHAPTER 9
References

Chapter 3, Project Description

Valero, 2013. *Responses to City of Benicia Information Request dated September 30, 2013.* Various dates between October 2013 and December 2013.

Valero, 2013. Response to Bay Area Air Quality Management District, 3/20/2013 Project Questions. April 11, 2013.

Valero, 2014. www.valero.com/ourbusiness/ourlocations/refineries/pages/benicia.aspx. Accessed May 15, 2014.

Chapter 4, Environmental Setting, Impacts, and Mitigation Measures

Section 4.1, Air Quality

Alameda Superior Court, 2012a, *Statement of Decision – California Building Industry Association v. Bay Area Air Quality Management District*, March 5, 2012.

Alameda Superior Court, 2012b, *Peremptory Writ of Mandate – California Building Industry Association v. Bay Area Air Quality Management District*, March 5, 2012.

Bay Area Air Quality Management District (BAAQMD), 2009a. Benicia Air Monitoring Station Preliminary Results, Benicia Community Meeting, May 2009, Eric Stevenson, Air Monitoring Manager

BAAQMD, 2009b. *Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance*, October, 2009.

BAAQMD, 2010a, *California Environmental Quality Act Guidelines Update, Proposed Thresholds of Significance*, May 3, 2010.

BAAQMD, 2010b. *Bay Area 2010 Clean Air Plan, Final Clean Air Plan Volume 1*, adopted September 15, 2010.

BAAQMD, 2011. *Letter from Jean Roggenkamp, BAAQMD Deputy Air Pollution Control Officer, to Telma B. Mereira, Contra Costa County Community Development Department of Conservation and Development re DEIR for the Shell Crude Tank Replacement Project*, September 12, 2011.

BAAQMD, 2012. *CEQA Air Quality Guidelines*, Updated May 2012.

BAAQMD, 2013. Authority to Construct / Permit to Operate. Webpage (http://www.baaqmd.gov/Divisions/Engineering/Authority-to-Construct-Permit-to-Operate.aspx) Last updated January 9, 2013.

BAAQMD, 2014a. Air Quality Standards and Attainment Status, obtained on-line (http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm) January 13, 2014.

BAAQMD, 2014b. CEQA Guidelines webpage (http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES.aspx) last updated January 16, 2014.

California Air Resources Board (CARB), 2009. Methodology for estimating premature deaths Associated with Long-Term Exposures to Fine Airborne Particulate Matter in California Draft Staff Report, December 7, 2009.

CARB, 2013. iADAM Air Quality Data Statistics. [http://www.arb.ca.gov/adam/index.html] Accessed December 23, 2013.

City of Benicia, 1999. General Plan, June 1999.

City of Benicia, 2013. Climate and Temperature Summary. Accessed online October 1, 2013 at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC=%7B9AA16CE0-F37D-4D59-8BF7-98443ADCB3A7%7D&DE=%7B31CD8D17-FC34-437A-80A5-78D2B7A5E9AE%7DEnvironmental Resources Management (ERM), 2013a. Valero Crude by Rail Project Construction Emissions. April 1, 2013.

Environmental Resources Management (ERM), 2013a. Valero Crude by Rail Project Construction Emissions. April 1, 2013.

ERM, 2013b. Crude by Rail Air Permit Application, February 2013.

ERM, 2013c. Crude by Rail Air Permit Application. Project Update Document #1, November 2013.

ERM, 2014a. Marine Vessel Criteria Pollutant and Greenhouse Gas Baseline Emissions, Public Copy, June 5, 2014.

ERM, 2014b. Technical memorandum: Updated Methodology for Assessment of Risk and PM2.5 Concentrations at Receptors near Locomotive Tracks in Fairfield, Ca. June.

Environmental Science Associates (ESA), 2014. Valero Crude by Rail Project Air Quality and Greenhouse Gas Emissions Supplement, June 11, 2014.

First Appellate District, 2013. *California Building Industry Association v. Bay Area Air Quality Management District* (2013) 218 Cal.App.4th 1171, *review granted and opinion superseded sub nom. California Bldg. Industry Assn. v. Bay Area Air Quality Management Dist.* (Cal. 2013) 164 Cal.Rptr.3d 552.

Placer County Air Pollution Control District (PCAQMD), 2012. CEQA Air Quality Handbook, October 2012.

Sacramento Metropolitan Air Quality Management District (SMAQMD), 2014. CEQA Guide December 2009, Last revised June 2014.

Supreme Court, 2013, *California Bldg. Industry Assn. v. Bay Area Air Quality Management Dist.* (Cal. 2013) 164 Cal.Rptr.3d 552 (granting review).

Yolo-Solano Air Quality Management District (YSAQMD), 2007. Handbook for Assessing and Mitigating Air Quality Impacts, Adopted July 7, 2007.

Section 4.2, Biological Resources

Altringham, Anne. 2012. "Train noise mapping: sound in the landscape and implications for wildlife." University of Edinburgh Master's Thesis. November 29, 2012. Available online at http://hdl.handle.net/1842/6377. Accessed April 16, 2014.

Audubon Society. 2007. WatchList 2007 Species. Available online at: http://birds.audubon.org/species-by-program/watchlist. Accessed December 3, 2013.

California Department of Fish and Game. 2010. Natural Communities List. Available online at: dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf. Accessed December 11, 2013.

California Department of Fish and Game. 2011. Special Animals List. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf. Accessed December 11, 2013.

California Department of Fish and Wildlife. 2013a. California Natural Diversity Database (CNDDB) 9-quad search for the Benicia, Mare Island, Cuttings Wharf, Cordelia, Fairfield South, Vine Hill, Walnut Creek, Briones Valley, and Richmond USGS 7.5-minute quadrangles, as well as the Denverton quadrangle. Rarefind 5. Online database. Accessed December 9, 2013.

California Department of Fish and Wildlife. 2013b. Special Plants Lists: *Endangered, Threatened, and Rare Plants List; Special Vascular Plants, Bryophytes, and Lichens List*. Available online at: http://www.dfg.ca.gov/wildlife/nongame/list.html. Accessed December 11, 2013.

California Department of Fish and Wildlife. 2013c. *List of State and Federally Listed Endangered and Threatened Animals of California, October 2013*. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf. Accessed December 11, 2013.

California Native Plant Society (CNPS), 2013. Online Inventory of Rare and Endangered Plants 9-quad search for the Benicia, Mare Island, Cuttings Wharf, Cordelia, Fairfield South, Vine Hill, Walnut Creek, Briones Valley, and Richmond USGS 7.5-minute quadrangles, as well as the Denverton quadrangle. Online database. Accessed December 11, 2013.

City of Benicia. 2008. Ordinance No. 8, Chapter 12.24, *Trees and Street Trees*. Available online at ci.benicia.ca.us/vertical/sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7BCE1C1C9F-446A-4D9F-BBD3-FB8E4DA54802%7D.PDF. Approved July, 2008. Accessed May 14, 2013.

City of Benicia. 1999. *Benicia General Plan,* adopted June 15, 1999.

City of Benicia. 2002. *Valero Refining Company's Land Use Application for the Valero Improvement Project, Environmental Impact Report*, October 2002.

County of Solano. 2008. Approved November 4, 2008. *Solano County General Plan*. Available online at co.solano.ca.us/depts/rm/planning/general_plan.asp. Accessed November 22, 2013.

Delta Conservancy. 2012. *Delta Conservancy Sacramento-San Joaquin 2012 Strategic Plan*. June 20, 2012.

Delta Stewardship Council, 2013. *The Delta Plan*.

Glover, S. 2007. *eBird Version 3.* Online: http://ebird.org/ebird/view/checklist?subID=S6002022. Site visited December 2013.

Harvey, H.T. 1966. *Some Ecological Aspects of San Francisco Bay*. Prepared for The San Francisco Bay Conservation and Development Commission. October 1966.

LSA Associates. 2012. *Final Administrative Draft Solano County Multi-Species Habitat Conservation Plan*. June 15, 2009.

Mayer, Kenneth E. and William F. Laudenslayer, editors. 1988. *A Guide to the Wildlife Habitats of California*. State of California Resources Agency, Department of Fish and Game, Sacramento, CA.

Monk and Associates, 2013. *Biological Resources Analysis for the Evergreen Management Group Goodyear Road, Solano County, California*. Prepared for JC Investment Consulting Inc. January 28, 2013.

National Marine Fisheries Service. 2013. Southwest Regional Office web page. Available online at: http://www.westcoast.fisheries.noaa.gov/. Accessed December 3, 2013.

National Park Service. Circa 2011. Annotated Bibliography of the Impacts of Noise on Wildlife. Available online at www.nature.nps.gov/sound/assets/docs/Wildlife_AnnotatedBiblio_Aug2011.pdf. Accessed April 16, 2014.

Seiler, Andreas. 2001. *Ecological Effects of Roads: A Review*. Available online at http://www.coalicionventanasverraco.org/files/ASeiler.pdf. Accessed April 16, 2014.

URS. 2002. *Benicia Valero MTBE Removal Project EIR*. 2002.

U.S. Department of the Interior (DOI), 2011. *Final Environmental Impact Statement/Environmental Impact Report for the Suisun Marsh Habitat Management, Preservation, and Restoration Plan.* November 2011.

U.S. Department of Transportation. 2011. *Highway Traffic Noise, Noise Effect on Wildlife*. Online information available at www.fhwa.dot.gov/environment/noise/noise_effect_on_wildlife/effects/wild04.cfm. Accessed April 16, 2014.

Woodward-Clyde Consultants. 1993. *Exxon Benicia Refinery Clean Fuels Project*. Prepared for City of Benicia. September 1993.

Section 4.3, Cultural Resources

Dexter, S.D. Benicia Arsenal Igloo Bunker #C-425, Primary # P-48-000516. California Department of Parks and Recreation Primary Record Form 523A. On file, Northwest Information Center, California Historical Resources Information Center, Sonoma State University, Rohnert Park, California, 2001.

Kleinfelder West, Inc., *Subsurface and Seismic Conditions along Avenue A, Valero Refinery, Benicia, California.* Prepared for Valero Refining Company. February 2013.

Levy, R., Costanoan. In *California*, edited by R.F. Heizer, pp. 485–495. Handbook of North American Indians, Volume 8. William G. Sturtevant, general editor. Smithsonian Institution, Washington D.C., 1978.

Milliken, Randall, *A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769–1810.* Ballena Press, Menlo Park, California, 1995.

Milliken, Randall, Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottfield, Donna Gillette, Vaviana Bellifemine, Eric Strother, Robert Cartier, and David A. Fredrickson. Punctuated Culture Change in the San Francisco Bay Area, In *Prehistoric California: Colonization, Culture, and Complexity*. Edited by T.L. Jones and K.A. Klar, pp. 99–124, AltaMira Press, 2007.

Milliken, Randall, Laurence H. Shoup, and Beverley R. Ortiz, *Ohlone/Costanoan Indians of the San Francisco Peninsula and their Neighbors, Yesterday and Today.* Prepared for National Park Service, Golden Gate National Recreation Area. June 2009.

Society of Vertebrate Paleontology (SVP), *Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines*, Society of Vertebrate Paleontology News Bulletin, Vol. 163, pp. 22–27. 1995.

Society of Vertebrate Paleontology (SVP), *Conditions of Receivership for Paleontologic Salvage Collections*, Society of Vertebrate Paleontology News Bulletin, Vol. 166, pp. 31–323. February 1996.

URS Corporation, *Cultural Resources Technical Report.* In Confidential Appendix E to Application for Certification for the Valero Cogeneration Project, Valero Benicia Refinery, Benicia, California, 2001.

Woodward-Clyde Consultants. Exxon Benicia Refinery Clean Fuels Project Draft Environmental Impact Report. Prepared for City of Benicia. September 1993.

Section 4.4, Energy Conservation

California Energy Commission (CEC), 2011. *California's Major Sources of Energy,* available online at http://energyalmanac.ca.gov/overview/energy_sources.html, accessed January 7, 2014.

California Energy Commission (CEC), 2013. *Total Electricity System Power*, available online at, http://energyalmanac.ca.gov/electricity/total_system_power.html, accessed January 7, 2014.

California Energy Commission (CEC), 2013. *2013 Integrated Energy Policy Report Update*. Publication Number: CEC-100-2013-001-LCF.

City of Benicia, 1998. *City of Benicia General Plan.* Adopted June 15, 1999.

City of Benicia. 2005. City of Benicia Municipal Code, available online at http://www.codepublishing.com/ca/benicia/, accessed January 7, 2014.

City of Benicia, 2009. Climate Action Plan. September 15, 2009. January 13, 2014.

Hannon et al., 1978. *Energy and Labor in the Construction Sector*. Article in Science Magazine. November 24, 1978.

Solano County, 2008. *Solano County General Plan.* Adopted August 5, 2008.

Tennessee-Tombigbee Waterway, 2014. *Shipping Comparisons,* available online at http://business.tenntom.org/why-use-the-waterway/shipping-comparisons/, accessed January 10, 2014.

True Cost, 2014. *True Cost – Analyzing our economy, government policy, and society through the lens of cost-benefit,* available online at http://truecostblog.com/2010/05/27/fuel-efficiency-modes-of-transportation-ranked-by-mpg/, accessed January 10, 2014.

Section 4.5, Geology and Soils

Association of Bay Area Governments (ABAG), 2010. On Shaky Ground – Documentation for 2003 Mapping Updated in 2010.

ABAG, 2013. Earthquake Hazard Map for Benicia. Scenario: Concord-Green Valley Fault. Accessed online on February 14, 2013 at: www.quake.abag.ca.gov

ABAG, 2013b. Rainfall-Induced Landslides: Existing Landslides. Accessed online on February 14, 2013 at: http://gis.abag.ca.gov/website/LandslideDistribution/index.html

California Department of Mines and Geology (CDMG), 1993. State of California Special Study Zones. Vine Hill Quadrangle. Revised Official Map. Effective July 1, 1993. Accessed online on February 14, 2013 at: http://gmw.consrv.ca.gov/shmp/download/ap/pdf/VINEHILL.PDF

California Geological Survey (CGS), 2013. Probabilistic Seismic Hazard Mapping Ground Motion Page. Accessed online on February 14, 2013 at: http://redirect.conservation.ca.gov/cgs/rghm/pshamap/pshamap.asp?Longitude=-122.15&Latitude=38.06

City of Benicia. 1999. *Benicia General Plan,* adopted June 15, 1999.

Federal Railroad Administration (FRA), 2013, Federal Railroad Administration Track Safety Standards Fact Sheet, FRA Office of Public Affairs. February 2013. Accessed online on March 26, 2014 at www.fra.dot.gov/Elib/Document/2906

Graymer, R. W., D. L. Jones, and E. E. Brabb, 2002. Geologic Map and Map Database of Northeastern San Francisco Bay Region, California. Most of Solano County and Parts of Napa, Marin, Contra Costa, San Joaquin, Sacramento, Yolo, and Sonoma Counties. U.S. Geologic Survey, 2002. Accessed online on February 14, 2013 at: http://pubs.usgs.gov/mf/2002/2403/mf2403f.pdf

Hart, E. W., 1997. Fault-Rupture Hazard Zones in California: Alquist-Priolo Special Studies Zones Act of 1972 with Index to Special Studies Zones Maps, California Division of Mines and Geology, Special Publication 42, 1990, revised and updated 1997.

Industrial Railways Company (IRC), 2013. Response to Geotechnical Seismic Deformation Modeling Report, Rail Car Offloading Facilities Project, Valero Refinery, Benicia, California. November 19, 2013.

Kleinfelder, 2013a. Subsurface and Seismic Conditions along Avenue A, Valero Refinery, Benicia, California. File No. 131669, February 28, 2013.

Kleinfelder, 2013b. Geotechnical Seismic Deformation Modeling Report, Rail Car Offloading Facilities Project, Valero Refinery, Benicia, California. November 15, 2013.

URS Corporation, 2002. *MTBE PO Draft Environmental Impact Report*, April 2002.

United States Geological Survey (USGS), 2008. Forecasting California's Earthquakes—What Can We Expect in the Next 30 Years? USGS Fact Sheet 2008-3027. Accessed online on March 1, 2013 at: http://pubs.usgs.gov/ fs/2008/3027/fs2008-3027.pdf

USGS, 2013. Geologic Hazards Science Center. California Quaternary Faults. Accessed online on February 14, 2013 at: http://geohazards.usgs.gov/qfaults/ca/California.php

Valero Refining Company, 2013. Crude by Rail Project Geotechnical Report, Valero Refining Company, California (Cover Letter to ESA). November 19, 2013.

Woodward-Clyde Consultants, 1993. *Exxon Benicia Refinery Clean Fuels Project*. Prepared for City of Benicia. September 1993.

Section 4.6, Greenhouse Gas Emissions

Bay Area Air Quality Management District (BAAQMD), 2009. Revised *Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance*, October, 2009.

BAAQMD, 2010. *Bay Area 2010 Clean Air Plan, Final Clean Air Plan Volume 1*, adopted September 15, 2010.

California Air Resources Board (CARB), 2009. *Climate Change Scoping Plan: A Framework for Change,* available online at: http://www.arb.ca.gov/cc/scopingplan/document/ adopted_scoping_plan.pdf; published December 2008, amended version included errata and Board requested modifications posted May 11, 2009.

CARB, 2014a. *First Update to the Climate Change Scoping Plan: Building on the Framework,* May 22, 2014.

CARB 2014b. *California Greenhouse Gas Inventory for 2000-2012- by Category as Defined in the 2008 Scoping Plan*. Available online at: http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-12_2014-03-24.pdf Accessed June 6, 2014.

California Natural Resources Agency (CNRA), 2013. *Safeguarding California: Reducing Climate Risk, An Update to the 2009 California Climate Adaption Strategy, Public Draft*, December 2013.

City of Benicia, 2009. Climate Action Plan. September 15. Available online at: http://www.ca-ilg.org/document/city-benicia-climate-action-plan. Accessed January 13, 2014.

City of Benicia, 2014. *2010 GHG Emissions Inventory Update*, April 2014.

Environmental Resource Management (ERM), 2013a. *Valero Crude by Rail Construction Emissions*, February 2013.

ERM, 2013b. *Crude by Rail Air Permit Application*, February 2013.

ERM, 2014. Marine Vessel Criteria Pollutant and Greenhouse Gas Baseline Emissions, Public Copy, June 5, 2014.

Environmental Science Associates (ESA), 2014. Air Quality and Greenhouse Gas Emissions Supplement for the Valero Benicia Crude by Rail Project, June 2014.

Intergovernmental Panel on Climate Change (IPCC), 2014. *Climate Change 2013: The Physical Science Basis.* Available online at: http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf Accessed June 6, 2014.

South Coast Air Quality Management District (SCAQMD), 2008. Board Meeting Agenda Item No. 31, Interim CEQA GHG Significance Threshold for Stationary Sources, Rules, and Plans, December 5, 2008.

U.S. Environmental Protection Agency (USEPA), 2013. Sources of Greenhouse Gas Emissions webpage, last updated September 9, 2014. Accessed online at: http://www.epa.gov/ climatechange/ghgemissions/sources.html on January 24, 2014.

USEPA, 2014a. Clean Air Act Permitting for Greenhouse Gas Emissions – Final Rules Fact Sheet webpage [http://www.epa.gov/NSR/ghgdocs/20101223factsheet.pdf] accessed January 24, 2014

USEPA, 2014b. Greenhouse Gas Reporting Program webpage. [http://www.epa.gov/ climatechange/emissions/ghgrulemaking.html] Accessed January 24, 2014.

Valero, 2013. Crude by Rail Project Response to ESA data Request No. 2, April 2, 2013.

Section 4.7, Hazards and Hazardous Materials

Association of American Railroads (AAR*), Petition for Rulemaking: Tank Car Standards for DOT Class 111 Tank Cars Used for Packing Group I and II Materials*, March 9, 2011. 2011a.

AAR, *Casualty Prevention Circular 1232, AAR Manual of Standards and Recommended Practices – AAR Special Requirements for DOT Tank Cars*, August 31, 2011. 2011b.

AAR, *Presentation to the National Transportation Safety Board, Safety Forum on Transportation of Crude Oil and Ethanol, Washington D.C. (by Robert Fronczak, AVP Environment & Hazmat, AAR)*, April 22, 2014. 2014.

City of Benicia. 1999. *Benicia General Plan,* adopted June 15, 1999.

California Department of Forestry and Fire Protection (CAL FIRE), *Fire Hazard Severity Zones*, Updated June 2, 2008. http://www.fire.ca.gov/fire_prevention/fhsz_maps_solano.php, Accessed June 4, 2014.

Federal Emergency Management Administration (FEMA), U.S. Dept. of Transportation, U.S. Environmental Protection Agency. *Handbook of Chemical Hazard Analysis Procedures*, 1989.

Federal Railroad Administration (FRA), *FRA Emergency Order No. 28, Notice No. 1, Emergency Order Establishing Additional Requirements for Attendance and Securement of Certain Freight Trains and Vehicles on Mainline Track or Mainline Siding Outside of a Yard or Terminal*, August 2, 2013. 2013a.

Federal Railroad Administration/Pipeline and Hazardous Materials Safety Administration (FRA/PHMSA), *Joint Safety Advisory 2013-06, Docket No. PHMSA-2013-0196; Notice No. 13-13; Lac-Megantic Railroad Accident Discussion and DOT Safety Recommendations*, August 2, 2013. 2013b.

FRA/PHMSA, *Joint Safety Advisory* 2013-07, *Docket No. PHMSA-2013-0254, Notice NO. 13-09 Safety and Security Plans for Class 3 Hazardous Materials Transported by Rail, November 20, 2013*. 2013c.

FRA, Office of Safety Analysis. *Ten Year Accident/Incident Overview for UPRR*. 2013. http://safetydata.fra.dot.gov/OfficeofSafety/Default.aspx. 2013d.

FRA/PHMSA, *Joint Safety Advisory 2014-01, Docket No. PHMSA-2014-0049; Notice No. 14-07, Recommendations for Tank Cars Used For the Transportation of Petroleum Crude Oil by Rail,* May 7, 2014. 2014.

National Transportation Safety Board (NTSB), Accident Report NTSB/RAR-12/01, *Derailment of CN Freight Train U70691-18 With Subsequent Hazardous Materials Release and Fire, Cherry Valley, Illinois, June 19, 2009*; February 14, 2012. 2012a

NTSB, *Recommendation R-12-5 through -8*, March 2, 2012. 2012b

NTSB, *Recommendation R-14-4 through -6*, January 21, 2014. 2014a.

NTSB, *Recommendation R-14-1 through -3*, January 23, 2014. 2014b.

Oil Daily, *Modern Tank Car Spilled Oil in Virginia*, May 12, 2014. 2014.

Pipeline and Hazardous Materials Safety Administration (PHMSA), *Advance Notice of Proposed Rulemaking, Hazardous Materials: Rail Petitions and Recommendations To Improve the Safety of Railroad Tank Car Transportation (RRR)*, September 6, 2013. 2013.

PHMSA, *Safety Alert --Preliminary Guidance from OPERATION CLASSIFICATION*, January 2, 2014. 2014.

UPRR, 2013, Union Pacific Railroad response to ESA data request. September 27, 2013.

US Department of Transportation (USDOT) and Association of American Railroads (AAR) *Agreement - AAR and Railroad Subscriber Commitments*, February 20, 2014. 2014.

USDOT, *Amended And Restated Emergency Restriction/Prohibition re Petroleum Crude Offerors and Petroleum Crude Oil Rail Carriers, Docket No. Dot-Ost-2014-0025*, March 6, 2014. 2014a.

USDOT, *Emergency Restriction/Prohibition re Petroleum Crude Oil Rail Carriers, Docket No. Dot-Ost-2014-0067*, May 7, 2014. 2014b.

Section 4.8, Hydrology and Water Quality

Association of Bay Area Governments (ABAG) 1995. Dam Failure Inundation Hazard Map for Benicia. http://www.abag.ca.gov/cgi-bin/pickdamx.pl

ABAG 2013. Dam Failure Inundation. Earthquakes and Hazards Program. Accessed online February 28, 2013 at http://quake.abag.ca.gov/dam-failure/

California Emergency Management Agency (CEMA), 2009. Tsunami Inundation Map for Emergency Planning. State of California ~ County of Solano. Benicia Quadrangle. California Emergency Management Agency, California Geological Survey, University of Southern California. July 15, 2009. Accessed online February 28, 2013 at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Solano/Documents/Tsunami_Inundation_Benicia_Quad_Solano.pdf

California Stormwater Quality Association (CASQA), 2003. Stormwater Best Management Practice Handbook, Construction. January, 2003.

City of Benicia, 1999. *Benicia General Plan*, adopted June 15, 1999.

City of Benicia, 2013. Climate and Temperature Summary. Accessed online October 1, 2013 at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC=%7B9AA16CE0-F37D-4D59-8BF7-98443ADCB3A7%7D&DE=%7B31CD8D17-FC34-437A-80A5-78D2B7A5E9AE%7D

Federal Emergency Management Agency (FEMA), 2013. Flood Insurance Rate Map. Solano County, California, and Incorporated Areas. Panel 634 of 730. Map number 06095C0634E.

Regional Water Quality Control Board (RWQCB), 2010. California 2010 303(3) combined list table (combines category 4a, 4b, and 5). Accessed online October 22, 2013 at: http://maps.waterboards.ca.gov/webmap/303d/files/2010_USEPA_approv_303d_List_Final_122311.xls

RWQCB, 2011. San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan), December, 2011.

San Francisco Bay Conservation and Development Commission (BCDC), 2011. 55-Inch sea level rise by end of century, Grizzly Bay. Available at: http://www.bcdc.ca.gov/planning/climate_change/maps/55/grizzly_bay.pdf. Accessed May 5, 2014.

San Francisco Bay Regional Water Quality Control Board (SFRWQCB), 2013. Correspondence from John H. Madigan, P.E. to Don Cuffel, Valero Benicia Refinery, Construction Projects Stormwater Runoff Covered by NPDES Permit No. CA0005550, Valero Benicia Refinery, Contra Costa County, May 15, 2013.

Stantec, 2010. Groundwater Monitoring Plan-Revised 2010, Valero Benicia Refinery. Stantec, May 24, 2010.

URS Corporation, 2001. Remedial Action Plan – Valero Benicia Refinery, July 2001.

URS Corporation, 2002. Valero Refining Company, California. Storm Water Pollution Prevention Plan. Prepared by URS Corporation, 2002. Revised, September 2007 and July 2011.

Valero, 2013. Crude by Rail Project. Response to ESA Data Request No. 3, March 27, 2013.

Woodward-Clyde Consultants. *Exxon Benicia Refinery Clean Fuels Project*. Prepared for City of Benicia. September 1993.

Section 4.9, Land Use and Planning

California Department of Natural Resources (DNR) and U.S. Bureau of Reclamation, 2013. *Bay Delta Conservation Plan*, Public Draft, November 2013, available at baydeltaconservationplan.com/Home.aspx.

City of Benicia, 1999. *Benicia General Plan,* adopted June 15, 1999.

City of Benicia, 2003. Land Use Diagram, revised November 2003.

City of Benicia, 2012. Zoning Map, revised April 2012.

City of Benicia, 2013. Municipal Code, Title 17, Zoning, Chapter 17.32-Industrial Districts.

San Francisco Bay Conservation and Development Commission (BCDC), 1976. *Suisun Marsh Protection Plan*, 1976. December 17, 1976, reprinted May 2012.

BCDC, 1977. *Benicia Waterfront Special Area Plan,* available online at http://www.bcdc.ca.gov/laws_plans/plans/benicia_waterfront.shtml, adopted May 19, 1977.

BCDC, 2006. *San Francisco Bay Plan*, 2006. Amended September 2006, reprinted March 2012.

BCDC and Metropolitan Transportation Commission, 1996. *San Francisco Bay Area Seaport Plan*, April 18, 1996, as amended through January 2012.

Solano County, 2012. Suisun Marsh Local Protection Program, 2012 Amendment, available at www.co.solano.ca.us/depts/rm/planning/suisun_marsh_local_protection_program.

Solano County Water Agency (SCWA), 2012. *Solano Habitat Conservation Plan*, Public Draft, October 2012, available at www.scwa2.com/Conservation_Habitat_Docs.aspx.

U.S. Bureau of Reclamation (USBR), 2011. *Suisun Marsh Habitat Management, Preservation, and Restoration Plan, Final EIS/EIR*, November 2011. Available at www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=781.

Yolo Natural Heritage Program (YNHP), 2013. *Yolo County Natural Community Conservation Plan/Habitat Conservation Plan,* First Administrative Draft, July 2013, available at www.yoloconservationplan.org./maps-and-documents.html.

Section 4.10, Noise

Bearden, David M., Environmental Information Analyst, Congressional Research Service, Report for Congress RS20531, *Noise Abatement and Control: An Overview of Federal Standards and Regulations*, Updated April 7, 2000.

California Department of Transportation (Caltrans), 2004. *Transportation- and Construction-Induced Vibration Guidance Manual*, Contract Number 43A0049, Task Order No. 18, June, 2004.

City of Benicia, 1999. *Benicia General Plan*, adopted June 15, 1999.

City of Benicia, 2013. City of Benicia Municipal Code Section 8.20.150. Accessed online May 21, 2013.

Environmental Science Associates (ESA). 2014. *Valero Refinery Crude by Rail Supplemental Noise Calculations*. January 10, 2014.

Federal Railroad Administration (FRA), 2014. The Train Horn Rule and Quiet Zones, www.fra.dot.gov/Page/P0104. Accessed online January 10, 2014.

Federal Transit Authority (FTA), 2006. *Transit Noise and Vibration Impact Assessment*, May 2006.

U.S. Government Printing Office (USGPO). Electronic Code of Federal Regulations, Title 49: Transportation, Park 229 – Railroad Locomotive Safety Standards, Subpart C – Requirements, §229.129, Locomotive horn. Accessed webpage (http://www.ecfr.gov/cgi-bin/ECFR?page=browse) January 10, 2014.

Wilson Ihrig & Associates. 2013. Noise Study for Valero Crude by Rail Project. March 8, 2013.

Section 4.11, Transportation and Traffic

Fehr and Peers Transportation Consultants, *Final Transportation Impact Analysis Report for the Valero Benicia Refinery Crude by Rail Project*, October 2013.

Chapter 5, CEQA Statutory Sections

Bay Area Air Quality Management District (BAAQMD), 2009. Revised *Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance*, October, 2009.

BAAQMD, 2012. *CEQA Air Quality Guidelines*, Updated May 2012.

BAAQMD 2014. Tools and Methodology for the 2012 CEQA Guidelines, available at http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx. Accessed 4 June 2014.

California Air Pollution Control Officers Association (CAPCOA), 2008. *CEQA & Climate Change*, January 2009.

City of Benicia, 2002. Valero Refining Company's Land Use Application for the Valero Improvement Project. Draft Environmental Impact Report, SCH# 2002042122, October 2002.

City of Benicia, 2008. Valero Improvement Project Addendum to VIP EIR, June 2008.

Environmental Resources Management (ERM), 2014. Technical memorandum: Updated Methodology for Assessment of Risk and PM2.5 Concentrations at Receptors near Locomotive Tracks in Fairfield, Ca. June.

San Francisco Bay Regional Water Quality Control Board (RWQCB), 2013. Correspondence from John H. Madigan, P.E. to Don Cuffel, Valero Benicia Refinery, Construction Projects

Stormwater Runoff Covered by NPDES Permit No. CA0005550, Valero Benicia Refinery, Contra Costa County, May 15, 2013.

Chapter 6, Analysis of Alternatives

City of Pittsburg, 2013, *WesPac Pittsburg Energy Infrastructure Project Recirculated Draft EIR*, SCH 2011072053, July 2013.

Valero, 2013. *Responses to City of Benicia Information Request dated September 30, 2013.* Various dates between October 2013 and December 2013.

This page intentionally left blank

Appendix A.
Notice of Preparation/Initial Study

ESA

CITY HALL • 250 EAST L STREET • BENICIA, CA 94510 • (707) 746-4200 • FAX (707) 747-8120

To: Office of Planning and Research
P.O. Box 3044
Sacramento, CA 95812-3044

From: City of Benicia
250 East L Street
Benicia, CA 94510

Subject: NOTICE OF PREPARATION (NOP) OF AN ENVIRONMENTAL IMPACT REPORT (EIR) AND NOTICE OF SCOPING MEETING: Valero Crude by Rail Project

Date: August 9, 2013

On May 31, 2013 the City of Benicia issued a Notice of Intent (NOI) to adopt a Mitigated Negative Declaration (MND) for the Valero CBR project. The issuance of the NOI started a 30-day comment period, which concluded at 5 PM, Monday, July 1, 2013. During the comment period the City received 34 written comments. Subsequent to the closure of the MND comment period the City received an additional 27 written comments as of August 2, 2013.

On July 11, 2013 the Planning Commission held a public meeting on the Valero CBR project. During the meeting 31 speakers commented on the project, in addition to questions from the Planning Commission.

The City received voluminous comments on the draft MND. Many of the comments stated that the project may have a significant effect on the environment, such that the City should prepare an Environmental Impact Report pursuant to CEQA Guidelines Section 15064. In light of the comments, Section 15064, and the desire to ensure full consideration of all environmental issues, the City has decided to prepare an Environmental Impact Report for the project.

Additional information on the project can be found on the City's website at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC={C45EA667-8D39-4B30-87EB-9110A2F9CE13}

Project Description:
The proposed Valero Crude by Rail Project would allow the Valero Benicia Refinery (Refinery) access to additional North American-sourced crude oil for delivery to the Refinery by railroad. The proposed Project would involve the installation and

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
TOM CAMPBELL, *Vice Mayor* . ALAN M. SCHWARTZMAN . MARK C. HUGHES . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
H.R. AUTZ, *City Treasurer*
LISA WOLFE, *City Clerk*

Recycled Paper

Refinery by railroad. The proposed Project would involve the installation and modification of Refinery non-process equipment that would allow the Refinery to receive a portion of its crude oil deliveries by railcar replacing equal quantities of crude currently being delivered to the Refinery by marine vessel. Valero intends to replace up to 70,000 barrels per day of the crude oil currently supplied to the Refinery by marine vessel with an equivalent amount of crude oil transported by railcars. The crude oil to be transported by railcars is expected to be of similar quality compared to existing crude oil imported by marine vessels. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.

Location of the Project
The Valero Refinery is located at 3400 East Second Street, Benicia.

Issues To Be Addressed In The EIR
The EIR will identify the potentially significant environmental effects of the Project, including those resulting from its construction, operation and maintenance. The EIR also will discuss and analyze a reasonable range of alternatives to the Project, including a No Project alternative, and alternatives to the Project that could attain most of its basic objectives while avoiding or reducing any of its significant environmental effects.

Below is a list of the project's potentially significant effects:

Air Quality: Potential air quality impacts during project construction would be reduced by implementation of Bay Area Air Quality Management District's basic control measures during construction.

Biological Resources: Construction activities would avoid nesting season impacts to nesting birds, and buffers would be implemented if nesting birds are identified.

Cultural Resources: Inadvertent discovery of cultural or paleontological resources or human remains would be mitigated by cessation of construction activities, notification of relevant authorities, and proper treatment of resources.

Geology and Soils: Implementation of recommendations contained in a site-specific geotechnical report would reduce impacts regarding groundshaking, liquefaction, and landslide hazards.

Hazards and Hazardous Materials: Potential impacts from upset and accident conditions during transportation of crude oil to the refinery would be investigated in detail and evaluated against existing risks of crude oil transportation by marine vessels.

Hydrology and Water Quality: Implementation of a storm water management plan would reduce water quality impacts during project construction.

Transportation/Traffic: Potential impacts regarding train crossings would be reduced through train scheduling and coordination between the City's Fire and Police Departments and the refinery's emergency response team.

Public Scoping Period for this Notice of Preparation
State law mandates a 30-day time limit after the date of the NOP for the scoping period. The scoping period for this Project begins on Friday, August 9, 2013 and closes at 5:00 p.m. on Friday, September 12, 2013. Public comments received will become part of the public record. Please include a name, organization (if applicable), address, and e-mail address of a contact person on all written comments for future notification related to this process.

Please send your comments to:

Amy Million, Principal Planner
Community Development Department
250 East L Street
Benicia, CA 94510
Fax: (707) 747-1637
amillion@ci.benicia.ca.us

Scoping Meeting
In order for the public and regulatory agencies to have an opportunity to submit comments on the scope of the EIR for the Project, a meeting will be held during the scoping period at the next regularly scheduled Planning Commission meeting. The meeting will be held:

Thursday, September 12, 2013
7:00 p.m. – 9:00 p.m.
City Hall Council Chambers
250 East L Street
Benicia, CA 94510

Following a brief presentation, interested parties will be provided an opportunity to provide comments about the Project. Written comments also may be submitted anytime during the NOP scoping period to the address or facsimile number provided above.

REMINDER:
All comments will be accepted by postmark, facsimile or email through 5 p.m. Friday September 13, 2013. Please be sure to include your name, organization (if applicable), address, and e-mail address. If you submit by email, your email will not be considered accepted until you received an email to confirm it was received.

This page intentionally left blank

VALERO CRUDE BY RAIL PROJECT

Initial Study/Mitigated Negative Declaration

Use Permit Application 12PLN-00063

Prepared for
City of Benicia

May 2013

VALERO CRUDE BY RAIL PROJECT

Initial Study/Mitigated Negative Declaration

Use Permit Application 12PLN-00063

Prepared for
City of Benicia

May 2013

550 Kearny Street
Suite 800
San Francisco, CA 94108
415.896.5900
www.esassoc.com

Los Angeles

Oakland

Orlando

Palm Springs

Petaluma

Portland

Sacramento

San Diego

Santa Cruz

Seattle

Tampa

Woodland Hills

202115

Mitigated Negative Declaration

Date of this Notice:	May 31, 2013
Lead Agency:	City of Benicia Community Development Department 250 East L Street Benicia, CA 94510
Project Title: **Project Sponsor:** **Contact Person:** Don Cuffel **Telephone:**	Valero Crude by Rail Project Valero Refining Company-California 707-745-7545
Project Location:	3400 East Second Street Benicia, CA 94510
Assessor's Parcel Numbers:	0080110480
City and County:	City of Benicia, Solano County

Project Description:

The proposed Valero Crude by Rail Project would allow the Valero Benicia Refinery (Refinery) access to additional North American-sourced crude oil for delivery to the Refinery by railroad. The Project would involve the installation and modification of Refinery non-process equipment that would allow the Refinery to receive a portion of its crude oil deliveries by railcar replacing equal quantities of crude currently being delivered to the Refinery by marine vessel. Valero intends to replace up to 70,000 barrels per day of the crude oil currently supplied to the Refinery by marine vessel with an equivalent amount of crude oil transported by rail cars. The crude oil to be transported by rail cars is expected to be of similar quality compared to existing crude oil imported by marine vessels. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.

The City of Benicia, serving as Lead Agency under the California Environmental Quality Act (CEQA), is completing the required environmental review for Project pursuant to CEQA, prior to approval of the project. In accordance with Section 15071 of the CEQA Guidelines, the City has prepared an Initial Study to determine the potential environmental consequences of approval and implementation of the Project.

Basis for Mitigated Negative Declaration Recommendation:

The City of Benicia finds that although the proposed project could have a significant effect on the environment, **there will not be a significant effect in this case because mitigation measures have been added to the project that avoid or reduce all impacts to a less than significant level**. This determination is based upon the criteria of the Guidelines of the State Secretary for Resources Sections 15064 (Determining the Significance of the Environmental Effects Caused by a Project), 15065 (Mandatory Findings of Significance), and 15070 (Decision to Prepare a Negative or Mitigated Negative Declaration), and the mitigation measures listed below.

Mitigation Measures: Mitigation measures are included in this project to avoid potentially significant effects (see below).

Air Quality

Mitigation Measure AIR-1: Implement BAAQMD Basic Mitigation Measures. Valero and/or its construction contractors shall comply with the following applicable BAAQMD basic control measures during Project construction:

- All exposed dirt non-work surfaces (e.g., parking areas, staging areas, soil piles, and graded areas, and unpaved access roads) shall be watered two times a day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California Airborne Toxics Control Measure Tile 13, Section 2485 of California of Regulations). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign with the telephone number and person to contact at the City of Benicia regarding dust complaints shall be posted throughout construction. Valero and/or contractor shall respond and take corrective action within 8 hours of notification by the City. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

Biological Resources

Mitigation Measure BIO-1: Project construction activities should avoid the nesting season of February 15 through August 31, if feasible. If seasonal avoidance is not possible then no sooner than 30 days prior to the start of any Project activity a biologist experienced in conducting nesting bird surveys shall survey the Project area and all accessible areas within 500 feet. If nesting birds are identified, the biologist shall implement a suitable protective buffer around the nest and no activities shall occur within this buffered area. Typical buffers are 250 feet for songbirds and 500 feet for raptors, but may be increased or decreased according to site-specific, Project-specific, activity-specific considerations such as visual barriers between the nest and the activity, decibel levels associated with the activity, and the species of nesting bird and its tolerance of the activity. Construction activities that are conducted within a reduced buffer shall be conducted in the presence of a qualified full-time biological monitor.

Cultural Resources

Mitigation Measure CUL-1: Inadvertent Discovery of Cultural Resources. If prehistoric or historic-period archaeological resources are encountered, all construction activities within 50 feet shall halt and Valero shall be notified. A Secretary of the Interior-qualified archaeologist shall inspect the findings within 24 hours of discovery. If it is determined that the Project could damage a historical resource or a unique archaeological resource (as defined pursuant to the CEQA Guidelines), mitigation shall be implemented in accordance with PRC Section 21083.2 and Section 15126.4 of the CEQA Guidelines, with a preference for preservation in place. Consistent with Section 15126.4(b)(3), preservation in place may be accomplished through planning construction to avoid the resource; incorporating the resource within open space; capping and covering the

resource; or deeding the site into a permanent conservation easement. If avoidance is not feasible, a qualified archaeologist shall prepare and implement a detailed treatment plan in consultation with Valero and the affiliated Native American tribe(s), if applicable. Treatment of unique archaeological resources shall follow the applicable requirements of PRC Section 21083.2. Treatment for most resources would consist of (but would not be not limited to) sample excavation, artifact collection, site documentation, and historical research, with the aim to target the recovery of important scientific data contained in the portion(s) of the significant resource to be impacted by the Project. The treatment plan shall include provisions for analysis of data in a regional context, reporting of results within a timely manner, curation of artifacts and data at an approved facility, and dissemination of reports to local and state repositories, libraries, and interested professionals.

Mitigation Measure CUL-2: Inadvertent Discovery of Paleontological Resources. In the event of an unanticipated discovery of a fossil or fossilized deposit during construction, excavations within 50 feet of the find shall be temporarily halted or diverted until a qualified paleontologist examines the discovery. The paleontologist shall notify the appropriate agencies to determine procedures that would be followed before construction is allowed to resume at the location of the find. The paleontologist shall oversee implementation of these procedures once they have been determined.

Mitigation Measure CUL-3: Inadvertent Discovery of Human Remains. In the event of discovery or recognition of any human remains during construction activities, such activities within 50 feet of the find shall cease until the Solano County Coroner has been contacted to determine that no investigation of the cause of death is required. The Native American Heritage Commission (NAHC) will be contacted within 24 hours if it is determined that the remains are Native American. The NAHC will then identify the person or persons it believes to be the most likely descendant from the deceased Native American, who in turn would make recommendations to Valero for the appropriate means of treating the human remains and any grave goods.

Geology and Soils

Mitigation Measure GEO-1: A site-specific, design level geotechnical investigation shall be required as part of this Project to identify geologic hazards and provide recommendations to mitigate any such hazards in the final design of the proposed Project. The analyses would be completed in accordance with applicable City ordinances and policies and consistent with the most recent version of the California Building Code, which requires structural design that can accommodate ground accelerations expected from known active faults. The geotechnical investigation report shall evaluate the potential for ground shaking, liquefaction, and landslide hazards and shall include recommendations to ensure slope stability. The investigation shall be conducted by a California registered engineer or certified engineering geologist and all recommendations made in the investigation report shall be incorporated into the proposed Project design specifications.

Hydrology and Water Quality

Mitigation Measure HYD-1: The Applicant and/or its contractor shall prepare and implement a storm water management plan (SWMP) for construction of the proposed Project. The proposed project is covered under the Applicant's National Pollutant Discharge Elimination System (NPDES) permit and storm water pollution prevention plan (SWPPP). A notice of intent (NOI) application and notice of termination (NOT) application are not required. Implementation of the SWMP shall start with the commencement of construction and continue though the completion of the proposed Project. The SWMP shall identify pollutant sources (such as sediment) that may affect the quality of stormwater discharge and implement best management practices (BMPs) consistent with the California Stormwater Quality Association's BMP Handbook for Construction to reduce pollutants in stormwater. The Applicant or the construction contractor shall install erosion and stormwater control measures on the construction site such as installation of a silt fence and other BMPs, particularly at locations close to storm drains and water bodies. The BMPs shall also include practices for proper handling of chemicals such as avoiding fueling at the construction site and overtopping during fueling and installing spill containment pans.

Transportation and Traffic

Mitigation Measure TRAN-1:

- Prohibit scheduling crude train crossings during the weekday lunch hour (12:00 – 1:00 PM).

Mitigation Measure TRAN-2:

- Coordinate with the City of Benicia Fire Department to prepare an action plan in the event that an emergency occurs during a Project train crossing. The action plan would provide methods of adequately informing the Fire Department of the expected train crossing schedule and alternate routes to access the Park Road and Bayshore Road industrial areas during the event that a train crosses Park Road.
- Utilize the Refinery's existing onsite emergency response team to assist with responding to off-site emergencies within the Park Road and Bayshore Road industrial areas as requested by the City of Benicia Fire Department under the existing mutual aid agreement, if an emergency occurs during the event of a train crossing on Park Road.

With adoption of the proposed mitigation measures, this project could not have a significant effect on the environment and an environmental impact report is not required. A reporting or monitoring program must be adopted for measures to mitigate significant impacts at the time the Mitigated Negative Declaration is approved, in accord with the requirements of Section 21081.6 of the Public Resources Code.

Charlie Knox
Community Development Director
City of Benicia

Signature

May 31, 2013

Date

TABLE OF CONTENTS

Valero Crude by Rail Project Initial Study

	Page
Initial Study	**1**
Summary Information	1
Environmental Factors Potentially Affected	3
I. Project Description	**I-1**
1. Overview	I-1
2. Location	I-2
3. Project Site	I-5
4. Existing Refinery Operations	I-5
5. Specific Project Components	I-6
6. Project Operation	I-10
7. Project Construction	I-12
II. Environmental Checklist	**II-1**
Evaluation of Environmental Impacts	II-1
1. Aesthetics	II-3
2. Agricultural and Forest Resources	II-8
3. Air Quality	II-10
4. Biological Resources	II-17
5. Cultural Resources	II-22
6. Geology and Soils	II-26
7. Greenhouse Gas Emissions	II-34
8. Hazards and Hazardous Materials	II-37
9. Hydrology and Water Quality	II-40
10. Land Use and Land Use Planning	II-47
11. Mineral Resources	II-49
12. Noise	II-50
13. Population and Housing	II-55
14. Public Services	II-57
15. Recreation	II-59
16. Transportation and Traffic	II-61
17. Utilities and Service Systems	II-70
18. Mandatory Findings of Significance	II-74
III. Report Preparers	**III-1**

Page

Appendices

A1. Air Permit Application A1-1
A2 Construction Emissions A2-1

List of Figures

1. Regional Location I-3
2. Valero Refinery Boundary I-4
3. Site Plan I-7

List of Tables

3-1 Average Daily Construction Exhaust Emissions II-12
3-2 Annual Net Operational Exhaust Emissions II-14
3-3 Maximum Cancer and Noncancer Risk II-15
8-1 Project Construction Greenhouse gas Emissions II-35
8-2 Project Annual Net Greenhouse Gas Emissions II-35
12-1 Noise Level Performance Standards for Noise-sensitive Land Uses II-51
12-2 Vibration Source Levels from Construction equipment II-52
16-1 Existing At-Grade Rail Operations II-64

VALERO CRUDE BY RAIL PROJECT

Initial Study

Summary Information

1. Project Title:	Valero Crude by Rail Project (12PLN-00063)
2. Lead Agency Name and Address:	City of Benicia 250 East L Street Benicia, CA 94510
3. Contact Person and Phone Number:	Charlie Knox Community Development Director (707) 746-4280
4. Project Location:	Valero Benicia Refinery 3400 East Second Street Benicia, CA 94510
5. Project Sponsor's Name and Address:	Valero Refining Company-California Don Cuffel 3400 East Second Street Benicia, CA 94510 (707) 745-7545
6. General Plan Designation(s):	General Industrial and Waterfront Industrial
7. Zoning Designation(s):	IG (General Industrial) and IW (Water Related Industrial)

8. Description of Project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)

See Project Description following Item 10.

9. Surrounding Land Uses and Setting. (Briefly describe the project's surroundings.)

The proposed Project is located within the eastern portion of the City of Benicia along the northern edge of the Suisun Bay below a low range of coastal hills. The proposed Project would include changes in the northeastern portion of the main Refinery property, between the eastern side of the lower tank farm and Sulphur Springs Creek.

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement. Indicate whether another agency is a responsible or trustee agency.)

The Crude by Rail Project would require a Use Permit from the City of Benicia as well as grading and building permits not covered by the Annual Permit Agreement. The following additional permits by other agencies would also be required:

- Bay Area Air Quality Management District: Authority to Construct/Permit to Operate, Title V Permit Amendment

Environmental Factors Potentially Affected

The proposed Project could potentially affect the environmental factor(s) checked below. The following pages present a more detailed checklist and discussion of each environmental factor.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Geology, Soils and Seismicity
☐ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials	☒ Hydrology and Water Quality
☐ Land Use and Land Use Planning	☐ Mineral Resources	☐ Noise
☐ Population and Housing	☐ Public Services	☐ Recreation
☒ Transportation and Traffic	☐ Utilities and Service Systems	☒ Mandatory Findings of Significance

DETERMINATION: (To be completed by Lead Agency)

On the basis of this initial study:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, no further environmental documentation is required.

Signature — May 31, 2013 (Date)

Charlie Knox (Printed Name) — City of Benicia (For)

CHAPTER I
Project Description

1. Overview

The Valero Benicia Refinery (Refinery) currently receives crude oil both by pipeline and by marine vessels. Crude oil originating within California (primarily San Joaquin Valley crude oil) is delivered by pipeline. Marine vessels transport a variety of crude oil (e.g., Alaskan North Slope crude oil and shipments from outside the U.S.) by marine vessel.

The primary purpose of the Valero Crude by Rail Project (proposed Project) is to allow the Refinery access to additional North American-sourced crudes that have recently become available, and that can be received by railroad. This involves installation and modification of Refinery non-process equipment that would allow the Refinery to receive a portion of its crude oil deliveries by railcar replacing equal quantities of crude currently being delivered to the Refinery by marine vessel. Valero intends to replace up to 70,000 barrels per day of the crude oil currently supplied to the Refinery by marine vessel with an equivalent amount of crude oil transported by rail cars. The crude oil to be transported by rail cars is expected to be of similar quality compared to existing crude oil imported by marine vessels. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.

The proposed Project would install a railcar unloading rack, repurpose an existing tank to include crude oil service, and construct associated infrastructure, including on-site rail lines, to allow the Refinery to receive crude oil by train. The proposed Project would permit the Refinery to receive crude oil by train in quantities up to 70,000 barrels per day (100 rail cars per day split into two 50 car trains), but it would not increase the volume of crude oil delivered to the Refinery because crude oil quantities delivered by train would be offset by a corresponding decrease in crude oil deliveries by marine vessels. The Refinery's crude oil processing rate is limited to an annual average of 165,000 barrels per day (daily maximum of 180,000 barrels per day) by Bay Area Air Quality Management District (BAAQMD) permit. This limit would remain unchanged. The proposed Project would not result in an increase in the production of existing products or byproducts. No modifications would be made to Refinery process equipment.

The proposed Project proposes to change the shipment method of up to 70,000 barrels per day of crude oil to rail cars (crude oil sources originating in North America) rather than by marine vessel (variety of domestic and international sources). Thus, the proposed Project could reduce marine vessel deliveries by up to 25,550,000 barrels per year. Based on the 3-year baseline period from December 10, 2009 through December 9, 2012, annual marine vessel deliveries could be reduced by up to 81 percent.

The quality of crude oil varies by oil well locations and reservoir formations; therefore, the quality of crude oil received from the same source may vary over time. Refineries are designed and equipped to process crude oil of a specific quality that is broadly defined by a range of gravity and sulfur content. The Refinery currently processes a blended slate of crude oil in a gravity range from 20° to 30° API and sulfur content range from 0.6 to 1.9 weight percent, based on 2011 to 2012 laboratory data. A blended crude oil slate is comprised of multiple individual crudes that when combined provide a crude mix that refinery hardware is designed to process. The proposed North American-source crudes will be a constituent in the Refinery's blended crude oil slate.

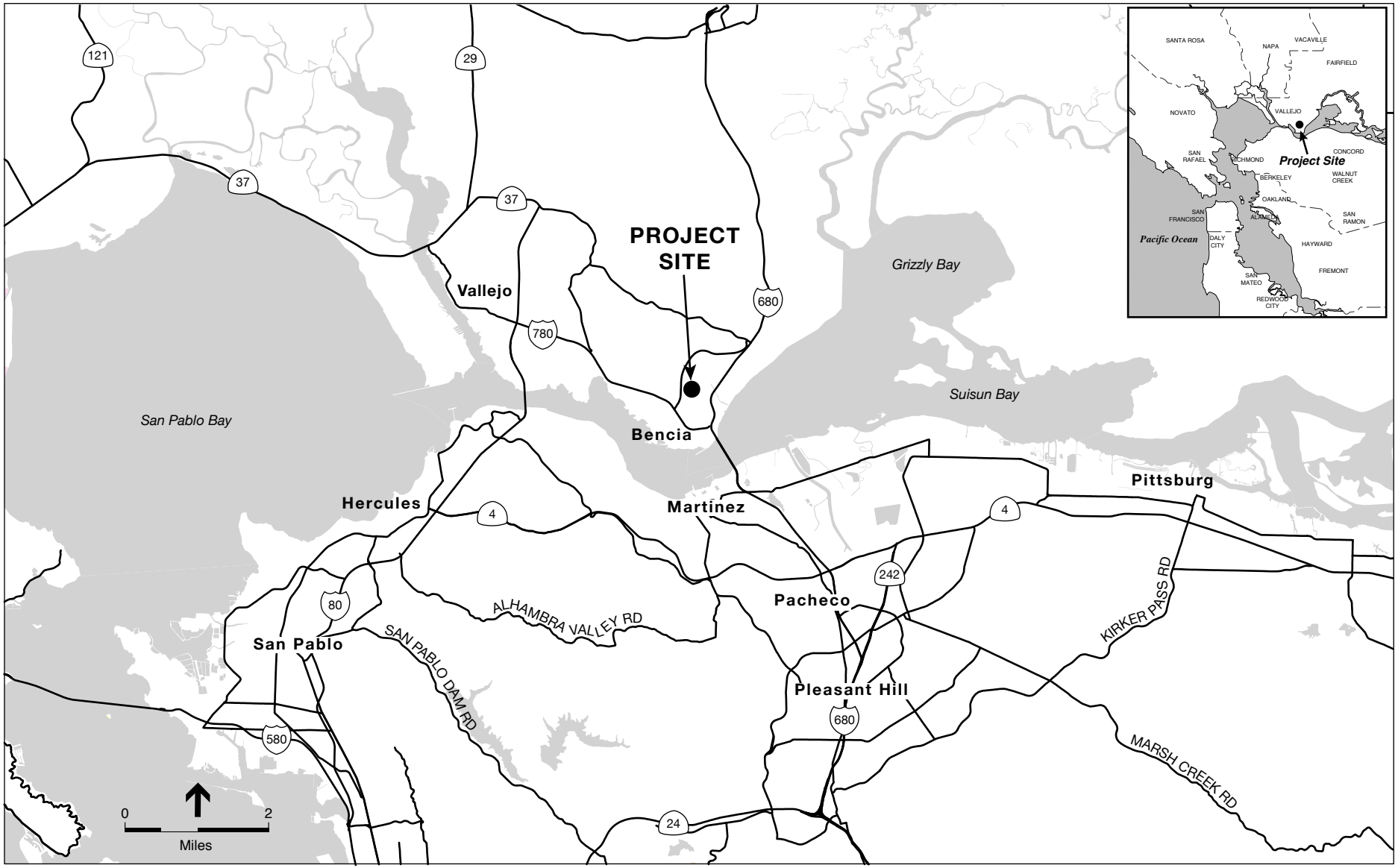
The North American-sourced crude oil gravity is expected to range from 20° to 43.5°API, so it would be similar or somewhat lighter than some of the current constituent crude oils used in blending. The North American-sourced crude oil sulfur content would range from 0.06 to 3.1 weight percent, but on average would be similar to that of the current constituent crude oil used in blending. The North American-sourced crude oils are expected to replace crude oils of similar gravity and sulfur content currently brought in by ship. The Refinery's various crude oil feedstocks are currently blended to achieve Refinery feedstock specifications, and the North American-sourced crude oils would be blended in the same manner. Since the North American-sourced crude oils would be replacing crude oils with similar properties, it is anticipated that the Refinery would continue to operate within its existing specifications for crude oil gravity and sulfur content range.

The Refinery does not anticipate a need to change the existing Refinery operations or process equipment, nor would emissions from Refinery operations change (with the exception of the storage tank service and rail unloading emissions) as a result of accepting and refining the proposed North American-sourced crudes.

2. Location

The Refinery is located at 3400 East Second Street, an industrial area in the eastern portion of the City of Benicia, in Solano County. The Refinery lies in a general north-south orientation near and west of Interstate 680. The Refinery is located along the northern edge of the Suisun Bay below a low range of coastal hills. To the west of East Second Street is open space, and the closest residential areas are approximately 3,000 feet to the south, west, and north-west of the Refinery and proposed Project site. Figure 1 shows the map of the region.

The Refinery occupies approximately 330 acres of the 880-acre Valero property; the remaining portion of the property is undeveloped. The Union Pacific Railroad Company (UPRR) line serves the Refinery as well as the Benicia Industrial Park that lies across Sulphur Springs Creek from the Refinery, via Track 700. The Refinery dock, located on the Carquinez Strait between the Benicia-Martinez Bridge and the Port of Benicia wharf, provides Refinery access to bulk transport by ship. The lands and facilities of the existing Refinery are shown in Figure 2.



SOURCE: ESA

Valero Crude by Rail Project Initial Study . 202115

Figure 1
Regional Location

SOURCE: ERM

Valero Crude by Rail Project Initial Study . 202115

Figure 2
Valero Refinery Boundary

3. Project Site

The Refinery and proposed Project site (within the Refinery) location are zoned General Industrial. Present land use at the proposed Project site is petroleum refining and storage. The elements of the proposed Project are compatible with the existing land use and would not result in substantial alterations of the planned land use in the area. Construction and operation of facilities associated with this proposed Project would be within the Refinery's property boundaries.

4. Existing Refinery Operations

The Refinery converts crude oil into many finished products, including California Air Resources Board-required cleaner-burning gasoline and diesel fuels, liquefied petroleum gas, jet fuel, fuel oil, and asphalt. Major equipment used for processing crude oil into finished products includes distillation columns, storage tanks, reactors, vessels, heaters, boilers, and other ancillary equipment. The Refinery also operates its own asphalt plant, wastewater treatment plant, and a marine terminal, which services crude oil, refinery products, and feedstock deliveries and exports via ships and barges. The Refinery also uses rail to transport materials such as asphalt, caustic, petroleum coke, and liquefied petroleum gas (LPG).

Crude oil is currently delivered to the Refinery only by pipeline and marine vessels. The crude oil delivered via marine vessels is received at the Valero Marine Terminal on Bayshore Road just south of the Benicia-Martinez Bridge, in the Port of Benicia. Crude oil is unloaded from the vessels and transferred into the storage tanks located at the tank farm north of the marine terminal. The Refinery currently uses external floating roof tanks (e.g., Tank 1707 and 1708) with the same configuration as the tank proposed to store crude oil for the proposed Project (Tank 1776). These tanks are configured and operated to comply with the same control requirements as applicable to organic liquid storage tanks under BAAQMD Regulation 8-5. This crude oil is combined with other crude oil receipts and refined in process units located north of the tank farm. The Refinery is limited by its BAAQMD permit (condition 20820, part 50) to processing crude oil at a feed rate of 180,000 barrels per day on a maximum daily basis and 165,000 barrels per day on an annual average basis.

The Refinery currently exports petroleum coke and LPG from the Refinery to off-site customers. Once per day, typically between 11:00 a.m. and noon, rail cars loaded with petroleum coke leave the Refinery via Track 700, cross Park Road, and head towards the AMPORTS Benicia Terminal facility directly to the south for the product to be loaded onto ships. After the coke products are loaded near the dock into storage silos for eventual loading onto ships for export, the empty coke rail cars are brought back onto the Refinery site for reloading for the next day's transfer operations. A similar operation takes place with rail cars transporting LPG destined for customers. The Refinery also occasionally imports LPG.

5. Specific Project Components

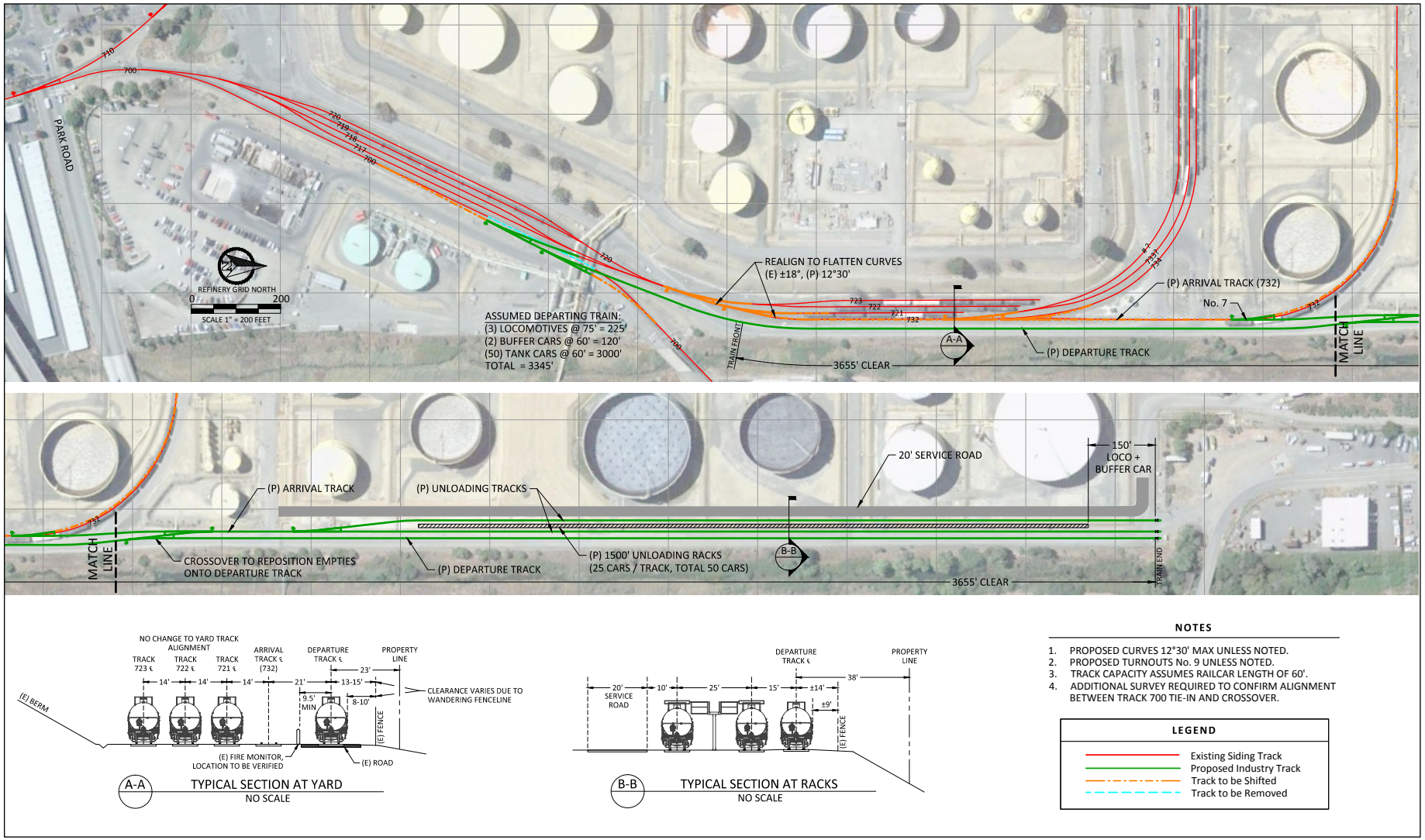
The proposed Project is shown in Figure 3, and would consist of the following primary components:

- Installation of one rail car unloading rack capable of offloading two parallel rows of 25 crude oil rail cars.
- Construction of two parallel, offloading rail spurs to access the rail car unloading rack and store rail cars in preparation for departure, and a parallel departure track.
- New BAAQMD permit condition to include the ability to store crude in an existing external floating roof tank (Tank No. 1776) in addition to Jet "A", Diesel, and mogas (automotive gasoline) service.
- Installation of approximately 4,000 feet of 16-inch diameter crude oil pipeline and associated components and infrastructure between the offloading rack and Tank 1776, and from Tank 1776 to the existing crude supply piping.
- Replacement and relocation of approximately 1,800 feet of tank farm dikes.
- Relocation of an existing firewater pipeline, compressor station, and underground infrastructure.
- Relocation of groundwater wells along Avenue "A."
- Construction of a service road adjacent to the proposed unloading rack.

Crude Oil Delivery Changes

The proposed Project would change the shipment method of up to 70,000 barrels (bbl) per day of crude oil to be delivered by rail cars (crude oil sources originating in North America) rather than by marine vessel (variety of domestic and international sources). Thus, the proposed Project could reduce marine vessel deliveries by up to 25,550,000 bbl per year. Based on a 3-year baseline period from December 10, 2009 through December 9, 2012, annual marine vessel deliveries could be reduced by up to 81 percent. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.

The North American-sourced crude oil gravity is expected to range from 20 to 43.5°API, so it would be similar or somewhat lighter than some of the current constituent crude oils used in blending. The North American-sourced crude oil sulfur content would range from 0.06 to 3.1 by weight percent, but on average would be similar to that of the current constituent crude oil used in blending. The North American-sourced crude oils are expected to replace crude oils of similar gravity and sulfur content that are currently brought in by ship. The Refinery's crude oil feedstock is currently blended to achieve Refinery feedstock specifications, and the North American-sourced crude oils would be blended in the same manner. Since the North American-sourced crude oils would replace crude oils with similar properties, it is anticipated that the Refinery would continue to operate within its existing specifications for crude oil gravity and sulfur content range.



SOURCE: Valero

Valero Crude by Rail Project Initial Study . 202115

Figure 3
Site Plan

The Refinery does not anticipate a need to change the existing Refinery operations or process equipment, nor would emissions from Refinery operations change (with the exception of the storage tank service and rail unloading emissions described as part of the Project on pages 10 and 11, below) as a result of accepting and refining the proposed North American-sourced crudes.

Tank 1776 Service Change

Tank 1776 (BAAQMD Source No. S-97) is an external floating roof (EFR) tank with a diameter of 128 feet, a height of 48 feet, and a working capacity of 101,400 barrels (4,258,800 gallons). It is currently permitted to store primarily Jet "A" or mogas, as well as other less volatile materials (e.g., diesel) and has a limit of 62,800,000 barrels per year throughput combined with seven other storage tanks. The tank has a welded steel shell and a pontoon-type floating roof with tight-fitting double seals that comply with BAAQMD Regulation 8-5 for the storage of organic liquids.

EFR tanks are commonly used to store large quantities of petroleum products such as crude oil or condensate. This type of tank is comprised of an open-topped cylindrical steel shell equipped with a roof that floats on the surface of the stored liquid. The roof rises and falls with the liquid level in the tank. It eliminates breathing losses and greatly reduces the evaporative loss of the stored liquid. It has a rim-seal system between the tank shell and roof to reduce rim evaporation.

The proposed Project would allow for a change in service for Tank 1776 from Jet "A", mogas, and diesel service to also allow for crude oil service. Though Tank 1776 would be allowed to store crude oil as part of this proposed Project, it would also retain the capability in the future to store jet fuel, mogas, diesel, and other Refinery products it has been previously permitted to store, as required. The storage capacity of the tank would not change as a result of the proposed Project, nor would there be the need for new emissions control measures for Tank 1776. The tank's existing control measures, which include tight-fitting double seals, satisfy BAAQMD's Regulation 8-5 and Best Available Control Technology (BACT) requirements for the services proposed.

There would be no physical modifications to Tank 1776 that would impact breathing emissions. However, the tank would be repurposed for crude oil storage. The tank would be outfitted with additional nozzles for crude oil service and for potential future connections as found on typical crude oil storage tanks. The bottom interior surface of the tank would be coated, if required, for crude water draw service. The overall exterior appearance of the tank would remain unchanged. Tank 1776 would not require heating because the proposed North American crude oil stored would flow readily at ambient temperatures. The proposed Project would not increase Refinery steam demand and production.

As noted above, the proposed Project would not result in any net increase in crude oil deliveries to the Refinery. The existing crude storage tanks would continue to be utilized in their existing service. Because Tank 1776 is close to the proposed rail unloading rack, the use of this nearby tank would reduce the amount of new infrastructure, such as a new pipeline, required for the sole purpose of transporting the new crude oil to the Refinery's crude oil tank farm situated farther

from the unloading rack. After the implementation of the proposed Project, material currently stored in Tank 1776 would be stored in existing storage tanks currently permitted for storage of similar materials.

Rail Car Unloading Rack

An unloading rack capable of unloading two parallel rows of rail cars (one on each side) and transferring crude oil to Tank 1776 would be constructed for the Project. The 1,500-foot-long unloading rack would be used only for unloading crude oil; there would be no loading of crude oil or other materials at this rack. The rack would be installed in the northeastern portion of the main Refinery property, between the eastern side of the lower tank farm and the fence adjacent to Sulphur Springs Creek. The fence would not be relocated to accommodate the new construction. The unloading rack platform walkway would be approximately 13 feet above grade. A majority of the lighting (primarily consisting of 25 new aluminum poles with lights mounted 12 feet above the platform) and rail car access walkways would be mounted to the unloading rack structure. A minimum of 23 feet vertical clearance is required by UPRR for facilities that bisect a railway track, and this would be the height of the proposed walkways. The rail car unloading rack would include directional lighting to illuminate rail car connecting points beneath the rail cars, walkways, access platforms, and a service road. The rack would use isolation valves specified to comply with BACT requirements for fugitive emissions.

The new rail car unloading facilities would include liquid spill containment. The rack area would be sloped inward towards the centerline of the rack. A roadside curb would be provided east of the tracks near the fenceline to further contain any minor spills and leaks. In addition, the existing liquid spill containment for tanks abutting the rail car unloading facilities would be modified to allow installation of the unloading facilities. Part of the existing containment berm for the tank field would be removed and a new concrete berm would be constructed approximately 12 feet west of the existing earthen berm. The resulting containment capacity would continue to meet or exceed minimum regulatory containment requirements.

Unloading Rail Spurs

Currently, the existing rail tracks at the Refinery serve the upper coke silo for petroleum coke loading and the intermediate tank farm for the light ends loading. There are no unloading rail spurs for crude oil deliveries at the Refinery.

As a part of the proposed Project, existing tracks would be realigned and two unloading rail spurs and a parallel storage and departure spur would be constructed to allow for receipt of rail cars at the unloading rack. The rail spurs and the parallel storage and departure spur would be constructed between the eastern side of the lower tank farm and the western side of the fence along Sulphur Springs Creek and would occupy a portion of Avenue “A.” The distance between the existing fence and the centerline of the departure/storage track would be approximately 14 feet. The centerline of the adjacent rail spur would be 15 feet from the centerline of the departure/storage track, with another 25 feet between the centerline of this rail spur to the western spur.

The proposed Project would install approximately 8,880 track-feet of new track on Refinery property. This would primarily consist of tracks servicing the rail car unloading rack and the rail car departure spur. To allow the rail cars to migrate between spurs, one redesigned and five new track turnouts would be installed. The proposed Project also proposes realigning approximately 3,560 track-feet located on Refinery property.

Ancillary Facilities

Ancillary facilities affected by the proposed Project would include a crude oil pipeline, spill containment structures, a firewater pipeline, groundwater wells, and a service road.

Currently, there is no crude oil pipeline to Tank 1776. Approximately 4,000 feet of primarily 16-inch-diameter, aboveground piping and associated components and infrastructure would be installed as part of the proposed Project between the unloading rack and Tank 1776, and from Tank 1776 to the existing crude supply piping.

The existing spill containment structure around the lower tank farm consists of a 5- to 10-foot-tall, earthen berm to provide secondary containment for tanks. The existing liquid secondary containment structure for the tanks abutting the rail car unloading facilities would be modified to allow installation of the unloading facilities. Approximately 1,800 feet of the existing earthen containment berm along the eastern edge of the tank farm would be removed and a new, 8-foot-tall concrete berm would be constructed approximately 12 feet west of the existing earthen berm. The resulting containment capacity of the shared containment system would continue to meet or exceed minimum regulatory containment requirements.

There is an existing firewater pipeline, several groundwater monitoring wells, a compressor station, and a carbon dioxide line in the vicinity of Avenue “A.” These facilities would be relocated to accommodate the new rail tracks.

Existing groundwater monitoring wells along Avenue “A” that interfere with the proposed facilities would be relocated or removed. The wells would be replaced in-kind or abandoned, as approved by the Regional Water Quality Control Board. Abandoned wells would be sealed and capped in accordance with Solano County and California Department of Water Resources procedures.

A new service road, approximately 20 feet wide, would be added along the western side of the new unloading rail spurs.

6. Project Operation

Once operational, the proposed Project would employ up to 30 full-time-equivalent personnel. The rail car unloading rack would accommodate up to 25 rail cars on each side at a time (two, 50-rail car “switches” per day would be transported to the rack by train). The tank cars would be emptied into a single pipeline located between the two rail spurs at slightly below ground level.

Each side of the rack would have 25 unloading stations, which would “bottom-unload” closed-dome rail cars using 4-inch-diameter hose, with dry disconnect couplings that would connect to a common header between the two sides of the rack (a check valve, connected to the top of each rail car via 2-inch-diameter hose would open to allow ambient air to enter during unloading and immediately close when unloading is finished). Three new pumps would be located on the western side of a new service road between Tanks 1720 and 1716. Two pumps operating in parallel would pump the crude oil from the unloading rack header via a new 16-inch pipeline to Tank 1776. The third pump will be installed as a spare pump. This will facilitate periodic maintenance on the primary pumps. Once emptied, the 50 rail cars would be disconnected from the rack, moved to an on-site departure spur, and then replaced by another 50-rail-car switch.

A typical rail car handling scenario is described below:

1. UPRR-operated locomotives would haul up to 100 crude oil rail cars (in two trains of up to 50 cars) a day from the UPRR Roseville Railyard to the Refinery. Each rail car is nominally 60 feet long, with a capacity of approximately 700 barrels and a maximum estimated load of 211,600 pounds.

2. For each delivery, UPRR-operated locomotives would haul in a full 50-rail-car train crossing Park Road on Track 700 and then travel on Track 732 to the unloading rack. Twenty-five rail cars would be spotted on each unloading track located on each side of the unloading rack. UPRR would leave its locomotives attached to each 25-rail-car train.

3. The Refinery would unload the delivered rail cars.

4. After the rail cars are emptied, the empty rail cars would be moved onto the “departure” spur on Refinery property adjacent to the unloading rack, to assemble a 50-rail-car train.

5. The empty 50-rail-car train on the departure spur would be moved onto Track 700, across Park Road, and transported off site by a UPRR operator.

Steps 2 through 5 would take approximately 8 to 10 hours for 50 rail cars. The proposed Project would result in four 50-car train crossings of Park Road per day (two trips into the Refinery and two trips out). UPRR would deliver one full 50-car train and pull out an empty 50-car train between the hours of 8:00 PM and 5:00 AM. A second 50-car train would either be delivered and empty 50-car train pulled out during this time period or during the non-peak daytime hours (avoiding 6:00 AM to 9:00 AM and 4:00 PM to 6:00 PM weekdays). A train with 200 feet of locomotive and 50 railcars in length would take about 7.3 minutes to cross Park Road at a speed of 5 mph. The at-grade crossing traffic controls provide a 30-second buffer time before and after each train crossing on Park Road. Each 50-railcar train movement is estimated to block traffic on Park Road for approximately 8.3 minutes. Operations would occur 24 hours per day/7 days per week/365 days per year.

7. Project Construction

The Refinery proposes to begin construction in 2013 and to commence operations in late-2013 or early 2014. Construction is expected to take approximately 25 weeks. Construction work would be conducted in two 10-hours shifts per day seven days per week for most activities.

Construction activities would take place mostly near the lower tank farm area, along Avenue “A” within the Refinery. Pipeline construction would take place between this area and Tank 1776, which includes Avenue “A”, Avenue “D”, 9th Street, and 14th Street.

Construction activities would include excavation and grading, demolition of the existing spill containment berm, realignment of existing track, and construction of a new containment wall, unloading rack, new rail tracks, and piping and associated equipment.

Most of the area that would be disturbed by the Project lies between the tank farm containment berm and the property fence, and is already graded. A part of this affected area that is graded and paved with asphalt forms Avenue “A.” New tracks would result in a cut volume of approximately 16,000 cubic yards and fill volume of 2,000 cubic yards. Containment berm work would result in a cut volume of 3,000 cubic yards. The new rail unloading rack would also result in a cut volume of 1,500 cubic yards. The net cut volume is approximately 18,500 cubic yards.

Material deliveries would include, but would not be limited to, pipes, valves, fittings, structural steel, plates, concrete, rebar, formwork, machinery and equipment, electrical equipment, electrical conduit and cable, instrumentation, insulation, gaskets, bolts, nuts, rail tracks, and fill material from off-site. Deliveries would also be required for additional services equipment (e.g., portable toilets and temporary office trailers for construction contractors).

The construction workforce would include workers conducting activities inside the Refinery in and around the Project site. The total workforce is estimated to include 121 construction workers.

The proposed Project would generate additional construction and personal vehicle trips during the construction period. Vehicle traffic would include employees, administrative personnel, management, materials, bus drivers, and soil deliveries.

Prior to commencing construction, a traffic control plan would be submitted to the appropriate agency. Public safety measures approved by the City Engineer would be maintained at key intersections or other driveways that may be affected by construction vehicle ingress and egress. No physical entrance, roadway, or intersection improvements would be needed to accommodate construction traffic volume.

Parking and on-site services would be provided for construction workers. Parking for the construction contractors would be in the two existing lots on the southern side of the main Refinery area. All temporary administrative, sanitary, and comfort services would be provided in the areas designated for these purposes on Refinery property. There would be no parking or other services off-site.

Laydown areas located off-site north and east of the Refinery at 251 West Channel Road and 443 Industrial Way, respectively, would host proposed Project equipment, and may also contain temporary office trailers, security lighting, and other incidental features.

CHAPTER II
Environmental Checklist

Evaluation of Environmental Impacts

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporation" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less-than-significant level (mitigation measures from Section XVII, "Earlier Analyses," may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. (see Section 15063(c)(3)(D)). In this case, a brief discussion should identify the following:

    a) Earlier Analyses Used. Identify and state where they are available for review.

    b) Impacts Adequately Addressed. Identify which effects from the checklist were within the scope of, and adequately analyzed in, an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analyses.

c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

a) the significance criteria or threshold, if any, used to evaluate each question; and

b) the mitigation measure identified, if any, to reduce the impact to less than significant.

1. Aesthetics

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
1. AESTHETICS — Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	☐	☐	☒	☐

Discussion

1a) ***Would the Project have a substantial adverse effect on a scenic vista?***

The Refinery is located in the northeastern portion of the City of Benicia and is the dominant visual feature of the Benicia Industrial Park, which is located in a valley flanked by undeveloped hills above Suisun Bay. The topography of the area ranges between 10 feet to 300 feet above mean sea level. The main Refinery process and storage areas are located on terraced slopes that descend from East Second Street towards the Carquinez Strait. The site exhibits complex industrial forms, lines, and geometric shapes. Refinery structures are painted light colors such as yellow-gold to blend with dry season grassland colors and forest green intended to mimic tree color, and to better blend into the landscape from distant viewpoints. Major components of the Refinery process block include the 462-foot-tall main stack, crackers and furnaces, cooling towers, natural gas supply lines and other piping, pumps, and other equipment. With the exception of the main stack and two flares, most of the stacks and coolers are less than 150 feet tall. Some of these structures, such as the main stack, are equipped with night lighting and beacons. In the main process block the units are clustered, sometimes creating solid walls of mechanical equipment comparable to the size of five- to six-story buildings. The Refinery also includes a number of clustered tanks or “tank farms,” which also contribute to the industrial aesthetic. The utilitarian character and appearance of the Refinery produces a strong industrial statement in the landscape that contrasts sharply with the open space and undeveloped hills adjacent to the north and west.

The *City of Benicia General Plan* includes the following goal and policy regarding scenic vistas: Goal 3.9, which calls for the protection and enhancement of scenic roads and highways, and Policy 3.9.1, which states that vistas along I-680 (and I-780) should be preserved. The General Plan identifies five gateways to the City, two of which are located in the eastern portion of the City and have views of the Refinery. The Northern Gateway is

located on I-680 at Lake Herman Road, approximately three-quarter-mile northeast of the Refinery. Although this junction includes a Caltrans vista point, only the upper portions of the tallest stacks of the Refinery are visible from this gateway. The Southern Gateway is located south of the Refinery on the Benicia-Martinez Bridge. Motorists from this viewpoint have clear views of the storage tanks on the ridges above the highway, but hills block views of most of the Refinery with the exception of the upper portions of some stacks.

The Visual Character section of the General Plan further identifies three principal scenic streets and gateways from which a variety of Benicia's scenic resources can be viewed. Two of these corridors (I-680 between Morrow Road [north of the City limits] and the Benicia-Martinez Bridge, and Lake Herman Road) have views of the Refinery. Views of the Refinery along I-680 between the Caltrans vista point at Lake Herman Road and the Benicia-Martinez Bridge are partially obscured by buildings and landscaping in the Benicia Industrial Park. While the Refinery is visible from I-680, the Project may be discernable by motorists for a very short duration as they travel over the viaduct above Sulphur Springs Creek. The rolling hills above the Refinery obscure most views of the site along Lake Herman Road.

The Refinery is also visible from other areas not designated as official views and vistas by the General Plan. From the residential neighborhoods northwest and southwest of the Refinery, the upper portions of stacks are visible from some locations, with views of Mount Diablo across the Carquinez Strait in the background. Views of the Refinery are largely restricted to the tier of homes nearest the Refinery due to the topography and the visual screen presented by these homes.

Proposed Project elements would include a rail car unloading rack; two parallel rail spurs and a parallel departure track; modification of the existing Tank 1776; approximately 4,000 feet of 16-inch diameter crude oil pipeline; replacement and relocation of approximately 1,800 feet of tank farm dikes with an eight-foot-tall concrete retaining wall; and relocation of existing facilities such as a firewater pipeline, compressor station, groundwater wells, and underground infrastructure.

The proposed Project would be constructed and operated mostly near the lower tank farm area, along the existing Avenue "A," at an elevation of approximately 10 feet above mean sea level. New pipeline also would be installed between this area and Tank 1776 along Avenue "A", Avenue "D", 9th Street, and 14th Street.

Many of proposed Project elements, such as the rail tracks, crude oil pipeline, firewater pipeline, groundwater wells, and other utility infrastructure would be located either a few feet above grade (pipelines), on the ground itself (rail tracks), or underground (wells and other utilities). Tank 1776 would be outfitted with additional nozzles for crude oil service and for potential future connections but the overall exterior appearance of the tank would remain unchanged.

The most visible physical changes at the site would be the replacement of portions of the tank farm dikes with the eight-foot-tall retaining wall and the rail car unloading rack. The 1,500-foot-long unloading rack would be constructed along Avenue "A" between the eastern side of the lower tank farm and Sulphur Springs Creek. The unloading rack platform walkway would be approximately 13 feet above grade. The unloading rack platform also would have 25 evenly-spaced aluminum poles with lighting that would extend 12 feet above the platform. Access to the unloading rack platform would be provided by access walkways that reach 23 feet above ground level in order to meet minimum UPRR requirements for facilities that bisect a rail track. Eight-foot-tall aluminum light poles would be mounted to the access walkways. Approximately 1,800 feet of tank farm dikes would be removed and replaced with an eight-foot-tall concrete retaining wall. The new wall would be similar in height to the containment berms but would be located slightly westward from the existing berm location. The majority of the wall would be approximately 45 feet west of the westernmost rail spur.

The proposed facilities would be much shorter than the existing tanks in the lower tank farm area and views of the unloading rack would be blocked from most off-site viewpoints due its location within the Refinery, the surrounding topography, and the low height of the proposed structure. The proposed Project would generally blend in with the existing facilities in the Refinery and would not obstruct predominant visual elements of the area that include the nearby hills, Suisun Bay, and expanses of adjacent open space or lightly developed areas. Impacts to scenic vistas would be less than significant.

1b) ***Would the Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?***

The Refinery is not located near a state designated scenic highway and is not subject to any state management requirements. A Caltrans vista point is located at I-680 and Lake Herman Road, approximately three-quarter-mile northeast of the Refinery. However, the proposed Project would not be visible from this location due to the its location in a valley below undeveloped hills. The proposed Project would not substantially damage scenic resources within a state scenic highway because the proposed Project elements would not be visible in or from any area where scenic resources exist. The proposed Project would be located within the footprint of the existing Refinery, which does not presently contain scenic resources (e.g., trees, rock outcroppings, and historic resources). No impact would result.

1c) ***Would the Project substantially degrade the existing visual character or quality of the site and its surroundings?***

General Plan policies and goals relevant to visual character and quality include Policy 3.7.1, which states that new development should be compatible with the surrounding architectural and neighborhood character; Goal 3.12, which calls for the improvement of the Industrial Park's appearance; and Policy 3.12.1 that encourages attractive, quality development in industrial areas.

The City's Municipal Code includes two primary zoning ordinance sections related to visual impacts of general industrial development. Section 17.32.030 lists requirements for lot size and setback criteria and Section 17.108 concerns design review of structures to ensure visual harmony with the surrounding area.

The new facilities proposed as part of the proposed Project would conform to General Plan policies, which seek to ensure that new development is compatible with the surrounding architectural and neighborhood character. The Project elements as described above under 1a) would be similar in appearance and generally visually harmonious with the existing Refinery and industrial character of the site and the adjacent Benicia Industrial Park; the Project would avoid excessive grading or alteration of the existing topography; and new development would be largely confined to a relatively narrow strip of land located in one of the lowest areas of the Refinery property. Impacts to visual character or quality of the site would be less than significant.

1d) ***Would the Project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?***

Lighting proposed by the proposed Project would be located as part of the rail car unloading rack and ancillary facilities. The 1,500-foot-long unloading rack would consist of 25, 60-foot-long segments. Each segment would include an aluminum pole with four LED lights mounted 12 feet above the unloading rack platform walkway and two LED pendant fixtures mounted underneath the platform, eight feet above grade. In addition, two pole-mounted LED lights would be located 18 inches above grade. Walkways extending over the rail spurs would include six stanchion-mounted LED fixtures along the walkway and stairs and four at stairway landings at each end of the unloading rack. Eleven stanchion-mounted LED fixtures would be mounted eight feet above eleven monitoring stations that would be evenly spaced along the length of the unloading rack. Eight stanchion mounted fixtures at eight feet above grade would be installed in the pumping station.

Projects zoned as General Industrial (IG) must comply with outdoor lighting performance standards listed in Section 17.70.240.D.2. These standards specify that lighting "shall be designed and installed to confine direct light rays to the site…Security lighting in any district may be indirect or diffused, or shall be shielded or directed away from adjoining properties and public rights-of-way."

All lighting would be directional to illuminate rail car connecting points beneath the cars, walkways, access platforms, and the service road. A majority of the lighting and rail car access walkways would be mounted to the unloading rack structure.

The Refinery currently illuminates facilities in order for operations to continue throughout the night. Lighting within the Refinery would increase as a result of the proposed Project, but would not exceed the performance standards specified in Section 17.240.D.2 of the

Zoning Ordinance. Structures that would be illuminated would be constructed within existing areas of the Refinery and would be directed appropriately to avoid disturbance to motorists or adjacent residential areas (the nearest residential neighborhood is located approximately 0.4-mile to the northwest of the terminus of the proposed rail spurs). The Project would not include structures that are constructed of highly reflective material, such as glass or mirror that would produce glare. The increased lighting resulting from the Project would not be substantial and would not adversely affect day or nighttime views in the area; the impact would be less than significant.

References

California Department of Transportation (Caltrans), Scenic Highway Program, www.dot.ca.gov/hq/LandArch/scenic_highways/scenic_hwy.htm, accessed March 20, 2013.

City of Benicia, *General Plan*, 1999.

City of Benicia, Municipal Code, as amended through December 18, 2012.

2. Agricultural and Forest Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
2. AGRICULTURAL AND FOREST RESOURCES — In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. **Would the Project:**				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion

2a) ***Would the Project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?***

According to the 2010 Solano County Important Farmland Map, the proposed Project site is classified as Urban and Built-up Land (DOC, 2011). As such, the proposed Project would not involve conversion of prime farmland, unique farmland, or farmland of statewide importance. No impact would result.

2b) ***Would the Project conflict with existing zoning for agricultural use, or a Williamson Act contract?***

No part of the proposed Project site property has an agricultural zoning or is under a Williamson Act contract. No impact would result.

2c) ***Would the Project conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production?***

The proposed Project would not conflict with existing zoning or cause rezoning regarding forest land or timberland. No impact would result.

2d) ***Would the Project result in loss of forest land or conversion of forest land to non-forest use?***

The proposed Project would not result in loss of forest land or conversion of forest land to non-forest use. No impact would result.

2e) ***Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?***

The proposed Project would not result in the conversion of farmland to non-agricultural use or conversion of forest land to non-forest use. No impact would result.

References

California Department of Conservation, 2010 Solano County Important Farmland Map, published June 2011.

3. Air Quality

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
3. AIR QUALITY — Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. **Would the project:**				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☒	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☒	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

Discussion

3a) ***Would the project conflict with or obstruct implementation of the applicable air quality plan?***

The most recently adopted air quality plan for the San Francisco Bay Area is the *Bay Area 2010 Clean Air Plan* (2010 CAP). The 2010 CAP is an update to the Bay Area Air Quality Management District's (BAAQMD) 2005 Ozone Strategy to comply with State air quality planning requirements. The 2010 CAP also serves as a multi-pollutant air quality plan to protect public health and the climate. The 2010 CAP control strategy includes revised, updated, and new measures in the three traditional control measure categories, including stationary source measures, mobile source measures, and transportation control measures. In addition, the 2010 CAP identifies two new categories of control measures, including land use and local impact measures, and energy and climate measures (BAAQMD, 2010).

BAAQMD recommends that the agency approving a project where an air quality plan consistency determination is required analyze the project with respect to the following questions: 1) does the project support the primary goals of the air quality plan; 2) does the project include applicable control measures from the air quality plan; and 3) does the project disrupt or hinder implementation of any 2010 CAP control measures? If all the questions are concluded in the affirmative, BAAQMD considers the project consistent with air quality plans prepared for the Bay Area (BAAQMD, 2012). Any project that would not support the 2010 CAP goals would not be considered consistent with the 2010 CAP, and if

approval of the project would not result in significant and unavoidable air quality impacts after the application of mitigation, then the project would be considered consistent with the 2010 CAP.

As presented in the subsequent impact discussions, proposed Project-related construction and operation emissions would not exceed the BAAQMD significance thresholds; therefore, the proposed Project would support the primary goals of the 2010 CAP. As mentioned above, projects that incorporate all feasible air quality plan control measures are considered consistent with the 2010 CAP. There appear to be no 2010 CAP control measures that would be directly applicable to the proposed Project; however, implementation of Mitigation Measure AIR-1 (see discussion 3b), below) would ensure that BAAQMD basic construction control measures would be implemented.

The proposed Project would support the primary goals of the 2010 CAP and it would not disrupt or hinder implementation of any 2010 CAP control measures. Therefore, there would be no impact associated with conflicting or obstructing implementation of the applicable air quality plan.

3b) ***Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?***

Exhaust emissions significance thresholds recommended in the BAAQMD's *Revised Draft Options and Justification Report* (2009) were used to determine the significance of impacts related to air quality standard violations. The justification report provides substantial evidence to support the recommended thresholds and, therefore, the City of Benicia has determined they are appropriate for use in this analysis. Based on the following, construction and operation of the mitigated Project would not result in a violation of an air quality standard or contribute significantly to an existing or projected air quality violation. Therefore, the associated impact would be less than significant with mitigation.

Construction

The majority of proposed Project-related exhaust emissions would be generated on-site due to the use of heavy-duty off-road equipment (such as excavators, graders, front loaders, dump trucks, cranes, and paving equipment). Construction activities would occur each day with two 10 hours shifts, 7 days a week, for 25 weeks. Exhaust emissions would also be generated by construction worker daily commutes and by heavy-duty diesel tractor trailer truck trips. It is assumed that up to 11,380 light-duty auto roundtrips would be required to transport workers to and from the site and up to 437 truck roundtrips to haul materials (e.g., concrete, asphalt) and debris to and from the site.

Criteria pollutant and precursor exhaust emissions of reactive organic gases (ROG), nitrogen oxides (NO_x), particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$) from construction equipment and vehicles would incrementally add to the regional atmospheric loading of these pollutants during construction of the proposed Project.

Impacts related to the proposed Project contributing to an existing or projected air quality violation are judged by comparing estimated direct and indirect proposed Project exhaust emissions to the significance thresholds, which for short-term construction emissions are 54 pounds per day for ROG, NO_X, and $PM_{2.5}$; and 82 pounds per day for PM_{10}. Only the exhaust portion of $PM_{2.5}$ and PM_{10} emissions are compared against the construction thresholds. BAAQMD recommends that analyses focus on implementation of dust control measures rather than comparing estimated levels of fugitive dust to a quantitative significance threshold. Rather, BAAQMD considers implementation of BAAQMD-recommended basic mitigation measures for fugitive dust sufficient to ensure that construction-related fugitive dust is reduced to a less-than-significant level.

Air pollutant emissions were estimated by ERM, a consultant to the Applicant. Table 3-1 shows the estimated total average daily exhaust emissions that would be associated with construction of the proposed Project. All assumptions and calculations used to estimate the Project-related construction emissions are available for review at the City of Benicia and online. As indicated in the table, the total average daily construction exhaust emissions would not exceed the BAAQMD's significance thresholds. Therefore, impacts that would be associated with construction-related exhaust emissions would be less than significant.

TABLE 3-1
AVERAGE DAILY CONSTRUCTION EXHAUST EMISSIONS

	Average Daily Emissions (lb/day)					
Sources	**ROG**	**CO**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Equipment Exhaust	6.96	26.60	49.67	0.06	2.56	2.35
On-site Vehicle Exhaust	0.18	1.63	0.79	0.00	3.57	0.38
Off-site Vehicle Exhaust	0.91	8.47	1.43	0.01	0.53	0.17
Total Emissions	**8.06**	**36.7**	**51.9**	**0.08**	**6.65**	**2.91**
CEQA Threshold	**54**	**---**	**54**	**---**	**82**	**54**
Threshold Exceeded (Y/N)	**No**	**---**	**No**	**---**	**No**	**No**

SOURCE: ERM, 2013a

In addition to exhaust emissions, emissions of fugitive dust would also be generated by project construction activities associated with earth disturbance, travel on paved and unpaved roads, etc. With regard to fugitive dust emissions, the BAAQMD's *Revised Draft Options and Justification Report* recommends that lead agencies focus on implementation of dust control measures to ensure that impacts would be less than significant rather than comparing estimated levels of fugitive dust to quantitative significance thresholds. Therefore, BAAQMD basic control measures (BAAQMD, 2012), which are recommended for every construction project and contained in Mitigation Measure AIR-1, would be implemented to ensure that impacts associated with fugitive dust emissions would be reduced to a less-than-significant level.

Mitigation Measure AIR-1: Implement BAAQMD Basic Mitigation Measures. Valero and/or its construction contractors shall comply with the following applicable BAAQMD basic control measures during Project construction:

- All exposed dirt non-work surfaces (e.g., parking areas, staging areas, soil piles, and graded areas, and unpaved access roads) shall be watered two times a day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California Airborne Toxics Control Measure Tile 13, Section 2485 of California of Regulations). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign with the telephone number and person to contact at the City of Benicia regarding dust complaints shall be posted throughout construction. Valero and/or contractor shall respond and take corrective action within 8 hours of notification by the City. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

Operations

Operation of the proposed Project would result in Valero replacing up to 70,000 barrels per day of the crude oil currently supplied to the Refinery by marine vessel with an equivalent amount of crude oil transported by rail cars. New stationary sources at the Refinery would include an unloading rack and pipeline, which would result in fugitive emissions of ROG. The project would also include a change in service to existing Tank 1776 to allow it to store crude oil; however, because there would be no change in the amount of crude oil stored at the Refinery, there would be no net increase in tank-related storage mass emissions relative to baseline conditions. Overall, the proposed Project would result in reduced air emissions compared to the existing operations because delivering crude oil by railcar results in less emissions within the BAAQMD compared to delivering crude oil by marine vessel. See Table 3-2 for a summary of net emissions reductions that would be associated with the project. It should be noted that the emissions reductions presented in Table 3-2 represent the maximum amount of reductions that would occur. If less than 70,000 barrels of crude oil are transported by rail, an equivalent lesser amount of crude oil would be delivered by marine vessel, resulting in proportionately less emissions reductions. Regardless, long-term operations of the proposed Project would result in a beneficial impact to air quality in the BAAQMD.

TABLE 3-2
ANNUAL NET OPERATIONAL EXHAUST EMISSIONS

Sources	Project Emissions, Net Change from Baseline (tons/yr)					
	ROG	NOx	CO	SO_x	PM_{10}	$PM_{2.5}$
Unloading Rack and Pipeline Fugitive Components	1.71	---	---	---	---	---
Trains	1.70	33.04	5.6	0.02	0.83	0.81
Marine Vessels (Baseline)	(5.18)	(91.84)	(10.69)	(26.79)	(3.58)	(3.40)
Total Emissions	(1.77)	(58.80)	(5.09)	(26.77)	(2.75)	(2.59)
CEQA Threshold	10	10	---	---	15	10
Threshold Exceeded (Y/N)	No	No	---	---	No	No

SOURCE: ERM, 2013b

3c) ***Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?***

Based on BAAQMD guidance, if a project would result in an increase in ROG, NO_x, PM_{10}, or $PM_{2.5}$ of more than its respective average daily mass significance thresholds, then it would also be considered to contribute considerably to a significant cumulative impact. In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project would exceed the identified significance thresholds, its emissions would be cumulatively considerable, and if a project would not exceed the significance thresholds, its emissions would not be cumulatively considerable. As presented in item 3b) above, short-term construction and operational exhaust emissions would not exceed the applicable significance thresholds, and implementation of Mitigation Measure AIR-1 would ensure that impacts associated with fugitive dust emissions would be reduced to a less-than-significant level. Therefore, the project would not be cumulatively considerable and cumulative impacts would be less than significant.

3d) ***Would the project expose sensitive receptors to substantial pollutant concentrations?***

The BAAQMD recommends that lead agencies assess the incremental toxic air contaminant (TAC) exposure risk to all sensitive receptors within a 1,000-foot radius of a project's fence line. Project construction would generate diesel particulate matter (DPM), which is considered to be a TAC, from the use of diesel off-road equipment. Long-term operations associated with the project would generate TAC emissions from locomotive idling, locomotive transit, locomotive, switching, and from fugitive equipment and routine Tank 1776 leaks. The Applicant provided a screening level health risk assessment, as summarized in Table 3-3, which modeled the following sources using the ISCST3 air dispersion model:

1) Locomotive idling- point source;
2) Locomotive transit- line of volume sources;
3) Locomotive switching- line of volume sources;
4) Tank 1776- circular area source; and
5) Fugitive equipment leak- rectangular area source.

TABLE 3-3
MAXIMUM CANCER AND NONCANCER RISK

Type of Estimated Health Impact	Cancer Risk per million, (Receptor Location)	Chronic Hazard Index, (Receptor Location)	Acute Hazard Index, (Receptor Location)
Maximum Exposed Individual Residential (MEIR)- Hypothetical residential receptors assumed at > 40m from the train tracks	2.27 Worst case risk at 150m west of train tracks (5786E,4215678N)	0.009 Worst case risk at 150m west of train tracks (578686E, 4215678N)	0.0057 (575494E, 4212545N)
Maximum Exposed Individual Worker (MEIW)	4.46 (576144E, 4214145N)	0.014 (576144E, 4214145N)	0.0473 (575944E, 4214395N)
Maximum Sensitive Receptor- Day Care Center	0.29 (574594E, 4212895N)	0.0006 (574594E, 4212895N)	0.0022 (574594E, 4212895N)

SOURCE: ERM, 2013c

The closest sensitive receptors to the proposed Project would be residences off Lansing Circle, approximately 2,700 feet northwest of the proposed Project site. There are no sensitive receptors within 1,000 feet of any of the proposed Project components. The dose to which receptors are exposed is the primary factor affecting health risk from exposure to TACs. Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments, which determine the exposure of sensitive receptors to TAC emissions, should be based on a 70-year exposure period when assessing TACs (such as DPM) that have only cancer or chronic non-cancer health effects (OEHHA, 2003). As shown in Table 3-3, the cancer risk at the maximum exposed individual residential (MEIR) receptor, maximum exposed individual worker (MEIW) receptor, and maximum sensitive receptor (MSR) is below 10 in a million. The chronic hazard index and the acute hazard index, at the MEIR, MEIW, and MSR are also below 1.0. Therefore, the impact related to exposing sensitive receptors to substantial pollutant concentrations would be less than significant.

3e) ***Would the project create objectionable odors affecting a substantial number of people?***

Diesel equipment used to construct the project may emit objectionable odors associated with combustion of diesel fuel. However, these emissions would be temporary and intermittent in nature, thus odor impacts associated with diesel combustion during

construction activities would be less than significant. There would be no change expected in the existing operational odors resulting from implementation of the proposed Project. This impact would be less than significant.

References

Bay Area Air Quality Management District (BAAQMD), 2009. Revised *Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance*, October, 2009.

BAAQMD, 2010, *Bay Area 2010 Clean Air Plan, Final Clean Air Plan Volume 1*, adopted September 15, 2010.

BAAQMD, 2012. *CEQA Air Quality Guidelines*, Updated May 2012.

ERM, 2013a. Crude by Rail Air Permit Application, February 2013.

ERM, 2013b. Valero Crude by Rail Construction Emissions. February.

ERM, 2013c. Crude by Rail – BAAQMD Permit Application Revised Health Risk Assessment. Submitted May 1, 2013.

Office of Environmental Health Hazard Assessment (OEHHA). 2003. *Air Toxics Hot Spots Program Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. August, 2003.

4. Biological Resources

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
4. BIOLOGICAL RESOURCES — Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☒	☐	☐

Discussion

4a) ***Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?***

The proposed Project could have a substantial adverse indirect effect on nesting birds. While other special-status species occur in the vicinity, they are unlikely to be impacted by the Project due to lack of habitat at the Project site. For the purposes of this analysis, the term "special-status" species includes those species that are listed or proposed for listing by the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and/or the California Department of Fish and Wildlife (CDFW)[1] and receive specific

[1] The California Department of Fish and Game (CDFG) changed its name on January 1, 2013 to The California Department of Fish and Wildlife (CDFW). In this document, references to literature published by CDFW prior to Jan. 1, 2013 are cited as 'CDFG, [year]'. The agency is otherwise referred to by its new name, CDFW.

protection defined in federal or state endangered species legislation, as well as species that are not formally listed as Threatened or Endangered but are designated as “Rare” or “Sensitive” on the basis of adopted policies and expertise of State resource agencies or organizations, or local agencies such as counties, cities, and special districts. Principal sources for these designations are CDFW’s Special Plant and Animal Lists (CDFW, 2013a) and NMFS Southwest Regional Office’s Protected Resources information (NMFS, 2013).

Sulphur Springs Creek flows adjacent to the Refinery and the riparian canopy extends to the property boundary. The creek is separated from the Refinery by a tall chain link fence. Sulphur Springs Creek and its associated riparian corridor and in-stream marshes provide suitable habitat for the following special-status species: California red-legged frog, western pond turtle, tri-colored blackbird, yellow-headed blackbird, Suisun song sparrow, Samuel’s song sparrow, grasshopper sparrow, loggerhead shrike, yellow-breasted chat, San Francisco common yellowthroat, and short-eared owl. Suisun song sparrow is documented within coastal brackish marsh associated with downstream reaches of Sulphur Springs Creek, and coastal brackish marsh is also recognized by the California Department of Fish and Wildlife (CDFW) as a special natural community (CDFW, 2013b). Brackish and salt marshes at the mouth of Sulphur Springs Creek provide habitat occupied by California black rail, California clapper rail, and salt marsh harvest mouse (CDFW, 2013a). Alameda whipsnake is documented from grasslands and chaparral surrounding the Refinery and American peregrine falcon is documented from undisclosed areas of Benicia (CDFW, 2013); peregrines often nest on tall buildings, and their nests could occur on Refinery structures, on industrial buildings in Benicia, or on rock outcrops associated with surrounding grasslands.

California red-legged frog and western pond turtle are unlikely to occur in the proposed Project area, which is defined for this analysis as the construction footprint where direct impacts to species could occur. Although the chain link fence is permeable to these species, there is no habitat in the proposed Project area and no protective cover. Nesting birds are also unlikely to occur in the proposed Project area, but could occur in the adjacent Sulphur Springs Creek corridor and could experience adverse indirect effects resulting from construction activities. The noise, vibrations, visual disturbance, and increased human activity associated with project construction could result in nest failure (disturbance, avoidance, or abandonment that leads to unsuccessful reproduction), or cause flight behavior that exposes an adult or its young to predators such as Cooper’s hawks *(Accipiter cooperii*). Nest failure is a possible but unlikely outcome of construction activities, since the baseline noise and activity levels at the Refinery would not be significantly increased by construction activities. However, if it were to occur, nest failure would be a significant effect under CEQA and a violation of California Fish and Game Code Sections 3503- 3513 and the federal Migratory Bird Treaty Act. Implementation of the following mitigation measure would reduce potentially significant project effects on nesting birds to a less-than-significant level.

Mitigation Measure BIO-1: Project construction activities should avoid the nesting season of February 15 through August 31, if feasible. If seasonal avoidance is not possible then no sooner than 30 days prior to the start of any Project activity a biologist experienced in conducting nesting bird surveys shall survey the Project area and all accessible areas within 500 feet. If nesting birds are identified, the biologist shall implement a suitable protective buffer around the nest and no activities shall occur within this buffered area. Typical buffers are 250 feet for songbirds and 500 feet for raptors, but may be increased or decreased according to site-specific, Project-specific, activity-specific considerations such as visual barriers between the nest and the activity, decibel levels associated with the activity, and the species of nesting bird and its tolerance of the activity. Construction activities that are conducted within a reduced buffer shall be conducted in the presence of a qualified full-time biological monitor.

4b) ***Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?***

Without mitigation, the Sulphur Springs Creek riparian corridor and downstream coastal brackish marshes could potentially experience adverse effects from project construction, resulting from excessive sediment loads generated by grading and other soil-disturbing activities adjacent to Sulphur Springs Creek that are carried into the streamflow. However, project construction would be restricted to active work areas within the Refinery that are devoid of vegetation, and indirect impacts to Sulphur Springs Creek would be prevented through implementation of appropriate mitigation. Proposed Project construction would occur primarily during the low-flow period of April 15 through October 15 when rainfall is not anticipated and the transport of sediments by surface flow would be unlikely. Additionally, the project would implement construction Best Management Practices and Storm Water Pollution Prevention measures identified in Section 9, *Hydrology and Water Quality*. Implementation of HYD-1 would reduce potential construction-related impacts on riparian habitat and downstream costal brackish marshes to a less-than-significant level.

4c) ***Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?***

The proposed Project would not have a substantial adverse effect on federally protected wetlands defined by Section 404 of the Clean Water Act. No wetlands or waters occur in the project area. Without mitigation, Sulphur Springs Creek which is a federally protected waters, and downstream coastal brackish marshes, which are federally protected wetlands could potentially experience indirect adverse effects resulting from project construction. However, the implementation of HYD-1 would reduce potential indirect impacts on federally protected wetlands to a less than significant level. Water quality impacts potentially resulting from project operation would be addressed through the preparation and

implementation of on-site drainage improvements and stormwater capture and treatment systems described in Section 9, *Hydrology and Water Quality*.

4d) ***Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?***

The proposed Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. No nursery sites such as monarch butterfly roosting groves, heron rookeries, or bat roosts are known to occur on the premises and migratory fish such as steelhead are not documented to occur in Sulphur Springs Creek. The Sulphur Springs Creek riparian zone is a likely movement corridor for wildlife, and could be adversely affected during proposed Project construction and operation by the use of nighttime lighting which may deter use of the corridor. Based on proposed Project lighting design the proposed downwards orientation of proposed Project lighting should result in a less than significant impact not substantially more than the Project baseline.

4e) ***Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?***

The proposed Project would not conflict with any local policies or ordinances protecting biological resources. The project would be constructed among active areas within the Refinery boundary and would not conflict with the *City of Benicia General Plan* (City of Benicia, 1999) or the *Solano County General Plan* (Solano County, 2008). While a variety of trees are protected by the City of Benicia's tree ordinance (City of Benicia, 2008), no trees are proposed for removal and no impact would occur.

4f) ***Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?***

The proposed Project would not conflict with the provisions of an adopted Habitat Conservation Plan (HCP). Solano County has a Final Administrative Draft Multispecies Habitat Conservation Plan (Solano HCP) (LSA, 2009), though neither the City of Benicia nor the Refinery are plan participants. The proposed Project would not result in impacts, either directly or through habitat modification, to any threatened or endangered species or California Species of Special Concern (SSC) or rare plants covered by the Solano HCP. Nesting birds, some of which are SSCs and are specified in the Solano HCP, have the potential to be present in the Sulphur Springs Creek riparian corridor and indirectly affected by project activities, but no formal consultation with the U.S. Fish and Wildlife Service or CDFW would be required for these species, and impacts on nesting birds would be avoided through implementation of Mitigation Measure BIO-1. A summary of the Solano County HCP is provided below for reference.

The Plan provides take coverage for 36 species, 25 of them listed as threatened or endangered under the federal Endangered Species Act (FESA); 16 listed as threatened or endangered under the California Endangered Species Act (CESA) or designated fully-protected species under California Fish and Game Code; a subset of 12 are jointly listed under both FESA and CESA; four are designated by CDFW and the California Native Plant Society as California Rare Plant Rank (CRPR) 1B species; and two are SSCs. The Plan also identifies Special Management Species, comprised of 20 additional CRPR plants and 15 wildlife SSCs. Plan species with potential to occur adjacent to the project area in Sulphur Springs Creek and downstream coastal brackish marshes are California red-legged frog, western pond turtle, tri-colored blackbird, yellow-headed blackbird, Suisun song sparrow, Samuel's song sparrow, grasshopper sparrow, loggerhead shrike, yellow-breasted chat, San Francisco common yellowthroat, and short-eared owl. Chinook, steelhead, smelt, and other anadromous species are not documented from Sulphur Springs Creek, likely due to the presence of a tidal gate at the creek mouth.

References

California Department of Fish and Wildlife. 2013a. Special Plant and Animals Lists. Available online at dfg.ca.gov/wildlife/nongame/list.html. Accessed May 13, 2013.

California Department of Fish and Wildlife. 2013b. Natural Communities List. Available online at dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf. Accessed May 14, 2013.

California Department of Fish and Wildlife. 2013c. California Natural Diversity Database (CNDDB), Rarefind 4. Online database. Accessed May 10, 2013.

City of Benicia. 2008. Ordinance No. 8, Chapter 12.24, *Trees and Street Trees*. Available online at ci.benicia.ca.us/vertical/sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7BCE1C1C9F-446A-4D9F-BBD3-FB8E4DA54802%7D.PDF. Approved July, 2008. Accessed May 14, 2013.

City of Benicia. 1999. *Benicia General Plan.* Adopted June 15, 1999. Available online at ci.benicia.ca.us/vertical/sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7B3328E313-6933-47AC-B8DF-B6D19564CE7F%7D.PDF. Accessed May 14, 2013.

County of Solano. 2008. Approved November 4, 2008. *Solano County General Plan*. Available online at co.solano.ca.us/depts/rm/planning/general_plan.asp. Accessed May 14, 2013.

LSA Associates. 2009. *Final Administrative Draft Solano County Multi-Species Habitat Conservation Plan*. June 15, 2009.

National Marine Fisheries Service. 2013. Southwest Regional Office web page. Available online at swr.nmfs.noaa.gov/Default.htm. Last updated May 10, 2013. Accessed May 13, 2013.

5. Cultural Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
5. CULTURAL RESOURCES — Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

Discussion

5a) ***Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?***

CEQA Guidelines Section 15064.5 requires the lead agency to consider the effects of a project on historical resources. A historical resource is defined as any building, structure, site, or object listed in or determined to be eligible for listing in the California Register of Historical Resources (California Register), or determined by a lead agency to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California. The following discussion will focus on architectural and structural resources. Archaeological resources, including archaeological resources that are historical resources according to Section 15064.5, are addressed in b) below.

ESA conducted a records search of all pertinent survey and site data at the Northwest Information Center (NWIC) of the California Historical Resources Information System, dated July 31, 2002 and updated on January 28, 2013 (File No. 12-0760). The records were accessed by utilizing the Benicia USGS 7.5-minute quadrangle map, Sections 25 and 30, Township 2N, Range 3W and 2W. The review included the project Area of Potential Effect (APE) and a ½ mile buffer. Previous surveys, studies, and site records were accessed as they pertained to the APE. Records were also accessed and reviewed in the *Historic Property Data File for Solano County*, which includes listings from the *National Register of Historic Places*, the *California Register of Historical Resources*, the *California Inventory of Historic Resources*, the *California Historical Landmarks*, and the *California Points of Historical Interest*.

The proposed Project would not impact any previously recorded historic-period buildings or structures within the project APE. The nearest known recorded resource is the Benicia

Arsenal Igloo Bunker #C-425 (designated as P-48-000516; Dexter, 2001). This structure is a World War II-era concrete ammunition bunker previously recommended not eligible for listing in the California Register or the National Register of Historic Places. The bunker is located over 1,000 feet west of the APE and will not be impacted by the proposed Project.

The proposed Project would have no impact on historical resources and no mitigation is required.

5b) ***Would the project cause a substantial adverse change in the significance of a unique archaeological resource pursuant to §15064.5?***

This section discusses archaeological resources, both as historical resources according to CEQA Guidelines Section 15064.5 as well as unique archaeological resources as defined in Public Resources Code Section 21083.2 (g).

The records search at the NWIC discussed above indicates that no previously recorded archaeological resources are located within the project APE or within the ½-mile records search radius. Qualified archaeologists conducted a pedestrian survey of the Refinery in 2001 (URS, 2001). The surveyors noted that the extent of soil disturbance due to grading and identified no prehistoric archaeological resources within the boundaries of the Refinery.

No unique prehistoric or historic-period archaeological resources were identified within the APE during the background research or the 2001 surface survey. Nearby site distribution, proximity to the nearest natural watercourse, and previous development/disturbance in the APE reduces the potential to uncover previously unidentified archaeological resources. In the unlikely event that archaeological resources are uncovered during proposed Project construction, the following mitigation measure would reduce potential impacts to a less-than-significant level.

> **Mitigation Measure CUL-1: Inadvertent Discovery of Cultural Resources.** If prehistoric or historic-period archaeological resources are encountered, all construction activities within 50 feet shall halt and Valero shall be notified. A Secretary of the Interior-qualified archaeologist shall inspect the findings within 24 hours of discovery. If it is determined that the Project could damage a historical resource or a unique archaeological resource (as defined pursuant to the CEQA Guidelines), mitigation shall be implemented in accordance with PRC Section 21083.2 and Section 15126.4 of the CEQA Guidelines, with a preference for preservation in place. Consistent with Section 15126.4(b)(3), preservation in place may be accomplished through planning construction to avoid the resource; incorporating the resource within open space; capping and covering the resource; or deeding the site into a permanent conservation easement. If avoidance is not feasible, a qualified archaeologist shall prepare and implement a detailed treatment plan in consultation with Valero and the affiliated Native American tribe(s), if applicable. Treatment of unique archaeological resources shall follow the applicable requirements of PRC Section 21083.2. Treatment for most resources would consist of (but would not be not limited to) sample excavation, artifact

collection, site documentation, and historical research, with the aim to target the recovery of important scientific data contained in the portion(s) of the significant resource to be impacted by the Project. The treatment plan shall include provisions for analysis of data in a regional context, reporting of results within a timely manner, curation of artifacts and data at an approved facility, and dissemination of reports to local and state repositories, libraries, and interested professionals.

5c) ***Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?***

Paleontological resources are the fossilized evidence of past life found in the geologic record. Despite the tremendous volume of sedimentary rock deposits preserved worldwide, and the enormous number of organisms that have lived through time, preservation of plant or animal remains as fossils is an extremely rare occurrence. Because of the infrequency of fossil preservation, fossils—particularly vertebrate fossils—are considered to be nonrenewable resources. Because of their rarity, and the scientific information they can provide, fossils are highly significant records of ancient life.

Rock formations that are considered of paleontological sensitivity are those rock units that have yielded significant vertebrate or invertebrate fossil remains. This includes, but is not limited to, sedimentary rock units that contain significant paleontological resources anywhere within its geographic extent. According to previous investigations, excavated native unconsolidated deposits and bedrock were placed as compacted fill, ranging from 18 to 53 feet in topographically low areas including the project APE (Woodward-Clyde, 1993). These disturbed deposits would not likely yield significant paleontological remains and as such, the proposed Project would have no impact to paleontological resources. In the unlikely event that paleontological resources are unearthed during proposed Project construction, the following mitigation measure would reduce potential impacts to a less-than-significant level.

Mitigation Measure CUL-2: Inadvertent Discovery of Paleontological Resources. In the event of an unanticipated discovery of a fossil or fossilized deposit during construction, excavations within 50 feet of the find shall be temporarily halted or diverted until a qualified paleontologist examines the discovery. The paleontologist shall notify the appropriate agencies to determine procedures that would be followed before construction is allowed to resume at the location of the find. The paleontologist shall oversee implementation of these procedures once they have been determined.

5d) ***Would the project disturb any human remains, including those interred outside of formal cemeteries?***

There is no indication that the project APE has been used for burial purposes in the recent or distant past. In the unlikely event of the discovery of any human remains during proposed Project construction activities, the following mitigation measure would reduce potential impacts to a less-than-significant level.

Mitigation Measure CUL-3: Inadvertent Discovery of Human Remains. In the event of discovery or recognition of any human remains during construction activities, such activities within 50 feet of the find shall cease until the Solano County Coroner has been contacted to determine that no investigation of the cause of death is required. The Native American Heritage Commission (NAHC) will be contacted within 24 hours if it is determined that the remains are Native American. The NAHC will then identify the person or persons it believes to be the most likely descendant from the deceased Native American, who in turn would make recommendations to Valero for the appropriate means of treating the human remains and any grave goods.

References

Dexter, S.D. Benicia Arsenal Igloo Bunker #C-425, Primary # P-48-000516. California Department of Parks and Recreation Primary Record Form 523A. On file, Northwest Information Center, California Historical Resources Information Center, Sonoma State University, Rohnert Park, California, 2001.

URS Corporation, *Cultural Resources Technical Report.* In Confidential Appendix E to Application for Certification for the Valero Cogeneration Project, Valero Benicia Refinery, Benicia, California, 2001.

Woodward-Clyde Consultants. Exxon Benicia Refinery Clean Fuels Project. Prepared for City of Benicia. September 1993.

6. Geology and Soils

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
6. GEOLOGY AND SOILS — Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☒	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☒	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☒	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

Discussion

6a.i) ***Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?***

The State of California, through the Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) prohibits the development of structures for human occupancy across active fault traces.[2] Under the Alquist-Priolo Act, the California Geological Survey (CGS, formerly the

[2] The Alquist-Priolo Act designates zones that are most likely to experience fault rupture, although surface fault rupture is not necessarily restricted to those specifically zoned areas. The zones are defined by the California Geological Survey (CGS). An active fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 11,000 years). A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. Sufficiently active is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches. A structure for human occupancy is one that is intended for supporting or sheltering any use or occupancy, which is expected to have a human occupancy rate of more than 2,000 person hours per year (Hart, 1997).

California Division of Mines and Geology) must establish zones on either side of an active fault that delimits areas susceptible to surface fault rupture. These zones are referred to as fault rupture hazard zones and are shown on official maps published by the CGS.

The closest active fault to the proposed Project area mapped under the Alquist-Priolo Act is the Concord-Green Valley fault which is oriented north-south and is located approximately two miles east of the proposed Project area (USGS, 2013; CDMG, 1993). The proposed Project area is located approximately 1.7 miles outside of the fault rupture hazard zone for this fault. Although fault rupture is not necessarily bound by the limits of the hazard zone, it is considered unlikely to occur in areas outside of the mapped fault rupture hazard zone. The proposed Project area is situated in close proximity to the east-dipping Lake Herman fault which runs along the eastern portion of the Refinery property (Graymer *et al.*, 2002). This is a pre-Quaternary fault (no displacement has occurred during the previous 1.6 million years) and the CGS does not delineate this as an active fault under the Alquist-Priolo Act. No active faults are known to traverse through the proposed Project area and the possibility of surface fault rupture on-site is very low (City of Benicia, 1999). Therefore, based on the current proposed Project design, which does not include housing or facilities for human occupancy, the potential for damage to property or injury/loss of life to people as a result of fault rupture is considered less than significant.

6a.ii) ***Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?***

The proposed Project site is located in the San Francisco Bay Area, a seismically active region of California with numerous active faults. Seismic activity in the region is dominated by the San Andreas Fault system, which includes the San Andreas, Hayward, and Calaveras faults. Several other faults, including the Rodgers Creek, Concord-Green Valley, Southampton, and West Napa faults also accommodate some of this movement and are considered active.

According to the U.S. Geologic Survey Working Group on California Earthquake Probabilities, there is a 63 percent likelihood that an earthquake of magnitude 6.7 or higher will occur in the Bay Area between 2007 and 2037 (USGS, 2008). The Association of Bay Area Governments (ABAG) has developed Earthquake Shaking Hazard Maps, which predict the potential for ground shaking during major earthquakes on the active faults in the Bay Area. The Shaking Hazard Maps rank degrees of ground shaking intensity based on the Modified Mercalli Intensity (MMI) scale. The MMI scale, originally developed by G. Mercalli in 1902, is commonly used to measure earthquake effects due to ground shaking. It is a useful scale because it describes ground motion in terms of effects observed by people in various type structures during past earthquakes. The MM values for intensities

range from MMI-I (earthquake not felt by people), through more common, moderate earthquakes at MMI-VI to major catastrophic events at MMI-XII (damage nearly total)[3].

The proposed Project site may be subject to high seismic ground motions. The 1989 moment magnitude[4] (Mw) 6.9 Loma Prieta earthquake caused widespread damage throughout the Bay Area and produced shaking of MMI-VI in the area of Benicia. The strongest shaking experienced in the Benicia area during historic time was generated from the April 18, 1906, Great San Francisco earthquake on the San Andreas Fault that generated a Mw 7.9. This earthquake produced shaking intensities of MMI-VIII and IX (URS, 2002). This analysis considered an earthquake on the Concord-Green Valley fault due to the close proximity of this fault to the proposed Project site. This fault is capable of generating a Maximum Credible Earthquake (MCE) of Mw 7.1. The Working Group on California Earthquake Probabilities (USGS, 2008) assigns a 3% probability to the occurrence of a Mw 6.7 or larger earthquake on the Concord-Green Valley fault over the next 30 years. A 6.7 magnitude earthquake on the Concord-Green Valley fault is predicted to result in shaking intensities of MM-VIII (very strong) at the Project site (ABAG, 2013).

According to the CGS Probabilistic Seismic Hazard Assessment (PSHA), the peak ground acceleration at the proposed Project site could reach 0.5 g (CGS, 2013).[5] The PSHA identifies the hazard from earthquakes that geologists and seismologists agree could occur in the future. With a 10 percent probability of exceedance in 50 years (equivalent to an earthquake with a 475-year recurrence interval), the expected ground motions at the site would be 0.5g.

Predicting seismic events is not possible, nor is providing mitigation that can entirely reduce the potential for injury and damage that can occur during a seismic event. Although some structural damage is typically not avoidable during an earthquake, building codes, construction ordinances, and modern construction materials have been established to protect against structural damage and major injury during a seismic event. While building codes assume that some damage will occur during an earthquake, they are designed to prevent loss of life and limb and reduce the potential of structural collapse. As described above, the proposed Project site is located in a seismically active area which is expected to experience a significant shaking event sometime in the future. Therefore, building codes

3 Intensities ranging from IV to X could cause moderate to significant structural damage. The damage level represents the estimated overall level of damage that will occur for various MM intensity levels. Some buildings will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all buildings perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a building all affect its performance.

4 While Richter Magnitude was historically the primary measure of earthquake magnitude, seismologists now use Moment Magnitude as the preferred way to measure earthquakes. The Moment Magnitude scale (Mw) is related to the physical characteristics of a fault, including the rigidity of the rock, the size of fault rupture, and the style of movement or displacement across the fault. Although the formulae of the scales are different, they both contain a similar continuum of magnitude values, except that Mw can reliably measure larger earthquakes and do so from greater distances.

5 g is gravity = 980 centimeters per second squared. Acceleration is scaled against acceleration due to gravity or the acceleration with which a ball falls if released at rest in a vacuum (1.0 g). Acceleration of 1.0 g is equivalent to a car traveling 100 meters (328 feet) from rest in 4.5 seconds.

contain the most stringent requirements for seismic design in this area. The proposed Project would be required to comply with the geotechnical and seismic design criteria required for construction in accordance with the California Building Code (Title 24). Project equipment would be designed, at minimum, to withstand a ground acceleration that has a 10 percent probability of being exceeded in 50 years.

With foundation and structural design in accordance with the current California Building Code (CBC) standards, seismic shaking should not result in significant structural damage to proposed Project components. Seismic design consistent with current professional engineering and Refinery industry standards would be employed in the proposed construction for resistance to strong ground shaking, especially for lateral forces. At a minimum, the CBC requirements would be followed during design and construction of all elements of the proposed Project. Additionally, the Applicant would be required to submit geotechnical engineering reports to the City that address site stability and foundation integrity for projects involving substantial grading in order to obtain grading or construction permits (City of Benicia, 1999). The following mitigation measure would ensure that the level of risk from ground shaking would be less than significant.

> **Mitigation Measure GEO-1:** A site-specific, design level geotechnical investigation shall be required as part of this Project to identify geologic hazards and provide recommendations to mitigate any such hazards in the final design of the proposed Project. The analyses would be completed in accordance with applicable City ordinances and policies and consistent with the most recent version of the California Building Code, which requires structural design that can accommodate ground accelerations expected from known active faults. The geotechnical investigation report shall evaluate the potential for ground shaking, liquefaction, and landslide hazards and shall include recommendations to ensure slope stability. The investigation shall be conducted by a California registered engineer or certified engineering geologist and all recommendations made in the investigation report shall be incorporated into the proposed Project design specifications.

6a.iii) ***Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?***

Seismic shaking can also trigger secondary ground-failures caused by liquefaction. Liquefaction is a phenomenon where saturated subsurface soils lose strength because of increased pore pressure and exhibit properties of a liquid rather than those of a solid. The soils most susceptible to liquefaction are clean, loose, uniformly graded, saturated, and fine-grained and occur close to the ground surface, usually at depths of less than 50 feet. Seismic hazard mapping prepared by the Association of Bay Area Governments (ABAG, 2013), indicates that the proposed Project site is located in a very low risk area for liquefaction. However, geotechnical investigations conducted in the vicinity of the proposed Project (Kleinfelder, 2013) have identified subsurface conditions that have the potential for seismically induced liquefaction, including settlement and lateral migration towards Sulphur Springs Creek. This could result in vertical surface settlement of several

inches and horizontal ground displacement of several feet, resulting in damage to proposed Project components (such as piping, containment berms and walls, and rail lines). Although geotechnical investigations have concluded that the layers of concern detected to date are relatively thin (typically less than five feet in thickness), the full lateral extent of the liquefiable and lateral spreading areas has not been determined. Given the conditions identified at the site, mitigation is available that would ensure that the level of risk from seismic-related ground failure, including liquefaction and secondary ground failures associated with liquefaction, would be less than significant. Additionally, modern construction methods and materials can reduce the potential damage from liquefaction.

6a.iv) ***Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?***

The Refinery site is partially located on bedrock slopes and slopes covered with relatively unconsolidated colluvium. However, the topography within the vicinity of the proposed Project elements is relatively flat and approximately 0.2 miles from any noted slopes that could be subjected to seismically-induced landslides in the event of a major earthquake in the region. Additionally, ABAG (2013b) has mapped areas at risk of rainfall-induced landslides based on historic landslide information and the proposed Project area has not been subject to historic rainfall-induced landslides or earth flows. The proposed rail line extension is located directly adjacent (within 50 to 80 feet) to Sulphur Springs Creek (see Figure 3, Site Plan) which flows southeast towards Suisun Bay and is characterized by shallow creek banks. Therefore this portion of the Refinery is not considered to be at risk of slope failure; the potential for adverse effects involving landslides would be less than significant.

6b) ***Would the project result in substantial soil erosion or the loss of topsoil?***

Given that the majority of the proposed Project site is developed and is an operating refinery, the proposed Project is not expected to expose soils that could result in substantial loss of topsoil or significant, long-term erosion. However, temporary erosion hazards could be an issue during construction. Construction activities associated with the proposed Project would require land disturbing activities such as grading, earthmoving, backfilling, and compaction that would expose soils to the effects of wind and stormwater runoff, and could result in erosion or soil loss (see Section 9, *Hydrology and Water Quality*, for additional discussion of sedimentation).

In order to minimize erosion impacts during construction, the Applicant would implement best management practices (BMPs) as required under the National Pollutant Discharge Elimination System (NPDES) General Construction Permit. BMPs are individual or combined measures that can be implemented in a practical and effective manner on the Project site which, when applied, prevent or minimize the potential release of contaminants into surface waters and groundwater. As part of the General Construction Permit, the contractor would be required to prepare and implement a Storm Water Pollution Prevention

Plan (SWPPP). One of the key elements of a SWPPP is the use of BMPs employed to protect stormwater quality, including minimizing erosion and soil loss during construction activities. Construction activities would be required to employ the specific erosion control BMPs presented in the SWPPP, typical examples of which include use of silt fencing, sandbag barriers, and placement of straw bales secured by stakes. Since BMPs have been recognized as methods to effectively prevent or minimize the potential release of contaminants into surface waters and groundwater, the potential for erosion impacts or loss of top soil during proposed Project construction would be less than significant.

6c) ***Would the project be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?***

The proposed Project area is predominantly underlain by compacted fill consisting of native unconsolidated deposits and bedrock. The fill material is somewhat well compacted sandy clay, with abundant rock fragments common throughout. The fill material ranges from 18 on up to 53 feet in topographically low areas, on top of 2 to 13 feet of natural stiff clay that rests on bedrock. In general, the fill is moderately to highly expansive, and is strong and only slightly to moderately compressible (Woodward-Clyde 1993). The proposed Project would include a design level geotechnical investigation that would include recommendations for foundation soils compaction and backfill compaction specifications to ensure geotechnically sound installation of the proposed Project components. The potential for seismic-related ground failure, including liquefaction for the proposed Project is discussed above under a.iii). The potential landslide hazard for the proposed Project is discussed above in a.iv). Mitigation Measure GEO-1, above, would reduce the potential hazard from unstable soils, including lateral spreading, subsidence, liquefaction, or collapse to a less-than-significant level.

6d) ***Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?***

In general, the effects of expansive soils can damage foundations, concrete slabs, and aboveground structures over long periods of time. Previous studies have determined that clay-rich expansive soils are present on the site (as discussed in c) above). Typically, expansive soils can be re-engineered or replaced with engineered fills during grading and prior to construction to reduce the potential for adverse effects. For the proposed Project, backfilling excavated areas with either imported fill or reuse of excavated material, if appropriate, and compacted as an engineered fill would eliminate the potential effects of expansive soils. Treatment of subsurface soils underneath the proposed facilities at the proposed Project site according to measures designed by a geotechnical engineer would also eliminate potential hazards of expansive soils. Mitigation Measure GEO-1, above, would reduce the potential impact from expansive soils to a less-than-significant level.

6e) ***Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?***

Implementation of the proposed Project would not involve the use of septic tanks or alternative wastewater treatment disposal systems to handle wastewater generation. Surface water run-off and wastewater produced by Refinery operations are currently treated at the Project site's wastewater treatment plant. Septic systems would not be an element of the Project and therefore, the ability of the soils on the proposed Project site to accommodate septic systems is not considered here. No impact is anticipated.

References

Association of Bay Area Governments (ABAG), 2013. Earthquake Hazard Map for Benecia. Scenario: Concord-Green Valley Fault. Accessed online on February 14, 2013 at: www.quake.abag.ca.gov

Association of Bay Area Governments (ABAG), 2013b. Rainfall-Induced Landslides: Existing Landslides. Accessed online on February 14, 2013 at: http://gis.abag.ca.gov/website/LandslideDistribution/index.html

California Department of Mines and Geology (CDMG), 1993. State of California Special Study Zones. Vine Hill Quadrangle. Revised Official Map. Effective July 1, 1993. Accessed online on February 14, 2013 at: http://gmw.consrv.ca.gov/shmp/download/ap/pdf/VINEHILL.PDF

California Geological Survey (CGS), 2013. Probabilistic Seismic Hazard Mapping Ground Motion Page. Accessed online on February 14, 2013 at: http://redirect.conservation.ca.gov/cgs/rghm/pshamap/pshamap.asp?Longitude=-122.15&Latitude=38.06

City of Benicia, 1999. General Plan. June, 1999. Accessed online on February 14, 2013 at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC={4961C62F-22A5-4BB7-B402-D050A5856B00}&DE={8874E99E-FF86-45FF-8F9D-FAC81A3022A5}

City of Benicia, 2002. Valero Refining Company's Land Use Application for the Valero Improvement Project. Environmental Impact Report, SCH# 2002042122. Prepared for City of Benicia, Community Development Department. October, 2002.

Graymer, R. W., D. L. Jones, and E. E. Brabb, 2002. Geologic Map and Map Database of Northeastern San Francisco Bay Region, California. Most of Solano County and Parts of Napa, Marin, Contra Costa, San Joaquin, Sacramento, Yolo, and Sonoma Counties. U.S. Geologic Survey, 2002. Accessed online on February 14, 2013 at: http://pubs.usgs.gov/mf/2002/2403/mf2403f.pdf

Hart, E. W., 1997. Fault-Rupture Hazard Zones in California: Alquist-Priolo Special Studies Zones Act of 1972 with Index to Special Studies Zones Maps, California Division of Mines and Geology, Special Publication 42, 1990, revised and updated 1997.

Kleinfelder, 2013. Subsurface and Seismic Conditions along Avenue A, Valero Refinery, Benicia, California. File No. 131669, February 28, 2013.

URS Corporation, 2002. *MTBE PO Draft Environmental Impact Report*, April 2002.

URS Corporation, 2003. Valero Refining Company, California. Storm Water Pollution Prevention Plan. Prepared by URS Corporation, 2003. Revised, September 2007 and July 2011.

United States Geological Survey (USGS) Working Group on California Earthquake Probabilities (WG02), Fact Sheet 039-03, *Summary of Earthquake Probabilities in the San Francisco Bay Region: 2003-2032*, 2003.

USGS, 2008. Forecasting California's Earthquakes—What Can We Expect in the Next 30 Years? USGS Fact Sheet 2008-3027. Accessed online on March 1, 2013 at: http://pubs.usgs.gov/fs/2008/3027/fs2008-3027.pdf

USGS, 2013. Geologic Hazards Science Center. California Quaternary Faults. Accessed online on February 14, 2013 at: http://geohazards.usgs.gov/qfaults/ca/California.php

Woodward-Clyde Consultants, 1993. *Exxon Benicia Refinery Clean Fuels Project*. Prepared for City of Benicia. September 1993.

7. Greenhouse Gas Emissions

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
8. GREENHOUSE GAS EMISSIONS — Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

Discussion

8a) ***Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?***

Based on the following analysis, construction and operation of the project would not generate greenhouse gas (GHG) emissions, either directly or indirectly, that would have a significant impact on the environment.

Construction

The majority of proposed Project-related GHG construction emissions would be generated on-site due to the use of heavy-duty off-road equipment that would include excavators, graders, front loaders, dump trucks, cranes, paving equipment, etc. The equipment operation hours per day and number of required work-days would vary depending on the specific type of equipment and on the construction activity; however, for the purposes of this analysis, it is assumed that construction activities at the site would occur during two shifts each day for an average of 10 hours per shift, 7 days a week, for 25 weeks. GHG emissions would also be generated by construction worker daily commutes and by heavy-duty diesel tractor trailer trucks that would be required to haul materials (e.g., concrete, asphalt, rails) and debris to/from the proposed Project site.

The Bay Area Air Quality Management District's (BAAQMD) *Revised Draft Options and Justification Report* (BAAQMD, 2009) does not identify a construction-related threshold of significance for GHG emissions; however, it does identify a quantitative threshold for annual operational emissions of 1,100 metric tons carbon dioxide equivalent (CO_2e). For stationary source projects, the quantitative threshold is 10,000 metric tons CO_2e per year. Therefore, for a conservative study, this analysis applies the BAAQMD's threshold of 1,100 metric tons CO_2e per year for non-stationary sources to the project-related construction emissions. A summary of the GHG construction emissions that would be associated with the project are presented in Table 8-1.

TABLE 8-1
PROJECT CONSTRUCTION GREENHOUSE GAS EMISSIONS

Sources	CO_2e Emissions (metric tons)
Equipment Exhaust	474
On-site Vehicle Exhaust	24
Off-site Vehicle Exhaust	103
Total Emissions	**601**
CEQA Threshold	1,100
Threshold Exceeded (Y/N)	**No**

SOURCE: ERM, 2013a

Details of the GHG construction emissions calculations and assumptions are available for review at the City of Benicia Community Development Department and online. As indicated in Table 8-1, project construction-related GHG emissions would be approximately 601 metric tons CO_2e per year, which is considerably lower than BAAQMD's quantitative threshold of 1,100 metric tons CO_2e per year for non-stationary sources. Therefore, GHG emissions that would be associated with construction of the proposed Project would represent a less than significant impact.

Operations

Project operations would result in a net reduction of GHG emissions over existing conditions (see Table 8-2) as the overall capacity of the Refinery would be unchanged, but there would be less crude oil deliveries by marine vessels that have higher emissions compared to deliveries of crude oil by rail transit. The proposed Project would reduce GHG emissions by up to approximately 3,543 metric tons of CO_2e per year compared to existing conditions. Therefore, implementation of the project would represent a beneficial impact.

TABLE 8-2
PROJECT ANNUAL NET GREENHOUSE GAS EMISSIONS

Sources	CO2e Emissions, Net Change from Baseline (metric tons/year)
Trains	5074
Marine Vessels (Baseline)	(8,617)
Total Emissions	(3,543)
CEQA Threshold	1,100
Threshold Exceeded ?	No

SOURCE: ERM, 2013b

8b) ***Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?***

The City of Benicia Climate Action Plan (CAP) would apply to the proposed Project, specifically Policy IC-3.2, *Decrease Transportation Source Emissions*, and Objective IC-4, *Encourage the Refinery to Continue to Reduce Emissions* (City of Benicia, 2009). The proposed Project would not conflict with the CAP because it would support both of these initiatives as it would result in reduced net emissions in the BAAQMD from transportation sources. Therefore, there would be no impact related to the proposed Project conflicting with the CAP.

References

Bay Area Air Quality Management District (BAAQMD), 2009. Revised *Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance*, October, 2009.

City of Benicia, 2009. Climate Action Plan. September 15. Available online at: http://www.ca-ilg.org/document/city-benicia-climate-action-plan. May 20, 2013.

ERM, 2013a. Crude by Rail Air Permit Application, February 2013.

ERM, 2013b. Valero Crude by Rail Construction Emissions, February 2013.

8. Hazards and Hazardous Materials

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
8. HAZARDS AND HAZARDOUS MATERIALS — Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☒	☐

Discussion

8a) ***Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?***

While the proposed Project clearly involves the transportation of crude oil – a hazardous material – by rail, it also results in a reduction of the transportation of crude oil by marine vessel. As the quantities of crude delivered by rail and marine vessel offset each other, it is, at a minimum, expected that the relative risks offset each other and that rail transport would present no new significant hazard above the current Refinery baseline risk for marine transport of crude oil to the Refinery. Thus, the potential risk for the routine transport of crude oil by rail for the proposed Project is considered less than significant.

8b) ***Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?***

The crude oil tanker cars must meet the U.S. Department of Transportation (USDOT) requirements for hazardous materials as established in the Code of Federal Regulations (CFR) No. 49 Parts 173.31. Tanker car unloading is covered in 49 CFR 174.67. Accident data from the USDOT show that between 1975 and 2005 the risk of transport of hazardous materials by rail tanker car has declined significantly – primarily due to a focus on safety by the railroads and improved tank car design (USDOT, 2013). The risks of upset and accident from the proposed Project occur through the potential for a spill of crude oil during transport, unloading, or storage at the Refinery or through a fire as a result of an accident involving a spill of crude oil during transport, unloading, or storage activities. In all of these situations, when compared to the baseline conditions at the Refinery of crude transport and handling by marine vessel, the relative differences between facilities and the reduction of transport of an equivalent amount of crude oil by marine vessel would have a less than significant impact.

8c) ***Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?***

There are no schools within a 1/4 mile radius of the proposed Project and none are proposed within that radius. No impact would result.

8d) ***Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?***

The proposed Project area (the Valero Refinery) is listed on the State Water Resources Control Board List as having potentially contaminated ground water, however, all remedial actions are complete (SWRCB, 2013) and no further action has been identified. As the proposed Project involves the installation of underground equipment and other new construction that would involve soil disturbance, there is the potential to encounter contaminated soil or groundwater. If contamination is encountered, construction work would follow legally required procedures to protect worker and public health and safety. Excavated soils would be segregated and sampled relative to the profiling requirements of the accepting landfill, and disposed of in accordance with policies of the accepting landfill and applicable regulations. This impact is considered less than significant.

8e) ***For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?***

The proposed Project is not located within an airport use plan. No impact would occur.

8f) ***For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?***

There are no private airstrips in the vicinity of the proposed Project. Therefore, there are no impacts anticipated from a private airstrip. No impact would occur.

8g) ***Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?***

Valero personnel respond to emergencies at the Refinery while the City of Benicia has overall responsibility for emergency response and evacuation plans within the City. The main feature of the proposed Project which could impact on evacuation plans is the additional periods of time in which project-related rail traffic would block Park Road outside the Refinery's southern border. As discussed below in Section 14, *Public Services*, and Section 16, *Transportation/Traffic*, the proposed Project would not pose a potentially significant new impact on this road and thus, is considered to be a less than significant impact on emergency/evacuation response plans.

8h) ***Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?***

No aspect of the proposed Project would expose people or structures to significant risk of wildland fires as the proposed Project facilities are entirely within the Refinery and away from source areas for such fires. Additionally, Valero personnel respond to all emergencies at the Refinery and could address such risks as needed. Transportation of crude by rail could have some potential for such risk but when compared to the baseline risk of all rail traffic, the Project-related risk is less than significant.

References

State Water Resources Control Board List website: https://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL18238656, accessed May 2013.

US Department of Transportation website: http://www.volpe.dot.gov/coi/pis/work/archive/tankcar.html, accessed May 2013.

9. Hydrology and Water Quality

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
9. HYDROLOGY AND WATER QUALITY — Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☒	☐	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river, or by other means, in a manner that would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d) Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river, or by other means, substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	☐	☐	☒	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☒	☐	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☒	☐
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☒	☐
j) Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

Discussion

9a, f) ***Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality?***

The majority of the proposed Project site is developed and is an operating refinery; the proposed Project would not result in any increase in impervious area or storm runoff. The San Francisco Bay Regional Water Quality Control Board (RWQCB) regulates water

quality in the Project area. The Refinery operates under a National Pollutant Discharge Elimination System (NPDES) permit administered by the RWQCB. Wastewater produced on the Refinery site by Refinery operations is currently treated at the Refinery's wastewater treatment plant and discharged into the Carquinez Straits via a waste water effluent outfall regulated under the Refinery NPDES permit. Long-term storm runoff generated at the Project site would be similar to the existing runoff on-site. Stormwater runoff would continue to be discharged through the stormwater outfalls that service the Refinery property[6]. The stormwater outfalls are permitted under the Refinery NPDES permit, which sets stormwater outfall discharge limits and monitoring requirements. Stormwater discharges and water quality at the Refinery's 16 storm water outfalls are managed through application of an existing Storm Water Pollution Prevention Plan (SWPPP), which incorporates the NPDES discharge limits and monitoring requirements as well as incorporates procedures, pollution prevention strategies, and best management practices (BMPs) used to meet these discharge limits. The SWPPP was originally prepared to comply with San Francisco Regional Water Quality Control Board (SFRWQCB) Order Number 2002-0112 (NPDES Permit No. CA0005550) adopted in October, 2002 (URS, 2003). In 2011, the SWPPP was revised to comply with Order Number R2-2009-0079, issued by the SFRWQCB in 2009 to be effective from January 1 through December 31, 2014. The impact would be less than significant for long-term operations.

Construction activities associated with the proposed Project would require land disturbing activities such as grading, earthmoving, backfilling, and compaction. Additionally, proposed Project construction would involve use of chemicals and solvents such as fuel and lubricating grease for motorized heavy equipment. Such construction activities could cause dislodging of soil and erosion or inadvertent spills of construction related chemicals into waterways resulting in adverse water quality impacts. Sulphur Springs Creek is directly adjacent to the proposed Project and these impacts could be significant in the immediate vicinity of construction activities as well as further downstream. Construction or grading activities occurring on land parcels of one acre or more in size are subject to a General Construction Permit under the NPDES permit program under section 402(p) of the federal Clean Water Act. However, the SFRWQCB confirmed that stormwater runoff generated during Project construction activities would not require coverage under the General Permit for Construction Activities based on measures described in Valero's SWPPP (RWQCB, 2013). Implementation of a storm water management plan (SWMP) as described below in Mitigation Measure HYD-1 would ensure that the Project would not substantially degrade water quality. Implementation of standard construction procedures and precautions would also ensure that the water quality impacts related to the handling of chemicals from Project construction would be less than significant.

Based on geotechnical information developed for the proposed Project site (Valero, 2013), encountering groundwater during grading and excavation is not anticipated. The groundwater

[6] Storm water outfalls in the vicinity of the proposed Project include EEF-003 through -004 and EEF-007 through -010.

table varies across the proposed Project area[7] (Stantec, 2012), but in general is approximately 10 feet below existing grade at the proposed Project site. Additionally, the groundwater levels are likely to be lower than 10 feet below grade during summer months when the grading and excavation work are scheduled to occur (Valero, 2013). Therefore, it is anticipated that interception of the groundwater table during excavation and grading will be minimal. However, excavation during proposed Project construction could intercept the shallow groundwater table at some locations and could require dewatering. Where groundwater is intercepted during construction, it will be extracted and contained in holding tanks and subsequently processed at the facility's wastewater treatment plant and discharged into the Carquinez Straits via a waste water effluent outfall regulated under the Refinery NPDES permit. Impacts to water quality, water quality standards, or waste discharge requirements relating to construction dewatering of groundwater would be less than significant.

> **Mitigation Measure HYD-1:** The Applicant and/or its contractor shall prepare and implement a storm water management plan (SWMP) for construction of the proposed Project. The proposed project is covered under the Applicant's National Pollutant Discharge Elimination System (NPDES) permit and storm water pollution prevention plan (SWPPP). A notice of intent (NOI) application and notice of termination (NOT) application are not required. Implementation of the SWMP shall start with the commencement of construction and continue though the completion of the proposed Project. The SWMP shall identify pollutant sources (such as sediment) that may affect the quality of stormwater discharge and implement best management practices (BMPs) consistent with the California Stormwater Quality Association's BMP Handbook for Construction to reduce pollutants in stormwater. The Applicant or the construction contractor shall install erosion and stormwater control measures on the construction site such as installation of a silt fence and other BMPs, particularly at locations close to storm drains and water bodies. The BMPs shall also include practices for proper handling of chemicals such as avoiding fueling at the construction site and overtopping during fueling and installing spill containment pans.

9b) ***Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?***

The proposed Project would not require withdrawal of groundwater. The proposed Project would not result in a substantial increase in impervious surface area within the Refinery. The Refinery is not located in a water supply groundwater basin and, although groundwater in the region is used for agriculture and domestic use, the volume and extent of groundwater underlying the Refinery is minimized by a lack of thick alluvial deposits (URS 2001). Additionally, the potential use of groundwater underlying the Refinery site is

[7] Depth to water at the Refinery ranges from 2 to 50 feet below ground surface (bgs) (URS 2001). Groundwater in the vicinity of the proposed Project site, adjacent to Sulphur Springs Creek, is monitored at a number of shallow groundwater monitoring wells and groundwater elevations have been recorded ranging from 3 to 8 feet above mean sea level (Stantec, 2012).

restricted due to existing groundwater contamination (Stantec, 2010). As discussed in a, f) above, excavation during Project construction could intercept the shallow groundwater table and could require dewatering, but such dewatering activities would be minimal and temporary in nature and as such, there would be no impacts to groundwater supplies or aquifers. The impact would be less than significant.

9c) ***Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion of siltation on- or off-site?***

The proposed Project site is predominantly paved. The proposed Project elements would be built in an area that is currently graded and paved and would not substantially alter the existing drainage pattern of the site. Storm water runoff would continue to be collected by the existing storm drains and discharged through the Refinery site's NPDES-permitted outfalls. There would be no substantial change above the current baseline in runoff flow rates nor would the proposed Project increase erosion or siltation off-site. Proposed Project construction activities could cause soil erosion [see a, f) above]. However, construction would be short term and, as addressed above, would be conducted in accordance with a SWPPP. There would be no alteration of streams or the existing drainage patterns that could result in substantial erosion or siltation long-term. The impact would be less than significant.

9d) ***Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?***

There would be no substantial change in runoff flow rates nor would the proposed Project increase the potential for flooding [see a, f) and c) above]. As stated in c) above, there would be no alteration of streams or the existing drainage patterns. Within the Refinery property, addition of new Project components would not substantially increase the impervious surface areas or increase the storm runoff generated at the proposed Project site. Stormwater runoff would be collected by the existing on-site storm drains and discharged through the existing NPDES-permitted outfalls servicing the Refinery site. The runoff produced at the location of the proposed Project would be accommodated within the existing capacity of the storm water conveyance system. Therefore, there would be no increase in the rate or volume of surface runoff that could result in on- or off-site flooding. The impact would be less than significant.

9e) ***Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?***

As discussed in items 9a), f), c) and d) above, stormwater runoff would be collected by the existing storm conveyance system and discharged through the NPDES-permitted outfalls or treated at the Refinery WWTP and discharged into Carquinez Straits. The runoff would be

accommodated within the existing stormwater drainage system and would be similar in nature to the existing site runoff quantities. The impact would be less than significant.

9g) ***Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?***

The proposed Project does not include the construction of housing. No impact would result from the proposed Project.

9h) ***Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?***

Review of the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Maps (FIRM) for the Project area, indicate that the proposed Project site along Sulphur Springs Creek is designated as "Zone AE", a Special Flood Hazard Area (SFHA) that is within the 100-year flood zone (FEMA, 2013). Construction of aboveground facilities within a flood hazard zone could potentially impede or redirect flood flows. Aboveground facilities that are not designed to withstand inundation can be damaged during flood events. Due to the proposed Project being within a 100-year flood zone, proposed Project components would be required to include in the design criteria flood hazard mitigation measures in accordance with the City of Benicia Floodplain Management Policy (City of Benicia, 1999). The flood hazard mitigation measures incorporated into the design criteria for the proposed Project would comply with construction standards established by the California Building Code. Further, the proposed Project elements are not habitable structures for human occupancy. Thus, no flood damage to these facilities would be expected. Additionally, construction of new unloading facilities and industry rail track within the mapped 100-year flood hazard zone would be unlikely to displace floodwaters, raise flood elevations, create new flooding impacts (e.g., by causing flooding of existing facilities or structures that previously would not have been inundated), and/or exacerbate existing flooding problems (e.g., by increasing the severity or frequency of flooding relative to pre-Project conditions). Therefore, it is unlikely that the proposed Project would substantially displace or redirect flood flows. The impact would be less than significant.

9i) ***Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?***

The proposed Project area is within the mapped dam inundation zone for Lake Herman Dam (ABAG, 1995). Although unlikely, catastrophic failure of this dam would potentially expose people or structures to a significant risk of loss, injury, or death involving flooding. However, all dams are routinely inspected and evaluated for seismic integrity as overseen by the California Division of Safety of Dams (DSOD). When a dam is found to have a failure potential, the water level behind the dam is reduced to allow for partial collapse without loss of water as required by DSOD (ABAG, 2013). Thus, the probability of dam failure resulting in significant loss, injury, or death is low (ABAG, 2013). Given the low

risk of dam failure, and because the proposed facilities would be designed to withstand natural hazards, potential impacts related to dam failure are considered less than significant.

9j) ***Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?***

The proposed Project would be limited to modifications and additions to the Refinery that would allow a larger proportion of its crude oil to be delivered by railcar and would not expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow. The influence of an ocean-borne tsunami wave would dissipate prior to reaching the City of Benicia, because of the distance of the Project area from the Golden Gate in San Francisco Bay. The Refinery site is not located within a designated tsunami inundation area (CEMA, 2009). Additionally, the chances of a tsunami generated east of the Golden Gate are very low because the fault structures in the Bay Area displace laterally. Seiches form in enclosed bodies of water. The risk from seiche is considered minimal because there are no enclosed water bodies in the immediate vicinity of the proposed Project site. Lake Herman, the closest enclosed large water body is approximately 1.5 miles north of the proposed Project site. The possibility of mudflow is minimal because the proposed Project area is relatively flat with no steep slopes in the immediate vicinity. The proposed Project would not exacerbate nor be subject to the risks of tsunami, seiche, or mudflows.

References

ABAG 1995. Dam Failure Inundation Hazard Map for Benicia. http://www.abag.ca.gov/cgi-bin/pickdamx.pl

ABAG 2013. Dam Failure Inundation. Earthquakes and Hazards Program. Accessed online February 28, 2013 at http://quake.abag.ca.gov/dam-failure/

California Emergency Management Agency (CEMA), 2009. Tsunami Inundation Map for Emergency Planning. State of California ~ County of Solano. Benicia Quadrangle. California Emergency Management Agency, California Geological Survey, University of Southern California. July 15, 2009. Accessed online February 28, 2013 at**:** http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Solano/Documents/Tsunami_Inundation_Benicia_Quad_Solano.pdf

City of Benicia, 1999. Benicia General Plan, adopted June 15, 1999.

Federal Emergency Management Agency (FEMA), 2013. Flood Insurance Rate Map. Solano County, California, and Incorporated Areas. Panel 634 of 730. Map number 06095C0634E.

San Francisco Bay Regional Water Quality Control Board (SFRWQCB), 2013. Correspondence from John H. Madigan, P.E. to Don Cuffel, Valero Benicia Refinery, Construction Projects Stormwater Runoff Covered by NPDES Permit No. CA0005550, Valero Benicia Refinery, Contra Costa County, May 15, 2013.

Stantec, 2010. Groundwater Monitoring Plan-Revised 2010, Valero Benicia Refinery. Stantec, May 24, 2010.

URS Corporation, 2001. Remedial Action Plan – Valero Benicia Refinery, July 2001.

URS Corporation, 2003. Valero Refining Company, California. Storm Water Pollution Prevention Plan. Prepared by URS Corporation, 2003. Revised, September 2007 and July 2011.

Valero, 2013. Crude by Rail Project. Response to ESA Data Request No. 3, March 27, 2013.

10. Land Use and Land Use Planning

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
10. LAND USE AND LAND USE PLANNING — Would the project:				
a) Physically divide an established community?	☐	☐	☒	☐
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

Discussion

10a) ***Would the project physically divide an established community?***

Land uses in the vicinity of the proposed Project include general industrial uses in the Benicia Industrial Park directly across Sulphur Springs Creek to the east. This area consists largely of single-level warehouse and manufacturing buildings interspersed with parking areas and materials storage yards. The nearest residential area is located approximately 0.4-mile to the northwest of the terminus of the proposed unloading rack and rail spurs. This neighborhood is separated from the proposed Project site by undeveloped hills, including areas owned by Valero. The proposed Project is surrounded by other areas of the Refinery to the west and south. The proposed Project would be constructed within the existing footprint of already-developed portions of the Refinery, in physically discrete areas occupied by existing Refinery and tank storage operations. Development on the proposed Project site would be contained within the footprint of the existing Refinery and tank farm, and would not physically divide an existing community. The impact would be less than significant.

10b) ***Would the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?***

The proposed Project site is designated General Industrial by the Benicia General Plan and General Industrial (IG) by the Benicia Zoning Ordinance. General Industrial uses are permitted by right under Benicia's Zoning Ordinance, except that a use permit is required for all oil and gas refining. The entire Refinery is located in an area designated by the *San Francisco Bay Plan* for water-related industry. The proposed Project site is not located within the boundaries of the *Benicia Waterfront Special Area Plan* or the *Bay Area Seaport*

Plan (*Benicia Port Plan*). The proposed Project would not conflict with any applicable land use plan or policy.

10c) ***Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?***

The proposed Project is located outside the Marsh Protection Area identified in the Suisun Marsh Local Protection Program of the *Suisun Marsh Protection Plan*. Therefore, the Project would not conflict with this conservation plan; no impact would result.

References

City of Benicia, Land Use Diagram, revised November 2003.

City of Benicia, Zoning Map, revised April 2012.

San Francisco Bay Conservation and Development Commission (BCDC), *Benicia Waterfront Special Area Plan*, available online at http://www.bcdc.ca.gov/laws_plans/plans/benicia_waterfront.shtml.

BCDC, *San Francisco Bay Plan*, amended September 2006, reprinted March 2012.

BCDC and Metropolitan Transportation Commission, *San Francisco Bay Area Seaport Plan*, April 18, 1996, as amended through January 2012.

BCDC, *Suisun Marsh Protection Plan*, December 17, 1976, reprinted May 2012.

11. Mineral Resources

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
11. MINERAL RESOURCES — Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Discussion

11a) ***Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?***

No base metal, precious metal, or other economic mineral deposits have been reported from the region surrounding the Refinery property (URS, 2002). Clay shale within the Great Valley Sequence has previously been used for the manufacture of brick (URS, 2002) Crushed rock aggregate is produced from two quarries near Lake Herman, to the northwest of the Refinery. No mineral deposits of significant economic value occur within or in the immediate surroundings of the Refinery. Also, there are no oil, gas, or hydrothermal resources either beneath or adjacent to the Refinery property (URS, 2002).

11b) ***Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?***

The proposed Project will not result in any significant impacts to locally-important mineral resources at or near the Refinery.

References

URS, Inc., *MTBE PO Draft Environmental Impact Report*, April 2002.

12. Noise

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
12. NOISE — Would the project:				
a) Result in Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Result in Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) Result in A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d) Result in A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
e) For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?	☐	☐	☐	☒
f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion

12a) ***Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?***

The Community Health and Safety Element of the *City of Benicia General Plan* contains noise performance standards, which are directly applicable to this project. These performance standards are used for determining the compatibility of proposed noise sensitive land uses with stationary noise sources. The standards also apply to new projects that include stationary noise sources, which may affect an existing noise sensitive development. The intent of these performance standards is both to prevent new noise sources from encroaching on existing noise sensitive developments and to prevent new noise sensitive development from encroaching on existing uses. The noise limits set by these performance standards are shown in Table 12-1. Noise sources evaluated relative to the performance standards in Table 12-1 should be considered with respect to their standard daily or weekly operating conditions. Noise sources may produce unusual noise levels due to temporary equipment malfunction, or unusual atmospheric conditions. Noise levels associated with these infrequent conditions are exempt from the performance standards contained in Table 12-1. In addition, the performance standards are not applicable to safety signals or warning devices.

TABLE 12-1
NOISE LEVEL PERFORMANCE STANDARDS FOR NOISE-SENSITIVE LAND USES

Noise Level Performance Standards, dBA Land Use	Exterior Hourly Leq		Interior Hourly Leq	
	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
Residential	55	50	40	35
Transient Lodging	55	50	40	35
Hospitals	--	--	40	35
Nursing Homes	55	50	40	35
Theaters, Auditoriums	--	--	35	35
Churches	55	50	40	40
Schools	55	50	45	45
Libraries	55	50	45	45

NOTES:
- Stationary noise sources include industrial operations, outdoor recreation facilities, HVAC units, loading docks, etc.
- The above standards may be adjusted upwards to allow for an increase in the existing ambient hourly Leq caused by a project. An increase of less than 3 dB is permitted, even if the standards in Table 12-1 are exceeded; an increase of 3 dB or greater constitutes a significant environmental impact, unless the increase does not cause the standards in Table 12-1 to be exceeded.
- The noise level standards contained above shall be applied to a typical hour of operation. When a peak hour of operation is expected to occur consistently during daily or weekly operations, the standards shall also be applied to those operations.
- Each of the noise standards specified above shall be lowered by five dB for tonal noises (humming, high pitched tones, speech music, or recurring impulsive noises). This lowering of the standard does not apply to residential units established in conjunction with industrial or commercial caretaker dwellings.
- The City may choose to apply the noise level performance standards at designated outdoor activity areas, in lieu of the property line.
- The above standards do not apply to safety signals or warning devices.
- For noise sources that occur on an infrequent basis and are considered to be safety equipment (such as flaring or pressure relief valves), a maximum noise level of 75 dB is acceptable, as measured from the receiver's property line. Noise levels that are projected to exceed this maximum are considered a significant environmental impact.
- Where outdoor activity areas do not exist and/or are not expected to be affected, the City may choose to only apply the interior noise level criteria.

SOURCE: City of Benicia General Plan, Community Health and Safety Element – Table 4-4. June 1999.

Title 8, Chapter 8.20 of the Benicia Municipal Code contains noise regulations that apply to the proposed Project. Section 8.20.140 addresses noise from the operation of machinery, equipment, fans, and air conditioning units. This section limits noise increases from such mechanical devices to a maximum of five dBA over ambient base noise levels at the property line of any property generating the noise. Section 8.20.150 prohibits construction activities within any residential zone, or within a radius of 500 feet from a residential zone between the nighttime hours of 10:00 p.m. of any one day and 7:00 a.m. of the following day in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance unless a permit has been obtained from the City Manager or his designee. This section would not apply to the proposed Project as construction activities associated with the proposed Project would take place more than 2,000 feet from the nearest residential zones. Therefore, there are no standards established in the local general plan or noise ordinance related to construction noise that would be applicable to the proposed Project.

Operations and Maintenance

Operational activities associated with the proposed Project that would generate noise would be related to the movement of rail cars and operation of the unloading rack pumps. A noise assessment was conducted for the Refinery by Wilson Ihrig &Associates to evaluate noise level increases at sensitive receptor locations in the vicinity of the Refinery due to the implementation of the proposed Project. The noise assessment found that under worst-case conditions, noise from the unloading rack pumps and the rail car movements would be up to 21 dBA and 58 dBA, respectively, at the nearest residence at Lansing Circle, approximately 2,700 feet northwest of the northern end of the Project site (Wilson, Ihrig &Associates, 2013).

Existing average hourly L_{eq} noise levels for day, evening, and nighttime hours at the nearest residences to the proposed Project site range between 52 dBA and 55 dBA. Overall, noise generated by the proposed Project would be similar to existing noise generated by the Refinery; and therefore, this impact would be less than significant.

12b) ***Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?***

Construction

Some types of construction equipment can produce vibration levels that can cause architectural damage to structures and be annoying to nearby sensitive receptors. Vibration levels generated during construction of the proposed Project would vary during the construction period, depending upon the construction activity and the types of construction equipment used. Typical vibration levels for the construction equipment types that would generally result in the highest vibration levels (e.g., auger rig, large bulldozers) are presented in Table 12-2.

TABLE 12-2
VIBRATION SOURCE LEVELS FROM CONSTRUCTION EQUIPMENT

Distance (feet)	Peak Particle Velocity (in/sec)
	Large Bulldozer
15	0.191
25	0.089
50	0.031
75	0.017
100	0.011
150	0.006

SOURCE: FTA, 2006.

A numerical threshold to identify the point at which a vibration impact occurs has not been identified by City standards or municipal codes. Therefore, a peak particle velocity (PPV) threshold identified by Caltrans is used in this analysis to determine the significance of vibration impacts related to adverse human reaction and risk of architectural damage to

normal buildings. The PPV threshold is 0.20 in/sec (Caltrans, 2002). This PPV level has been found to be annoying to people in buildings and can pose a risk of architectural damage to buildings.

The nearest residences would be 2,700 feet from the Project site. At this distance, construction equipment PPV levels would be substantially less than the 0.20 in/sec significance threshold. Therefore, short-term construction-related vibration impacts would be less than significant.

Operations and Maintenance

As discussed above, operation and maintenance of the proposed Project would increase the daily number of trains accessing the Project site, which would produce groundborne vibration in the immediate area of the railroad. Project-related vibration associated with railroad movements would result in a less-than-significant impact at the nearest sensitive receptors that are over 2,000 feet away from the Project site.

12c) ***Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?***

As discussed above, noise generated by the proposed Project is similar to existing noise generated by the Refinery. The proposed Project would result in a change in the method of delivering crude oil to the Project site from marine vessel to railcar. Overall, long-term noise levels that would be associated with the proposed Project would be similar to baseline conditions. A noise assessment conducted for the Applicant determined that the expected maximum noise levels from the two pump motors and train movements would be up to approximately 21 dBA and 58 dBA, respectively (Wilson, Ihrig &Associates, 2013). These noise levels are comparable to existing noise in the area generated at the Refinery and therefore the proposed Project would not result in substantial permanent increases in ambient noise levels. This impact would be less than significant.

12d) ***Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?***

Construction

Noise associated with Project-related construction activities would result in temporary increases in noise levels in the study area. Construction activities that would be associated with the proposed Project would require the use of excavators, graders, front loaders, dump trucks, cranes, and paving equipment, etc. Maximum noise levels from such equipment would range between approximately 80 dBA and 88 dBA at 50 feet (FTA, 2006). Construction of the proposed Project would temporarily generate noise from various activities and equipment over the 25 week construction schedule. The nearest sensitive receptor is located 2,700 feet away from the area where Project construction activities occur. At this distance, noise generated by construction equipment would be attenuated to less than 40 dBA, which would be less than ambient noise levels. As a result, this impact would be less than significant.

Operation

Movement of the trains would present a periodic increase of ambient noise in the Project area; however, as discussed above, this increase in noise would be similar to noise levels generated by existing Refinery operations. Therefore, this impact would be less than significant.

12e) ***For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?***

The proposed Project is not located within 2 miles of a public airport. Therefore, there would be no impact associated with this criterion.

12f) ***For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?***

The proposed Project is not located within the vicinity of a private airstrip. Therefore, there would be no impact associated with this criterion.

References

Caltrans, 2002, *Transportation Related Earthborne Vibrations (Caltrans Experiences).* Technical Advisory, Vibration TAV-02-01-R9601. February 20, 2002.

City of Benicia General Plan, 1999. Community Health and Safety Element. June 1999.

Federal Transit Authority (FTA), 2006. *Transit Noise and Vibration Impact Assessment*, May 2006.

Wilson Ihrig &Associates. 2013. Noise Study for Valero Crude by Rail Project. March 8.

13. Population and Housing

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
13. POPULATION AND HOUSING — Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing housing units, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion

13a) ***Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?***

The proposed Project would temporarily result in the presence of approximately 121 construction workers through the approximately 25-week construction period. The temporary addition of a construction work force would not be considered a significant impact, nor would the addition of approximately 30 full-time-equivalent permanent employees. The proposed Project would require access to an available construction labor pool. Adequate labor exists in the Bay Area to fill the number of jobs the Project would create, and the Project would not be required to import labor. The Project would not, directly or indirectly, induce population growth; the impact would be less than significant.

13b) ***Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?***

The proposed Project site is an existing and developed Refinery, and there is currently no occupied housing at the site. Development and improvements proposed as part of the proposed Project would be constructed and implemented in already developed areas of the Refinery, in areas occupied by Refinery operations and equipment. The proposed Project would not displace existing housing. No impact would result.

13c) ***Would the project displace substantial numbers of people necessitating the construction of replacement housing elsewhere?***

Development and improvements proposed as part of the proposed Project would be constructed and implemented in already developed areas of the Refinery, in areas occupied by Refinery operations and equipment. The proposed Project would not displace people necessitating the construction of replacement housing elsewhere. No impact would result.

References

ERM, Valero Crude by Rail, Project Description, March 2013.

14. Public Services

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
14. PUBLIC SERVICES — Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
i) Fire protection?	☐	☐	☒	☐
ii) Police protection?	☐	☐	☒	☐
iii) Schools?	☐	☐	☒	☐
iv) Parks?	☐	☐	☒	☐
v) Other public facilities?	☐	☐	☒	☐

Discussion

14a.i-v) ***Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection?***

The Refinery has its own security personnel and security procedures, which restrict access to the site and thereby reduce dependence on local law enforcement. The Refinery also has its own fire brigade for emergencies occurring within the Refinery, which is licensed by the State Fire Marshall, and utilizes the services of the Benicia Fire Department for response to emergencies occurring outside of the Refinery boundaries. Valero is also a participating member of the Bay Area Petrochemical Mutual Aid Organization, which is composed of more than half a dozen refineries and chemical plants whose operators have agreed to provide one another with emergency response resources in the event of a major emergency.

Given that the Refinery currently provides internal fire protection and security services and has adequate personnel, equipment and response times, the project would not increase the demand for fire protection or police protection services. Therefore, it is not expected that the project would affect service ratios or response times or increase the use of existing fire protection or police facilities such that substantial physical deterioration, alteration, or expansion of these facilities would occur.

The proposed Project does not include a residential component that would directly result in school-age children moving to the area, nor would it indirectly induce substantial population growth in the area. Any short-term increase in population due to construction activities or long-term increase during operation would be considered minimal, as the majority of the anticipated workforce most likely currently resides within commuting distance of the project site. Thus, the number of potential school-age children of these construction workers would similarly be minimal. No new school facilities would be necessary to serve the project, so no adverse environmental impacts from facility construction and operation would occur.

The proposed Project would not adversely affect nearby parks (see Section 15, *Recreation*). The project would not directly or indirectly induce population growth in the area, therefore, the construction or alteration of other new public facilities would not be required as a result of the project.

In conclusion, the proposed Project would not require the construction of new or altered governmental facilities to maintain adequate service levels, response times, or performance objectives; impacts would be less than significant.

References

ERM, Valero Crude by Rail, Project Description, March 2013.

15. Recreation

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
15. RECREATION — Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?	☐	☐	☒	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion

15a) ***Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?***

There are six parks within about 1.5-mile of the proposed Project site: Waters End Park, Frank Skillman Park, Southampton Park, Francesca Terrace, Duncan Graham Park, and Overlook Park. As discussed in Section 4.13, *Population and Housing*, approximately 121 workers would be necessary during the 25-week construction period. Thirty full-time-equivalent workers are anticipated during project operation. Due to the relatively short construction period and the available experienced labor pool, it is anticipated that the construction workforce would likely already reside in the City of Benicia, Solano County, or in other nearby Bay Area communities. These workers would be expected to use recreational facilities nearest their places of residency. Therefore, the project's anticipated construction workforce is not likely to use existing Benicia neighborhood and regional parks or recreational facilities proximate to the Refinery at levels greater than normal use. Major infrastructure improvements such as parks and recreational facilities are generally planned and constructed to serve hundreds or thousands of people. Even if all 30 anticipated permanent workers moved into the City of Benicia from elsewhere, the resulting population increase would be minor in relation to the overall population of the City. Thus, the actual increase in users at each park or recreational facility would be insignificant in relation to the design capacity. Therefore, any increases in usage associated with the project would not result in substantial or accelerated physical deterioration of parks; the impact would be less than significant.

15b) ***Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?***

The proposed Project does not include parks or recreational facilities. Additional parks and recreational facilities would not be necessary as a result of the proposed Project. As explained in a) above, the population increase associated with the project would not be large enough to require the construction of parks and recreational facilities. Thus, there would be no impact related to construction or expansion of recreation facilities.

References

ERM, Valero Crude by Rail, Project Description, March 2013.

16. Transportation and Traffic

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
16. TRANSPORTATION AND TRAFFIC — Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☒	☐	☐
b) Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location, that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
e) Result in inadequate emergency access?	☐	☒	☐	☐
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☒	☐

Discussion

16a) ***Would the project conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system?***

Given that the Refinery and the adjacent Benicia Industrial Park are both industrial uses that are regularly served by, and rely on the operation of the railroad to transport both raw materials and finished products, use of the railroad spur tracks (i.e., Track 700) that serve the individual businesses in the area is an essential component of the overall transportation system in this part of Benicia. For that reason, the usual forms of traffic analysis, which ignore rail operations, are not appropriate to measure the impact of the proposed Project.

For purposes of this analysis, based on the characteristics of the proposed Project, the above-cited significance criterion has been focused to produce the following more-appropriate criterion / threshold of significance (explained below): *Would the project cause a substantial increase in the queue length caused by trains crossing Park Road, with the threshold of significance defined as a queue that substantially impedes other traffic (such*

as traffic on the I-680 mainline, or at an adjacent upstream intersection wherein traffic not destined over the Park Road crossing is unable to continue along the travel way)?

The *City of Benicia General Plan* provides a minimum standard of LOS D for intersection operations, meaning that impacts to intersection operations are considered significant if a project would cause intersection operations to degrade to worse than LOS D. This criterion is typically used to assess impacts of development projects that would generate increased vehicle trips on at area intersections, something that this project would not do (except for temporary and intermittent traffic generated during project construction). However, intersection level of service is not the only or most applicable metric that can be used to evaluate impacts of increased rail activity on the surrounding transportation network. Park Road, which provides one access to the Refinery and to the Benicia Industrial Park, crosses the active railroad siding that carries materials and products to and from the Refinery and businesses in the industrial park. Generally, people who drive through industrial areas served by at-grade railroad crossings have a higher tolerance of delay associated with daily at-grade rail activity that is not on a set schedule compared to delays that are not in the vicinity of an at-grade railroad crossing.

Vehicle queues that result from at-grade rail crossings have a major influence on roadway and intersection traffic operations within the vicinity of the at-grade crossing. Vehicle queues and delay are directly related -- the longer the vehicle queues are, the higher the delay becomes. However, during times of the day when traffic volumes are low, it is possible for an at-grade train crossing to result in vehicle queues that do not significantly impede other traffic (e.g., queues that do not impede traffic flow at upstream locations such as intersections and freeways). Even though delay experienced by drivers in a queue might be high during a long train crossing, it is not a foregone conclusion that the at-grade train crossing would adversely affect the surrounding transportation network. According to Union Pacific Railroad (UPRR), trains that regularly cross Park Road currently cause traffic delays of up to 10 minutes at a time (longer delays recently have been observed as described below). Those daily traffic delays at the Park Road / Bayshore Road intersection (i.e., with LOS worse than the City's LOS D standard) are part of the existing work environment that drivers expect and deal with as they choose.

Therefore LOS is not relevant to the more-important potential impacts – queues, delays and emergency access – of the proposed Project's rail car movements. Intersection LOS is inadequate to assess these potential impacts and is therefore not a suitable significance criterion for this analysis. Also, as described in the Project Description and below, there would be four 8.3-minute episodes of Project-caused delay, but no increase in delay due to the proposed Project at any other times.

Setting

Regional access to the proposed Project site is provided primarily from Interstate 680 (I-680), while local access is provided via Park Road, Bayshore Road and Industrial Way. The nearest I-680 interchanges are at Bayshore Road and Industrial Way. Park Road is a

two-lane road that connects the industrial port area along the southeastern edge of the City of Benicia to the industrial areas to the northeast. It intersects the existing UPRR track at an at-grade railroad crossing located just east of Bayshore Road. Bayshore Road is a two-lane road that connects the Refinery to the industrial port area along the southeastern edge of the City of Benicia, following the Suisun Bay shoreline; a partial interchange with I-680 provides access to and from the south. Industrial Way is a two-lane road that loops through the industrial area where the Refinery is situated, providing access to numerous industrial parcels either directly or via connections with local streets; a partial interchange with I-680 provides access to and from the north.

The study area lacks substantial pedestrian facilities (sidewalks are not provided along any of the roads), which is typical of industrial areas. No designated bicycle facilities are provided within the study area. Fairfield and Suisun Transit (FAST) operates an express intercity route—Route 40—that connects the City of Vacaville to the Bay Area Rapid Transit (BART) station in the City of Walnut Creek. Route 40 has one stop in each direction at the intersection of Park Road and Industrial Way. From here, the northbound route continues via I-680 to the City of Fairfield, and the southbound route continues via I-680 to the Pleasant Hill BART Station; both utilize the I-680 interchanges at Industrial Way and Bayshore Road.

Train Operations at Park Road Crossing

The City of Benicia serves as the terminus for what is commonly referred to as the Overland Route for UPRR. The Refinery is served by a spur off the Overland Route mainline that runs between the industrial port area along the southeastern edge of the City of Benicia and the Refinery itself, terminating north of Park Road. This spur features an at-grade crossing at Park Road, east of Bayshore Road. The spur also serves the industrial areas northeast of the Refinery. Switching activity between tracks typically occurs just south of the Park Road at-grade railroad crossing. The Park Road crossing is controlled by two gates and mast-mounted flashing lights.

Train crossing counts (using video cameras placed adjacent to the at-grade crossings) were collected at the Park Road at-grade crossing in addition to the at-grade crossing at the Iron Workers Union Driveway 700 feet southeast of Park Road, for the week of Monday, April l5 through Sunday, April 21, 2013. As shown in Table 16-1, the number of train crossings is higher at Park Road than at the Iron Workers Union driveway. The reason for the higher number of crossings at Park Road is because the majority of switching activity between tracks serving the Refinery and tracks serving other industrial areas northeast of the Refinery occur on the segment just south of Park Road and north of the Iron Workers Union Driveway. It is common for UPRR trains to access the Refinery, then exit the Refinery, cross Park Road, perform the track switching, and cross Park Road again to access the other industrial areas northeast of the Refinery, and vice versa.

TABLE 16-1
EXISTING AT-GRADE RAIL OPERATIONS

Attribute	Park Road At-Grade Crossing	Iron Workers Union Driveway At-Grade Crossing
Range of Crossings Per Day	4 - 18	4 - 6
Average Crossings Per Day – Weekdays	10	5
Average Crossing Duration – Weekdays	02:50	03:15
Average Number of Railcars Per Day – Weekdays	95	69
Average Number of Railcars Per Crossing - Weekdays	10	15
Range of Number of Railcars Per Crossing - Weekdays	2 - 35	2 - 43
Maximum Observed Crossing Duration – Weekdays	16:17	24:50
% of Crossings With Duration Under 5 Minutes – Weekdays	86%	87%
Average Crossings Per Day – Weekend	7	5
Average Crossing Duration – Weekend	01:42	00:18
Average Number of Railcars Per Day – Weekend	45	40
Average Number of Railcars Per Crossing - Weekend	7	8
Range of Number of Railcars Per Crossing - Weekend	2 - 18	2 - 18
Maximum Observed Crossing Duration – Weekend	05:56	03:21
% of Crossings With Duration Under 5 Minutes – Weekend	92%	100%

SOURCE: Fehr & Peers, 2013.

The back and forth seen with current daytime switching operations is required for UPRR to "cut" the train into the various segments needed within the Refinery and then over on the Industrial Way siding. UPRR pulls out onto Park Road to get the tail end of the train ahead of the switch needed to redirect the train to the Industrial way siding.[8]

The majority of train crossings at both at-grade intersections occurred between 9:00 AM and 7:30 PM on weekdays, and between 12:00 Noon and 6:30 PM on weekends. An average of 10 train crossings totaling 95 railcars during the weekdays were observed on Park Road, with the average crossing duration estimated at 2 minutes and 50 seconds. About 86 percent of all crossings on Park Road had a duration of less than 5 minutes. The majority of train crossings on Park Road had a duration of typically less than 2 minutes, though a maximum crossing duration was observed at 16 minutes and 17 seconds on Wednesday, April 17, 2013 around 2:00 PM.

Similarly, the majority of train crossings on the Iron Workers Union Driveway had a duration of less than 2 minutes, though a maximum crossing duration was observed at 24 minutes and 50 seconds on Wednesday, April 17, 2013 around 2:00 PM. The average number of train crossings and duration of each crossing is generally lower on weekends compared to weekdays.

8 *Note*: This switching operation will not occur for Project trains because the first half of 50 railcars would be led by a locomotive, and the last half would be pushed by one (called "buried power"). The train will be "cut" in the middle all within the Refinery as the two 25-car segments are aligned at the rack. No back and forth across Park Road is required for this operation.

Existing Plus Project Conditions

Below is a summary of the Project assumptions for Existing Plus Project conditions:

- Up to 100 railcars will be delivered daily, with single train deliveries of up to 50 railcars
- A minimum headway of one hour between Project train deliveries
- Typical railcar length is 60 feet
- Up to 200 feet of locomotive per train delivery
- Average travel speed across the Park Road at-grade railroad crossing is 5 mph
- All switching activity between tracks will occur within the Refinery site north of Park Road
- According to UPRR, their plan is to deliver a full 50-car train and pull out an empty 50-car train between the hours of 8:00 PM and 5:00 AM. The exact sequence is still being worked out by their logistics team due to other constraints such as their available sidings and other trains scheduled to use the main line from Roseburg to Benicia. In the future, the second 50-car train may also be delivered (and removed when emptied) during that evening non-peak window <u>or</u> during the non-peak daytime hours (avoiding 6:00 AM – 9:00 AM and 4:00 PM – 6:00 PM weekdays). UPRR has yet to confirm the window of availability for daytime Park Road crossings.

An automatic traffic count was conducted on Park Road for seven days (Monday through Sunday, January 7-13, 2013) near the at-grade crossing, to establish the temporal distribution of traffic volumes at the crossing. The peak hour for typical weekday conditions generally occurs between 7:15 and 8:15 AM, but because proposed Project trains would not cross Park Road during the morning and afternoon peak traffic periods (6:00 AM – 9:00 AM and 4:00 PM – 6:00 PM), the analysis of potential proposed Project impacts focused on traffic volumes during the off-peak hours of 9:00 to 10:00 AM (representative of 9:00 AM to 3:00 PM and 6:00 to 7:00 PM conditions), and 9:00 to 10:00 PM (representative of conditions from approximately 7:00 PM to 6:00 AM).

A train with 200 feet of locomotive and 50 railcars in length would take about 7.3 minutes to cross Park Road at a speed of 5 mph. The at-grade crossing traffic controls provide a 30-second buffer time before and after each train crossing on Park Road. Therefore, each 50-railcar train delivery would block traffic on Park Road for approximately 8.3 minutes. The estimated blockage time on Park Road due to the proposed Project is lower than other existing observed train crossings. The April 2013 maximum observed train crossing duration was 16 minutes and 17 seconds, which is nearly double the blockage time of the train crossings due to the proposed Project.

The off-peak hours of 9:00 – 10:00 AM and 9:00 – 10:00 PM were evaluated assuming a 50-railcar train crossing at Park Road. Vehicle queues associated with the 50-railcar crossing would extend back onto the northbound I-680 off-ramp, but not onto the I-680 mainline, and the great majority of drivers caught in the queue would be those heading toward Park Road and the at-grade crossing (i.e., few vehicles turn right from the off-ramp onto Bayshore

Road). Queues also would extend back to the Park Road / Refinery Driveway, but would not reach Industrial Way. These results for the AM off-peak hour are similar to what drivers under existing conditions already experience. Train crossings of durations greater than 8 minutes already occur about once a day between the 9:00 AM – 7:30 PM periods.

Traffic volumes in the evenings and late nights are much lower within the study area compared to the peak traffic periods. During the 9:00 – 10:00 PM hour, the resulting queues during a train crossing would be no longer than 4 vehicles. Although the proposed 50-railcar train crossing would block Park Road for over 8 minutes, the resulting queues would be contained within the provided intersection storage capacity at Park Road/Bayshore Road during the 9:00 – 10:00 PM hour.

Project train crossings occurring during the 9:00 AM – 7:00 PM period would generate queues on the west side of the tracks that could extend back onto Bayshore Road and affect the operations of the I-680 ramp-terminal intersections, but would not extend back onto the I-680 mainline. Queues on the east side of the tracks would generally be contained within the Park Road segment between the tracks and Industrial Way, affecting access to and from Refinery driveways. The segment of Park Road between the at-grade railroad crossing and Industrial Way provides a two-way left-turn lane which could be utilized as a queue storage lane by some drivers waiting on westbound Park Road for the train to clear.

If the proposed train crossings occur during the 7:00 PM – 6:00 AM period, resulting queues on the west side and east side of the tracks would not exceed the provided storage capacity, and would not extend back and affect the operations of other study intersections.

Cumulative Conditions

A 1.5 percent per year growth rate was applied to existing traffic volumes, which is similar to the annual rate of 1.6 percent used in the *Benicia Business Park EIR* for the period between 2006 and 2030. It is noted that according to 2006 and 2013 count data collected at the intersection of Park Road/Bayshore Road, traffic volumes have not increased during the seven-year period, potentially due to the recent economic downturn.

Under cumulative volume conditions, vehicle queues associated with the 50-railcar crossing again would extend back onto the northbound I-680 off-ramp, but not onto the I-680 mainline. Queues also would extend back to the Park Road/ Refinery Driveway, but would not reach Industrial Way. Traffic volumes in the evenings and late nights are much lower within the study area compared to the peak traffic periods. During the 9:00 – 10:00 PM hour, the resulting queues during a train crossing would be no longer than 5 vehicles. Although the proposed 50-railcar train crossing would block Park Road for over 8 minutes, the resulting queues would be contained within the provided intersection storage capacity at Park Road/Bayshore Road during the 9:00 – 10:00 PM hour.

Project train crossings occurring during the 9:00 AM – 7:00 PM period would generate queues on the west side of the tracks that would extend back onto Bayshore Road and affect

the operations of the I-680 ramp-terminal intersections, but would not extend back onto the I-680 mainline. Queues on the east side of the tracks would generally be contained within the Park Road segment between the tracks and Industrial Way, affecting access to and from Refinery driveways. The segment of Park Road between the at-grade railroad crossing and Industrial Way provides a two-way left-turn lane, which could be utilized as a queue storage lane by some drivers stuck on westbound Park Road waiting for the train to clear.

If the proposed train crossings occur during the 7:00 PM – 6:00 AM period, resulting queues on the west side and east side of the tracks would not exceed the provided storage capacity, and would not extend back and affect the operations of other study intersections.

Project Impacts

The proposed Project would increase the frequency of 8-minute crossings that occur in the area, but the increased crossing frequency is within the current range of crossing variability. Although the proposed Project would increase the train frequency on Park Road by four train crossings per day (two trips into the Refinery and two trips out of the Refinery), the proposed crossing duration of each proposed Project train trip is lower than train crossing durations that already exist today without the proposed Project. Train crossings that currently occur between 12:00 PM and 1:00 PM tend to produce more vehicle stacking than at other times during which train crossings related to the Project would occur; the following measure would minimize potential Project impacts:

Mitigation Measure TRAN-1:

- Prohibit scheduling crude train crossings during the weekday lunch hour (12:00 – 1:00 PM).

The proposed Project impact would be less than significant with implementation of the above-described mitigation measure.

16b) ***Would the project conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures?***

As stated in 16a above, the proposed Project would not generate vehicle traffic on area roadways (except for temporary and intermittent traffic generated during Project construction). In additional, vehicle queues caused by train crossings on Park Road (current and future) would not affect any roads that are part of the Solano County Congestion Management Program (CMP) network. Lastly, level of service standards for roadways that are part of the Solano County CMP are intended to regulate long-term traffic increases from operation of new development, not temporary construction traffic. No impact would result.

16c) ***Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?***

The proposed Project would not involve aircraft, would not be near an airport, nor would the Project construct anything that would intrude into aircraft flight paths or air traffic spaces. Therefore, the proposed Project would have no impact on air traffic patterns.

16d) ***Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment), or due to the proposed increased frequency/length of train crossings?***

The Federal Railroad Administration (FRA) provided collision history data for the Park Road at-grade crossing. According to the FRA, the last reported collision at the Park Road at-grade crossing was in April 1995 when a train collided with a truck.

Neither proposed Project construction nor Project operations would alter the physical configuration of the existing roadway network serving the area, and would not introduce unsafe design features. The proposed Project also would not introduce uses that are incompatible with existing uses already served by the road system that serves the Project area. Therefore, the proposed Project would have a less-than-significant traffic hazard impact.

16e) ***Would the project result in inadequate emergency access?***

The Benicia Fire Department has a response time goal of 7 minutes for all emergency calls, 90 percent of the time, and they routinely achieve that goal (i.e., have a response time no more than 7 minutes more than 90 percent of the time). According to the 2012 data, the average response time within the entire City was about 5.2 minutes (2,099 total incidents), and the average response time to the Park Road/Bayshore Road area was about 6.6 minutes (27 total incidents). The City of Benicia Fire Department also has a contract with the Solano County Emergency Medical Service Authority to provide an advance life support staffed engine to all emergency medical calls within 7 minutes from the time the station is alerted.

Although the proposed Project would increase the train frequency within the study area by four train crossings per day (two trips into the Refinery and two trips out of the Refinery), the proposed crossing duration of each proposed Project train trip would be lower than train crossing durations that already exist today without the proposed Project. The proposed increased crossing frequency is within the current range of crossing variability. According to the 2012 emergency response data provided by the fire department, an average of about two emergency incidents a month occurred along the industrial areas of Park Road and Bayshore Road. The probability of an emergency incident occurring at the same time as a proposed Project train crossing is low. It is unlikely that the Project would cause the average emergency vehicle response time to increase to over 7 minutes for the Park Road and Bayshore Road industrial areas. However, the following measures would minimize potential Project impacts in regards to emergency vehicle access:

Mitigation Measure TRAN-2:

- Coordinate with the City of Benicia Fire Department to prepare an action plan in the event that an emergency occurs during a Project train crossing. The action plan would provide methods of adequately informing the Fire Department of the expected train crossing schedule and alternate routes to

access the Park Road and Bayshore Road industrial areas during the event that a train crosses Park Road.

- Utilize the Refinery's existing onsite emergency response team to assist with responding to off-site emergencies within the Park Road and Bayshore Road industrial areas as requested by the City of Benicia Fire Department under the existing mutual aid agreement, if an emergency occurs during the event of a train crossing on Park Road.

The proposed Project impacts would be less than significant with implementation of the above-described mitigation measures.

16f) ***Would the project conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?***

Implementation of the proposed Project would neither directly nor indirectly eliminate existing or planned alternative transportation corridors or facilities, include changes in policies or programs that support alternative transportation, nor construct facilities in locations in which future alternative transportation facilities are planned. The proposed Project would not conflict with adopted policies, plans and programs supporting alternative transportation.

As described above, FAST operates one weekday transit route (Route 40) on Park Road within the study area; the nearest bus stops are located at the intersection of Park Road/Industrial Way. Route 40 provides four buses in each direction during the AM commute period between 5:30 and 9:00 AM, and five buses in each direction during the PM commute period between 3:30 and 8:00 PM. Proposed Project train crossings would not occur during the AM or PM peak traffic period. It is anticipated that proposed Project train crossings could occur during the 6:00 to 8:00 PM period, and on average, about one bus travels along Park Road in each direction during that period. The chances of buses attempting to cross Park Road in the event of a proposed Project train crossing are small, but possible. Although the proposed Project would increase the train frequency on Park Road by four train crossings a day, the proposed crossing duration of each proposed Project train trip is lower than train crossing durations that already exist today without the proposed Project. The potential increase in transit delay incurred by the Project is within the delay variability already experienced by Route 40 during the PM peak commute period.

The Project impacts would be less than significant.

References

Fehr and Peers Transportation Consultants, *Draft Transportation Impact Analysis Report for the Valero Benicia Refinery Crude by Rail Project*, May 2013.

17. Utilities and Service Systems

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
17. UTILITIES AND SERVICE SYSTEMS — Would the project:				
a) Conflict with wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider that would serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Discussion

17a) ***Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?***

Wastewater produced on the proposed Project site by Refinery operations is currently treated at the Refinery's wastewater treatment plant and discharged into the Carquinez Straits via a waste water effluent outfall. The Refinery operates under a National Pollutant Discharge Elimination System (NPDES) permit administered by the San Francisco Bay Regional Water Quality Control Board RWQCB. As discussed in Section 9, *Hydrology and Water Quality*, long-term storm runoff generated at the proposed Project site would be similar to the existing runoff on-site. Stormwater runoff would continue to be discharged through 16 stormwater outfalls permitted under the Refinery NPDES permit, which sets discharge limits and monitoring requirements. Stormwater discharges and water quality at the storm water outfalls are managed through application of an existing Storm Water Pollution Prevention Plan (SWPPP), which incorporates the NPDES discharge limits and monitoring requirements as well as incorporates procedures, pollution prevention strategies, and best management practices (BMPs) used to meet these discharge limits.

Construction activities would require land disturbing activities as well as involve the use of chemicals and solvents. These construction activities could result in soil erosion or inadvertent spills of chemicals into the adjacent Sulphur Springs Creek. Implementation of the erosion and stormwater runoff control measures, as well as proper handling of chemicals in compliance with the General Construction Permit described in Section 9, *Hydrology and Water Quality*, would ensure that the Project would not exceed wastewater treatment requirements; the impact would be less than significant.

17b) ***Would the project require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?***

The proposed Project would be constructed and its operations conducted entirely within those areas of the Refinery that are already served by the existing water and wastewater collection and treatment systems. No additional wastewater would be generated by Refinery operations under the Project. Therefore, the Refinery's wastewater treatment plant would not require expansion or modification under the proposed Project. Approximately 121 construction workers and 30 permanent full-time employees are anticipated. Wastewater generated from temporary and permanent employees would not require the expansion or modification to the City's wastewater treatment plant, where domestic wastewater from the Refinery is treated. No impact would result.

17c) ***Would the project require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?***

The proposed Project elements would be built in an area that is currently graded and paved and would not substantially alter the existing drainage pattern of the site. Storm water runoff would continue to be collected by the existing storm drains and discharged through the Refinery site's NPDES-permitted outfalls. There would be no substantial change above the current baseline in runoff flow rates nor would the proposed Project increase erosion or siltation off-site. There would be no alteration of streams or the existing drainage patterns and runoff would be accommodated within the existing capacity of the storm water conveyance system. The proposed Project would not require construction of new storm water drainage facilities; therefore, no impact would result.

17d) ***Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?***

The proposed Project is not anticipated to require additional water supplies above that supplied via the existing contract with the City. New or expanded entitlements would not be required to serve the Project. No impact would result.

17e) ***Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?***

No additional wastewater would be generated by Refinery operations under the proposed Project. Therefore, the Refinery's wastewater treatment plant would have adequate capacity. Wastewater generated by temporary and permanent employees under the proposed Project would be treated by the City's wastewater treatment plant. The anticipated 30 permanent employees and 121 construction workers would not require expansion of the City's treatment plant. The impact would be less than significant.

17f) ***Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?***

Grading and demolition of existing paved areas would be required as a part of construction of the proposed Project. Excess soil, asphalt, and concrete generated from site preparation and demolition activities would be disposed of on-site. Existing piping removed during construction associated with relocated equipment also would be deposited at the Refinery's reclamation yard. Other materials, such as construction packaging materials, would be transported off-site for recycling or disposal at appropriately permitted disposal sites. Non-hazardous waste and recyclable waste generated by the proposed Project would be transported to the Keller Canyon Landfill in Pittsburg by a contracted hauler. The Keller Canyon Landfill is a Class II landfill with a maximum permitted throughput of 3,500 tons per day. The remaining capacity of the landfill was estimated at 71,900,000 cubic yards as of September 2008, and the estimated closure date is 2050 (CalRecycle, 2013). Solid waste produced during construction would represent the largest component of the waste produced by the proposed Project. This one-time contribution to the landfill would be well within the capacity of the landfill and would result in a less-than-significant impact. During operation, solid wastes would be generated during routine maintenance activities. The additional waste quantities generated during proposed Project operation would be an insubstantial increase in comparison to the existing solid waste generated by normal operations at the Refinery. The additional waste quantities generated by operation of the proposed Project would result in a less-than-significant impact.

17g) ***Would the project comply with federal, state, and local statutes and regulations related to solid waste?***

The Refinery is currently complying with federal, State, and County requirements related to management of solid waste. In addition, the Refinery has an ongoing recycling program that would be employed during the construction and operation of the proposed facilities. There are no aspects of, or actions proposed under the proposed Project that would not comply with these existing solid waste statutes and regulations. As a result there is no reason to expect that the Refinery would not continue to comply with solid waste regulations. There would be no impact.

References

California Department of Resources Recycling and Recovery (CalRecycle), Keller Canyon Landfill, Solid Waste Facility Permit, December 14, 2009, available online at www.calrecycle.ca.gov/SWFacilities/Directory/07-AA-0032/Detail/, accessed May 15, 2013.

18. Mandatory Findings of Significance

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
18. MANDATORY FINDINGS OF SIGNIFICANCE — Would the project:				
a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c) Have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

Discussion

18a) ***Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?***

As discussed in Sections 4) and 5) above, all potential impacts for biological and cultural resources are either reduced to less than significant with mitigation or less than significant. Implementation of proposed mitigation measures BIO-1 and CUL-1 would similarly reduce this potential impact to less-than-significant impact.

18b) ***Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?***

There are no currently known projects within the Refinery area or near the Refinery potentially affected by the proposed Project which could be considered cumulatively considerable. Allowing for uncertainty of this conclusion, this impact is considered less than significant.

18c) ***Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?***

While the potential for the proposed Project to have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly, cannot be fully determined, it is clear that the primary project-related risk would be a spill of crude oil during transportation. In this case, the relative risk of an area potentially affected by a spill of crude oil from the proposed Project over the baseline case where crude is shipped by marine vessel is very likely much smaller and much less environmentally impacting. Consequently, when compared to the baseline, this potential impact is considered less than significant.

CHAPTER III
Report Preparers

Lead Agency

City of Benicia
Community Development Department
250 East L Street
Benicia, California 94510

Mr. Charlie Knox	Community Development Director

Consultant

ESA
550 Kearny Street, Suite 800
San Francisco, California 94108

Chuck Bennett	Project Director
Tim Morgan	Project Manager; Hazards and Hazardous Materials; Mineral Resources
Cory Barringhaus	Deputy Project Manager; Aesthetics; Agriculture and Forestry Resources; Land Use; Population and Housing; Public Services; Recreation; Utilities
Matt Fagundes	Air Quality; Greenhouse Gas Emissions; Noise
Jack Hutchison	Transportation and Traffic
Justin Taplin	Geology and Soils; Hydrology and Water Quality
Natasha Dvorak	Biological Resources
Heidi Koenig	Cultural Resources
Kristina Tierney	Air Quality; Greenhouse Gas Emissions; Noise

APPENDIX A1

Air Permit Application

This page intentionally left blank

Crude by Rail
Air Permit Application

Valero Benicia Refinery
Benicia, California

Public Document

February 2013

www.erm.com

The world's leading sustainability consultancy.

Valero Refining Co. - California

Crude by Rail
Air Permit Application

Valero Benicia Refinery
Benicia, California
BAAQMD Plant No. B2626

February 2013

Project No. 0186851

Environmental Resources Management
1277 Treat Boulevard
Suite 500
Walnut Creek, CA 94597
T: (925) 946-0455
F: (925) 946-9968

TABLE OF CONTENTS

LIST OF FIGURES		**IV**
LIST OF TABLES		**IV**
LIST OF ACRONYMS		**V**
1.0	**INTRODUCTION**	**1**
1.1	Facility Contact Information	1
1.2	Overview	1
1.3	Schedule	1
1.4	Application Summary	2
2.0	**FACILITY AND PROJECT DESCRIPTION**	**3**
2.1	Facility Description	3
2.2	Project Description	5
2.2.1	*Unloading Racks*	*7*
2.2.2	*Tank 1776 (District Source S-97)*	*7*
2.2.3	*Train Activity*	*8*
3.0	**EMISSION ESTIMATES**	**9**
3.1	Tank Emissions	9
3.1.1	*POC Emissions*	*10*
3.1.2	*TAC Emissions*	*10*
3.2	Fugitive Component Emissions	11
3.2.1	*POC Emissions*	*11*
3.2.2	*TAC Emissions*	*12*
3.3	Cargo Carrier Emissions	12
3.3.1	*Criteria Pollutant Emissions*	*12*
4.0	**APPLICABLE REGULATIONS**	**14**
4.1	District Rules and Regulations	14
4.1.1	*Regulation 1 – General Provisions and Definitions*	*14*
4.1.2	*Regulation 2 – Permits*	*14*
4.1.2.1	*Rule 2-1 – General Requirements*	*14*
4.1.2.2	*Rule 2-2 – New Source Review*	*15*
4.1.2.3	*Rule 2-5 – New Source Review of Toxic Air Contaminants*	*17*
4.1.2.4	*Rule 2-6 – Major Facility Review*	*18*

4.1.3 Regulation 3 – Fees 18
4.1.4 Regulation 6 – Odorous Substances 18
4.1.5 Regulation 7 – Odorous Substances 19
4.1.6 Regulation 8 – Organic Compounds 19

4.1.6.1 Rule 8-5 – Storage of Organic Liquids 19
4.1.6.2 Rule 8-18 – Equipment Leaks 19
4.1.6.3 Rule 8-28 – Episodic Releases from Pressure Relief Valves at Petroleum Refineries and Chemical Plants 19

4.1.7 Regulation 10 – Standards of Performance for New Stationary Sources 19
4.1.8 Rule 11-12 – National Emission Standard for Benzene Emissions 19

4.2 California Environmental Quality Act 19
4.3 Federal Rules and Regulations 20

4.3.1 40 CFR 52.21 – Prevention of Significant Deterioration of Air Quality 20
4.3.2 40 CFR 60 Subpart A – General Provisions 20
4.3.3 40 CFR 60 Subpart Kb – Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984 20
4.3.4 40 CFR 60 Subpart GGGa – Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006 20
4.3.5 40 CFR 61 Subpart A – General Provisions 21
4.3.6 40 CFR 61 Subpart FF – Benzene Waste Operations NESHAP 21
4.3.7 40 CFR 63 Subpart A – General Provisions 21
4.3.8 40 CFR 63 Subpart CC – National Emission Standards for Petroleum Refineries 21

5.0 ESTIMATED PERMIT FEES 22

6.0 REFERENCES 23

APPENDIX A – PROJECT DRAWINGS AND SPECIFICATIONS
Attachment A-1 – Process Flow Diagram
Attachment A-2 – Plot Plan

APPENDIX B –EMISSION CALCULATIONS
Attachment B-1 – Tank 1776 Baseline Throughput and Emissions
Attachment B-2 – Tank 1776 Post-CBR Emissions
Attachment B-3 – Fugitive Component Emissions
Attachment B-4 – Cargo Carrier Emissions

APPENDIX C – DISTRICT ATC APPLICATION FORMS

LIST OF FIGURES

Figure 2-1	*Valero Benicia Refinery Location Map*	*4*
Figure 2-2	*Location Map*	*6*

LIST OF TABLES

Table 2-1	*Fugitive Component Counts*	*7*
Table 2-2	*Tank 1776 Capacity and Dimensions*	*8*
Table 3-1	*Emissions Summary*	*9*
Table 3-2	*Tank 1776 POC Emissions*	*10*
Table 3-3	*Tank 1776 TAC Emissions*	*11*
Table 3-4	*Fugitive Component POC Emissions*	*11*
Table 3-5	*Fugitive Component TAC Emissions*	*12*
Table 3-6	*Cargo Carrier Criteria Pollutant Emissions*	*12*
Table 4-1	*BACT for EFR Tanks*	*15*
Table 4-2	*Emission Offsets*	*16*
Table 4-3	*TAC Emissions and District Trigger Levels*	*18*
Table 5-1	*Estimated Permit Fees*	*22*

LIST OF ACRONYMS

ATC	Authority to Construct
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
bbl	barrel
BWON	Benzene Waste Operations NESHAP
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO2e	carbon dioxide equivalent
District	Bay Area Air Quality Management District
EFR	external floating roof
GHG	greenhouse gas
HAP	hazardous air pollutant
HRSA	Health Risk Screening Assessment
LDAR	Leak Detection and Repair
MACT	Maximum Achievable Control Technology
MMbbl	million barrels
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOx	oxides of nitrogen
NPOC	non-precursor organic compound
PM	particulate matter
POC	precursor organic compound
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psia	pounds per square inch absolute
PTE	Potential to Emit
RVP	Reid Vapor Pressure
SO_2	sulfur dioxide
TAC	toxic air contaminant
TBACT	Best Available Control Technology for Toxics
UP	Union Pacific Railroad Company
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

1.0 INTRODUCTION

Valero Refining Co. - California (Valero) owns and operates a petroleum refinery located in Benicia, California. Valero is proposing the Crude by Rail project ("CBR" or "project"), which would allow the refinery to receive crude oil by train. The project would require a Bay Area Air Quality Management District (BAAQMD or "District") Authority to Construct (ATC) permit. The purpose of this document and its appendices is to provide information to the District in support of the project and issuance of an ATC.

The project would also require a land-use permit from the City of Benicia. Approval of the land-use permit would require compliance with the California Environmental Quality Act (CEQA), including preparation of an Initial Study. An application for a land-use permit was submitted to the City of Benicia in December 2012. The City is acting as lead agency.

1.1 Facility Contact Information

Name/Address:	Valero Refining Co. - California 3400 East Second Street Benicia, CA 94510-1097
District Facility No.:	B2626
Facility Contact:	Susan Gustofson, P.E. Staff Environmental Engineer (707) 745-7011 susan.gustofson@valero.com

1.2 Overview

Valero currently receives crude oil by pipeline and by ship. The project would install two rail car unloading racks, re-purpose an existing tank to include crude oil service, and construct associated infrastructure, including rail lines, to allow Valero to receive crude oil by train. The project would permit Valero to receive crude oil in quantities up to 70,000 barrels (bbl) per day (100 rail cars per day), but it would not increase the volume of crude oil delivered to the refinery because crude oil quantities delivered by train would replace crude oil quantities received by ship. The refinery's crude oil processing rate, which is limited by District permit to an annual average of 165,000 bbl per day (daily maximum of 180,000 bbl per day), would remain unchanged. No modifications would be made to refinery process equipment.

1.3 Schedule

Valero plans to begin construction in 2013 and to commence operating the crude by rail unloading facility in late 2013 or early 2014. Construction is expected to take approximately 6 months.

1.4 Application Summary

This application package, including the attached appendices, provides necessary information for the District to evaluate the project. The remainder of this document is organized as follows:

- Section 2.0 (Facility and Project Description) provides an overview of the facility and presents the various elements of the project, including descriptions of project components;
- Section 3.0 (Emissions Estimates) provides a summary of project emissions for storage tank, fugitive components associated with the rail car unloading facilities, and cargo carrier emissions;
- Section 4.0 (Applicable Regulations) addresses compliance with applicable District and federal regulatory requirements;
- Section 5.0 (Estimated Permit Fees) provides an estimate of District New Source Review fees;
- Section 6.0 (References);
- Appendix A – Project Drawings and Specifications;
- Appendix B – Emission Calculations;
- Appendix C – District Permit Application Forms.

2.0 FACILITY AND PROJECT DESCRIPTION

2.1 Facility Description

The refinery occupies approximately 330 acres of the 880-acre Valero property, which is located at 3400 East Second Street in the eastern portion of the city of Benicia, along the northern edge of Suisun Bay. Figure 2-1 shows an aerial photograph of the refinery, property boundaries, and surrounding area.

The refinery converts crude oil into many finished products, including California Air Resources Board (CARB) cleaner-burning gasoline and diesel fuels, liquefied petroleum gas, jet fuel, fuel oil, and asphalt. Major equipment used for processing crude oil into finished products includes distillation columns, storage tanks, reactors, vessels, heaters, boilers, and other ancillary equipment. Valero also operates its own wastewater treatment plant and a marine terminal, which services crude oil, refinery product, and feedstock deliveries and exports via ships and barges. The marine terminal is located approximately 1 mile south of the refinery, near the northern landing of the Benicia Bridge. The refinery also uses rail to transport refinery feedstocks and products. All rail traffic enters and exits along the southeastern boundary of the refinery near the intersection of Park Road and Bayshore Road.

The refinery site and project location are zoned General Industrial. Present land use at the project location is petroleum refining and storage. The elements of the project will be compatible with the existing land use, and will not result in substantial alterations of the planned land use in the area. Construction and operation of facilities associated with this project will be within the Valero property boundaries.

Figure 2-1 Valero Benicia Refinery Location Map

Imagery date: 9/1/2012, Google Earth Pro 6.2.2.6613.

2.2 Project Description

Valero currently receives crude oil by pipeline and by ship. The proposed project would allow Valero to receive crude oil by train and consist of the following primary components:

- Unloading racks. Two unloading racks would be installed to allow crude oil to be transferred from rail cars (up to 100 rail cars per day, 70,000 bbl per day) to existing external floating roof tank 1776 (District Source S-97). The racks would be installed in the northeastern portion of the main refinery property, between the eastern side of the lower tank farm and the fence adjacent to Sulphur Springs Creek.
- Tank 1776 (District Source S-97). Existing external floating roof tank 1776 would be used to store all crude oil transferred from the rail car unloading racks. Tank 1776 is currently permitted to store jet fuel and other refinery products. It would be changed to crude oil service as part of this project, but it would retain the capability to store jet fuel and other refinery products in the future if required. There would be no physical modifications to tank 1776 that would impact emissions. The bottom interior surface of the tank would be coated as required for crude water draw service.
- Pipeline and associated components. Approximately 4,000 feet of primarily 16-inch-diameter piping and associated components (pumps, valves, flanges, and connectors) would be installed between the rail car unloading racks and tank 1776 and from tank 1776 to the existing crude supply piping.
- Rail tracks. Two rail spurs and a parallel rail car storage track would be constructed on refinery property to allow receipt of rail cars at the unloading racks. The rail spurs and parallel rail car storage track would be located between the eastern side of the lower tank farm and the western side of the fence along Sulphur Springs Creek.
- Other infrastructure modifications. Approximately 1,800 feet of tank farm dike walls and an existing firewater pipeline and compressor station would be relocated to accommodate the new rail tracks.

Figure 2-2 shows the location of the rail car unloading racks and tank 1776. Detailed project drawings showing rail track locations, pipeline routes, and other project details, are provided in Appendix A.

Figure 2-2 Location Map

Imagery date: 9/1/2012, Google Earth Pro 6.2.2.6613.

2.2.1 Unloading Racks

The project would install two parallel rail car unloading racks. Each rail car unloading rack would accommodate up to 25 rail cars at a time (two, 50-rail car "switches" per day would be transported to the racks by train). Each rack would have 25 unloading stations, which would bottom-unload "closed dome" rail cars using a 4-inch-diameter hose, with dry disconnect couplings, connected to a common header routed between the two racks (a check valve, connected to the top of each rail car via 2-inch-diameter hose, would open to allow ambient air to enter during unloading and immediately close when unloading was finished). Two new pumps, operating in parallel, would pump the crude oil from the unloading rack header via a new 16-inch-pipeline to tank 1776 (see Section 2.2.2 for tank details). Once emptied, the 50 rail cars would be disconnected from the racks, moved off site (or to an interim storage location on site), and then replaced by another 50-rail car switch (see Section 2.2.3 for a description of train and rail car movements, including duration).

The unloading racks would be used only for unloading crude oil, up to 70,000 bbl per day (25.55 million barrels [MMbbl] per year); there would be no loading of crude oil or other materials at the racks. As a result, the only emissions associated with the unloading racks would be fugitive emissions from flanges, connectors, valves, and pumps (at the unloading rack, between the unloading rack and tank 1776, and from tank 1776 to the existing crude supply piping). The estimated number of new fugitive components associated with the project is presented in Table 2-1.

Table 2-1 Fugitive Component Counts

Component Type	Estimated Count*
Pumps	3
Valves	518
Flanges	1036
Connectors	259
Atmospheric Pressure Relief Devices	0

All components in light liquid service.
Estimated counts include contingency factor of 15% for valves. Flanges estimated using 2.0:1 flange/valve ratio. Connectors estimated using 0.5:1 connector/valve ratio. A third pump is a proposed installed spare for the two primary pumps.

Final component counts would be determined upon completion of construction.
A process flow diagram and project drawings are provided in Appendix A.

2.2.2 Tank 1776 (District Source S-97)

Tank 1776 is an existing external floating roof (EFR) tank that would be used to store all crude oil transferred from the rail car unloading racks, up to 70,000 bbl per day (25.55 MMbbl per year). Tank 1776 is a grandfathered source currently permitted to store various refinery products such as jet fuel, diesel, and gasoline. It shares a 62.8 MMbbl per year combined throughput limit with seven other storage tanks (S-63, S-73, S-74, S-75, S-76, S-78, and S-163). As part of this project, no physical modification would be made to tank 1776 that would increase breathing emissions, but the tank would be re-purposed for crude oil storage. To that end, the tank will be outfitted with additional nozzles for crude service and for potential future connections as found on typical crude storage tanks. Table 2-2 provides the dimensions and capacity of tank 1776.

Table 2-2 Tank 1776 Capacity and Dimensions

Valero Tank ID (District ID)	Type	Diameter (feet)	Height (feet)	Capacity [1] (bbl)
TK-1776 (S-97)	External Floating Roof	128	48	110,000

[1] Working (useable) capacity is 101,400 bbl.

Tank 1776 has a welded steel shell and its EFR is equipped with primary and tight-fitting secondary seals to minimize emissions. The roof fittings comply with the current District Rule 8-5 requirements for floating roof tanks.

Crude oil stored in tank 1776 would be transferred to an existing header where it would be blended with crude oil from other storage tanks before being piped to refinery process units.

2.2.3 Train Activity

Up to 100 rail cars per day would be unloaded at the refinery. Typically, two 50-rail-car switches per day would occur between the unloading racks and the Union Pacific Railroad Company (UP) tracks southeast of the refinery and highway 680. A UP locomotive would transport up to 50 rail cars at a time to the unloading rack. All locomotives would enter and exit along the southern refinery boundary, near the intersection of Park Road and Bayshore Road (see Figure 2-2 for location of the locomotive entrance/exit).

After the 50 rail cars are emptied at the unloading rack, they would be moved to the adjacent storage track. A UP locomotive would then retrieve the empty rail cars parked on the storage track and transport them off site. This unloading cycle would then be repeated for the remaining 50 loaded rail cars.

The duration of this unloading process, from entry of 50 loaded rail cars to refinery property, unloading of the 50 rail cars, to exit of 50 empty rail cars from refinery property, would take approximately 8 to 10 hours (16 to 20 hours for 100 rail cars).

Track layouts are provided in Appendix A.

3.0 EMISSION ESTIMATES

Estimated annual emissions have been calculated for the project to determine District permitting and emission offset requirements. Annual mass emissions are calculated based on 24-hour-per-day and 365-day-per-year operation. Net emissions are presented as the increase associated with the project based on post-project emissions minus baseline emissions. Consistent with District Rule 2-2-605, a baseline of the last 3 years (December 2009 through November 2012) best represents recent emissions at the refinery.

A summary of project net emissions is presented in Table 3-1. Emissions estimates for tank 1776 represent the net increase in potential emissions at maximum annual crude throughput (25.55 MMbbl per year). Fugitive emissions from components reflect the increased number of components associated with the unloading rack and related components, including pumps, valves, flanges, and connectors. Train emissions reflect the potential emissions increase at maximum annual crude throughput of 25.55 MMbbl per year, while marine vessel emissions reflect the potential emissions decrease associated with a 25.55 MMbbl reduction in crude oil delivered by marine vessels.

Net emissions of precursor organic compounds (POCs) from tank 1776 and fugitive component emissions (unloading rack, pumps, etc.) are the only pollutant increases associated with the project subject to District permitting requirements.

Table 3-1 Emissions Summary

Source	Project Emissions, Net Change from Baseline (ton/yr)						
	POC	NOx	CO	PM_{10}	$PM_{2.5}$	SO_2	GHG
Tank 1776 (S-97)	4.33	-	-	-	-	-	-
Unloading Rack and Pipeline Fugitive Components	1.71	-	-	-	-	-	-
Trains	1.70	33.04	5.60	0.83	0.81	0.02	5,593
Marine Vessels	(5.18)	(91.84)	(10.69)	(3.58)	(3.40)	(26.79)	(9,498)
Total	2.56	(58.80)	(5.09)	(2.75)	(2.59)	(26.77)	(3,905)

Project emissions estimates @ 25.55 MMbbl per year crude oil by rail. "()" indicates decrease.

POC = precursor organic compounds
NOx = oxides of nitrogen
CO = carbon monoxide
PM_{10} = particulate matter (10 microns or less)
$PM_{2.5}$ = particulate matter (2.5 microns or less)
SO_2 = sulfur dioxide
GHG = greenhouse gases, calculated as CO2 equivalent (CO2e)

3.1 Tank Emissions

The change in tank 1776 service to include crude oil storage would result in a net increase in POC and toxic air contaminant (TAC) emissions at the source. To minimize emissions, tank 1776's external floating roof is equipped double seals with zero-gap secondary seals, consistent with District Rule 8-5, Best Available Control Technology (BACT) performance requirements, and Title 40 of the Code of Federal Regulations (CFR) 60 Subpart Kb.

3.1.1 POC Emissions

POC emissions are calculated using the United States Environmental Protection Agency (USEPA) TANKS 4.09d software. Crude oil storage tank emissions for the project are presented in Table 3-2, including baseline, post-project, and net emissions. Pre-project (baseline) emissions are based on actual emissions from product storage at tank 1776 for the 3-year baseline period from December 2009 through November 2012.

Table 3-2 Tank 1776 POC Emissions

Valero Tank ID (District ID)	POC Emissions (lb/day)			POC Emissions (ton/yr)		
	Baseline	Post-Project	Net	Baseline	Post-Project	Net
TK-1776 (S-97)	15.6	39.3	23.7	2.85	7.18	4.33

Post-project emissions assume annual crude oil throughput of 25.55 MMbbl/yr (70,000 bbl/day x 365 day/yr) and the following crude oil properties: Reid Vapor Pressure (RVP) = 9.4 pounds per square inch absolute (psia), density = 6.74 lb/gal (43.5 API).

Appendix B provides documentation of the emission estimation methodology including tank characteristics, material properties, USEPA TANKS 4.09d software input assumptions and output results, and actual tank throughput data for the 3-year baseline period.

Tank 1776 is currently permitted for jet fuel (JP4) as a grandfathered source under Valero's Title V permit, and shares a combined throughput limit of 62.8 MMbbl per year with the following tanks: S-63, S-73, S-74, S-75, S-76, S-78, and S-163 (S-74 is operated under NuStar Logistics' Title V permit, Facility B5574, while the other tanks are operated under the refinery's Title V permit. NuStar is a contiguous facility that is operated pursuant to a service agreement between NuStar Logistics and Valero Refining Company--California). Valero requests that S-97 receive a new throughput limit of 25.55 MMbbl per year applicable to storage of crude oil only, but that S-97 should also remain subject to the shared 62.8 MMbbl per year throughput limit for S-63, S-73, S-74, S-75, S-76, S-78, S-97, and S-163 to the extent S-97 is used for storage of products other than crude.

While the post-project PTE calculated for S-97 would be greater than baseline emissions, crude oil throughput at S-97 would be offset by a corresponding decrease in crude oil throughput at the facility's other crude oil storage tanks that are currently served by ship and by pipeline (S-57 through S-62, S-1047, and S-1048 [S-57 through S-62 are operated under NuStar Logistics' Title V permit]). As a result, post-project combined crude oil throughput at tanks S-57 through S-62, S-97, S-1047, and S-1048 would not exceed 62.6 MMbbl per year, which is the current combined throughput limit specified by Condition 20820 for tanks S-57 through S-62, S-1047, and S-1048.

3.1.2 TAC Emissions

POC emissions from crude oil storage include compounds classified as TACs. For the TAC emissions estimates, post-project POC emissions were speciated into TAC constituents based on the default speciation data obtained from USEPA TANKS 4.09d software for crude oil at the conditions assumed for each tank. Pre-project (baseline) emissions are based on actual emissions from product storage at tank 1776 for the 3-year

baseline period from December 2009 through November 2012. TAC emissions are summarized in Table 3-3.

Table 3-3 Tank 1776 TAC Emissions

TAC	Hourly Emissions (lb/hr)			Annual Emissions (lb/yr)		
	Baseline	Post-Project	Net	Baseline	Post-Project	Net
Benzene	5.3E-03	8.6E-03	3.2E-03	46.6	74.9	28.3
Ethylbenzene	6.1E-04	3.7E-03	3.1E-03	5.4	32.3	26.9
Hexane (n-)	4.7E-03	7.1E-03	2.4E-03	41.3	62.3	21.0
Toluene	6.8E-03	1.0E-02	3.5E-03	59.5	90.0	30.5
Xylenes (m-)	2.8E-03	1.3E-02	1.0E-02	24.7	111.9	87.2

Hourly TAC emissions are average hourly emissions based on annual emissions estimates. TAC emissions estimates based on TANKS4.09d default speciation profiles (except for benzene in crude oil: 0.6%wt benzene assumed for crude oil, which is higher than default benzene content in TANKS4.09d).

See Appendix B for detailed assumptions and TANKS 4.09d input parameters.

3.2 Fugitive Component Emissions

3.2.1 POC Emissions

Project fugitive POC emissions are based on the total count of new components associated with the Crude by Rail project. POC emission increases are based on emission factors developed using the Correlation Equation Method (California Air Pollution Control Officers Association [CAPCOA]/CARB, 1999), with the District Rule 8-18 component emission definitions as the screening values. Total fugitive emissions are estimated by multiplying the emission factor for each component type by the estimated count of each component type. For the proposed project, total POC emissions from fugitive components are estimated to be 1.71 tons per year as presented in Table 3-4.

Table 3-4 Fugitive Component POC Emissions

Component Type	POC Emissions (ton/yr)
Pumps	0.07
Valves	0.35
Flanges	1.17
Connectors	0.11
Atmospheric Pressure Relief Devices	0.00
Total	**1.71**

All components in light liquid (crude oil) service.
POC emissions estimates represent net post-project potential emissions.

Detailed fugitive emission calculations including the correlation equations, screening values, and resulting emission factors are presented in Appendix B.

3.2.2 TAC Emissions

Fugitive POC emissions contain compounds that are classified as TACs. Using the same liquid fraction for the same crude oil speciation as for the storage tanks, TAC emissions were calculated from project component fugitive POC emissions and are presented in Table 3-5.

Table 3-5 Fugitive Component TAC Emissions

TAC	CAS #	Wt. Percent in Crude Oil	TAC Emissions (net)	
			lb/hr	lb/yr
Benzene	00071-43-2	0.06	2.3E-04	2.0
Ethylbenzene	00100-41-4	0.4	1.6E-03	13.7
Hexane (n-)	00110-54-3	0.4	1.6E-03	13.7
Toluene	00108-88-3	1.0	3.9E-03	34.2
Xylenes (m-)	01330-20-7	1.4	5.5E-03	47.8

Consistent with District Rule 2-5-601, fugitive components are considered new sources. Hourly and annual TAC emissions are based on the post-project emissions (i.e., the potential to emit). Detailed fugitive TAC emission calculations are documented in Appendix B.

3.3 Cargo Carrier Emissions

3.3.1 Criteria Pollutant Emissions

Cargo carrier emissions would decrease because emission rates per bbl of crude delivered would be lower for trains than for ships, and increases in crude volume delivered by train would result in decreases in crude volume delivered by ship. Emissions from cargo carriers include all emissions while operating in the District. A summary of cargo carrier emissions is presented in Table 3-6.

Table 3-6 Cargo Carrier Criteria Pollutant Emissions

Source	Post-Project Emissions, Net Change from Baseline (ton/yr)						
	POC	NOx	CO	PM_{10}	$PM_{2.5}$	SO_2	GHG
Trains	1.70	33.04	5.60	0.83	0.81	0.02	5,593
Marine Vessels	(5.18)	(91.84)	(10.69)	(3.58)	(3.40)	(26.79)	(9,498)
Total	(3.48)	(58.80)	(5.09)	(2.75)	(2.59)	(26.77)	(3,905)

Train emissions are post-project potential emissions @ 25.55 MMbbl per year; marine vessel emissions (negative) are post-project emissions @ -25.55 MMbbl per year (reduced crude oil deliveries).

Detailed calculations are presented in Appendix B. The baseline period is defined as the 3-year period ending November 30, 2012.

Cargo carrier emissions, specifically ship and barge emissions, associated with the import of crude and gas oil at Valero's marine terminal are currently subject to annual calendar year limits, as specified in Part 23 of Condition 20820. No changes are proposed to these limits; post-project cargo carrier emissions would remain within these limits.

4.0 APPLICABLE REGULATIONS

Prior to issuance of an ATC, the District must determine that the proposed project will comply with applicable air quality rules and regulations, including both District and federal requirements. This section presents a discussion of each applicable air quality requirement and documentation that the project complies with all requirements.

4.1 District Rules and Regulations

4.1.1 Regulation 1 – General Provisions and Definitions

Section 1-301 of Regulation 1 prohibits discharge from any source such quantities of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public; or that endangers the comfort, repose, health or safety of any such person or the public; or that causes or has a natural tendency to cause injury or damage to business or property.

The project will be operated in accordance with all federal and District rules and regulations, and is not expected to cause a public nuisance.

4.1.2 Regulation 2 – Permits

4.1.2.1 Rule 2-1 – General Requirements

Section 2-1-301 – Authority to Construct

Unless otherwise exempted, an ATC must be obtained from the District prior to building, modifying, or replacing any emissions unit or control device. The project would emit regulated air contaminants. Therefore, the project is subject to the requirements of Section 2-1-301 to obtain an ATC from the District prior to project implementation. District ATC permit application forms are presented in Appendix B, Attachment B-1, in accordance with Section 2-1-402.

Per Section 2-1-114.2.4, cargo carrier emissions must be included in the facility's emissions. As discussed in Section 3.3, post-project, facility-wide cargo carrier emissions would remain unchanged or decrease because emissions rates per barrel of crude delivered would be lower for trains than for ships, and increases in crude volume delivered by train would replace crude volume delivered by ships.

Criteria pollutant emissions from cargo carriers would not exceed the existing "Cargo Carrier and Dock" emission limits contained Parts 23 and 24 of Condition 20820. Cargo carrier TAC emissions would not be emitted in a quantity greater than that previously emitted (Section 2-1-234.4.). While cargo carrier emissions would remain unchanged or decrease, the distribution of cargo carrier emissions would shift from the marine terminal south of the refinery to the rail lines east and south of the refinery.

Section 2-1-302 – Permit to Operate

In accordance with Section 2-1-302, a Permit to Operate must be obtained from the District prior to using or operating any article, machine, equipment, or other contrivance, the use of which may cause, reduce or control emissions of air contaminants. After construction of any equipment associated with the proposed project is complete in accordance with the ATC, Valero would notify the District when ready to commence

operation. Operation of the new project would only commence once Valero receives a Permit to Operate or a temporary authorization to operate in accordance with the ATC.

Section 2-1-412 – Public Notice, Schools

Section 2-1-412 requires public notice if the new or modified source is located within 1,000 feet of any K-12 school. The project will not be located within 1,000 feet of the boundary of any school.

4.1.2.2 Rule 2-2 – New Source Review

District Rule 2-2, New Source Review, applies to all new and modified sources that are subject to ATC requirements. The proposed project is potentially subject to several sections of Rule 2-2.

Section 2-2-301 – Best Available Control Technology

Section 2-2-301 requires BACT to control emissions from any new source with the potential to emit 10 pounds per day or more of non-precursor organic compounds (NPOCs), POCs, NOx, SO_2, PM_{10}, or CO. Tank 1776 would be subject to BACT because post-project POC emissions would exceed 10 pounds per day (see Table 3-2 for emissions estimates). Fugitive components (pumps, valves, flanges, connectors) would not be subject to BACT because post-project POC emissions would be below 10 pounds per day. Cargo carriers (trains) are not subject to BACT per Section 2-2-206.

District BACT guidelines for POC emissions from EFR tanks are summarized in Table 4-1.

Table 4-1 BACT for EFR Tanks

Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	Typical Technology
POC	1. Vapor recovery system w/ an overall system efficiency >98% [a],[T] 2. BAAQMD Approved roof w/ liquid mounted primary seal and zero gap secondary seal, all meeting design criteria of Reg. 8, Rule 5. Also, no ungasketed roof penetrations, no slotted pipe guide pole unless equipped with float and wiper seals, and no adjustable roof legs unless fitted w/ vapor seal boots or equivalent. [a],[T] Additionally, a dome is required for tanks that meet all of the following: 1) capacity greater than or equal to 19,815 gallons 2) located at a facility with greater than 20 tons per year volatile organic compound (VOC) emissions since the year 2000 and 3) storing a material with a vapor pressure equal to or greater than 3 psia (except for crude oil tanks that are permitted to contain more than 97% by volume crude oil).[b]	1. Thermal Incinerator; or Carbon Adsorber; or Refrigerated Condenser; or BAAQMD approved equivalent. [a],[T] 2. BAAQMD Approved Roof and Seal Design. [a],[T]

References:

District BACT Guideline Document 167.1.2, Source: Storage tank – External Floating Roof, Organic Liquids, Class: All, Revision 2, Date: 9/19/2011. Only POC BACT information is shown because BACT is only triggered for POC emissions.
[a] BAAQMD
[T] TBACT (Best Available Control Technology for Toxics)
[b] BAAQMD Application 22722, SCAQMD Regulation 1178 (1/1/04)

BACT1 for EFR tanks specifies a vapor recovery system with an overall efficiency greater than 98 percent. While technologically feasible, a vapor recovery system is not typically used in practice on large EFR tanks because it would be cost-prohibitive, well above the District's cost-effectiveness threshold of $17,500 per ton of POC reduced.

BACT2 for EFR tanks is a liquid-mounted primary seal, zero-gap secondary seal, and gasketed fittings, all meeting the design criteria of Rule 8-5. Tank 1776 would satisfy these BACT2 requirements (it would not be subject to the BACT2 dome requirement because it would be permitted to store more than 97 percent by volume crude oil).

Section 2-2-302 and 2-2-303 – Project Emission Offsets

In accordance with Section 2-2-302, emission offsets must be provided for a new or modified source at a facility that emits or will be permitted to emit 35 tons per year or more of POC or NOx (minus any contemporaneous emission reduction credits) at a 1.15 to 1.0 ratio. The refinery is permitted to emit POC and NOx in excess of 35 tons per year. For new and modified sources, emission increases must be calculated in accordance with Sections 2-2-604 and 2-2-605. As presented in Table 4-2, the project results in an increase in POC emissions from tank 1776 and from fugitive component emissions. Valero plans to provide emission reduction credits at the prescribed ratio of 1.15 to 1.0 to offset the net project emission increase.

Table 4-2 Emission Offsets

Emission Source	POC Emissions (ton/yr)	NOx Emissions (ton/yr)	PM_{10} Emissions (ton/yr)	SO_2 Emissions (ton/yr)
Project Emissions				
Tank 1776	4.33	0	0	0
Fugitive Components	1.71	0	0	0
Cargo Carriers (Trains, Marine Vessels)	*	*	*	*
Subtotal	*6.04*	*0*	*0*	*0*
Contemporaneous Emission Reductions				
None	0	0	0	0
Subtotal	*0*	*0*	*0*	*0*
Net Project Emission Increase	**6.04**	**0**	**0**	**0**
Emission Offset Requirement	**6.95**	**-**	**-**	**-**

Emissions are post-project net emissions (post-project potential emissions minus baseline emissions). Emission offset ratio is 1.15:1. Only POC, NOx, PM_{10}, and SO_2 are subject to emission offset requirements.
* There would be no increase in cargo carrier emissions (trains, marine vessels). See Table 3-6 for the estimated net change in emissions from cargo carriers. Cargo carrier emissions would continue to comply with the existing cargo carrier emission limits in Condition 20820, Parts 23-25.

See Appendix B for detailed calculations and assumptions.

Valero would surrender emission reduction credits for the required emission offsets upon confirmation by the District.

Section 2-2-304 through 2-2-306 – PSD Requirement

The tanks and fugitive components would only emit POC, which is not a regulated Prevention of Significant Deterioration (PSD) pollutant. Cargo carrier emissions are not considered as part of the facility emissions when determining PSD applicability per Section 2-2-215.2.

Section 2-2-317 – Maximum Achievable Control Technology Requirement

In accordance with Section 2-2-317, the District shall not issue an ATC for a new or modified source at a Major Facility of hazardous air pollutants (HAPs) unless the source will meet Best Available Control Technology for Toxics (TBACT), except as provided in Section 2-2-114. Section 2-2-114 allows an exemption from Section 2-2-317 when the combined increase in Potential to Emit (PTE) from all related sources in a proposed construction or modification is less than 10 tons per year of any HAP and less than 25 tons per year of any combination of HAPs. The increase in HAP emissions from tank 1776 and associated project fugitive components would be less than 10 tons per year of any HAP and less than 25 tons per year of all HAPs combined. Therefore, TBACT is not required for tank 1776 or the associated project fugitive components pursuant to Section 2-2-317.

4.1.2.3 Rule 2-5 – New Source Review of Toxic Air Contaminants

In accordance with District Regulation 2-5-100, if the project's emissions of any TAC, which are identified in Table 2-5-1 of Regulation 2, Rule 5, exceed the indicated trigger level, then a risk analysis is required. "Project emissions" include emissions from new sources and increased emissions from modified sources. The rule requires that emissions of all TACs associated with a project be included in the risk analysis if any single TAC exceeds its hourly or annual trigger level.

According to Section 2-5-216, project emissions must include all approved projects within the 2-year period preceding an application, unless the emissions are demonstrated to be unrelated to those in the application. There are no approved projects within the 2-year period prior to this application that are related to this application. Therefore, no adjustment to project emissions is necessary.

Project TAC emissions are summarized in Table 4-3. Hourly TAC emissions are below acute trigger levels. Annual TAC emissions are below the chronic trigger level for all pollutants except benzene. Because benzene exceeds the District's chronic trigger level, Valero has included a completed District Health Risk Screening Assessment (HRSA) form in Appendix C.

Table 4-3 TAC Emissions and District Trigger Levels

Pollutant	CAS Number	Emissions, Net Change from Baseline		Trigger Levels (District Table 2-5-1)		Exceed Acute Trigger Level?	Exceed Chronic Trigger Level?
		lb/hr	lb/yr	lb/hr (acute)	lb/yr (chronic)		
Tank 1776							
Benzene	71-43-2	3.2E-03	28.3	2.9	6.4	No	**Yes**
Ethylbenzene	100-41-4	3.1E-03	26.9	NA	77,000	No	No
Hexane (n-)	110-54-3	2.4E-03	21.0	NA	270,000	No	No
Toluene	108-88-3	3.5E-03	30.5	82.0	12,000	No	No
Xylenes (m-)	1330-20-7	1.0E-02	87.2	49.0	27,000	No	No
Fugitive Components							
Benzene	71-43-2	2.3E-04	2.0	2.9	6.4	No	No
Ethylbenzene	100-41-4	1.6E-03	13.7	NA	77,000	No	No
Hexane (n-)	110-54-3	1.6E-03	13.7	NA	270,000	No	No
Toluene	108-88-3	3.9E-03	34.2	82.0	12,000	No	No
Xylenes (m-)	1330-20-7	5.5E-03	47.8	49.0	27,000	No	No

Net TAC emissions from Tables 3-3 and 3-5.

4.1.2.4 Rule 2-6 – Major Facility Review

The refinery is a major facility and currently holds a Major Facility Review Permit, also referred to as a Title V operating permit. The project will require a Minor Permit Revision of the Title V permit in accordance with Regulation 2-6-215 because it is not an administrative or significant permit revision. The proposed revisions are not considered to be administrative or significant because there are no proposed revisions that meet the definition for administrative revisions under 2-6-201 or that meet the definition for significant revisions under Section 2-6-226.

Valero will submit a Title V permit modification application following receipt of the ATC for this project.

4.1.3 Regulation 3 – Fees

District Regulation 3 specifies the fee structure for projects subject to District permitting review. Estimated fees for the project are presented in Section 5.0.

4.1.4 Regulation 6 – Odorous Substances

Regulation 6, Rule 1 limits particulate matter and visible emissions. Tank 1776, the offloading racks, and fugitive components would not be sources of PM or visible emissions. The locomotives used to transport rail cars would emit PM, but Rule 6-1 does not apply to cargo carriers.

4.1.5 Regulation 7 – Odorous Substances

District Regulation 7 places general limitations on odorous substances and specific emission limitations on certain odorous compounds. This rule only becomes applicable if the District receives odor complaints from 10 or more complainants within a 90-day period. Because the District has not received 10 or more complaints with a 90-day period concerning refinery emissions, the Valero refinery is not subject to this rule.

4.1.6 Regulation 8 – Organic Compounds

4.1.6.1 Rule 8-5 – Storage of Organic Liquids

Rule 8-5 limits emissions of organic compounds from storage tanks. S-97 would continue to be subject to this rule. The tank would continue to comply with Rule 8-5; the project would not change the applicability of Rule 8-5 to tank 1776.

4.1.6.2 Rule 8-18 – Equipment Leaks

Rule 8-18, specific to equipment leaks, limits POC emissions from equipment components such as valves, flanges, connectors, and pumps. The limits on these fugitive POC emissions are specific to each component type. The new fugitive components installed as part of this project would be added to the Valero's existing Leak Detection and Repair (LDAR) program to ensure compliance with Rule 8-18.

4.1.6.3 Rule 8-28 – Episodic Releases from Pressure Relief Valves at Petroleum Refineries and Chemical Plants

Section 8-28-302 requires that any person installing a new refinery source or modifying an existing refinery source that is equipped with at least one pressure relief device in organic compound service must meet all applicable requirements of Rule 2-2, including BACT. Any pressure relief devices installed as part this project would meet BACT.

4.1.7 Regulation 10 – Standards of Performance for New Stationary Sources

Regulation 10 adopts the provisions of 40 CFR 60 by reference. The applicable subparts of 40 CFR 60 are identified in Section 4.3 of this application.

4.1.8 Rule 11-12 – National Emission Standard for Benzene Emissions

Rule 11-12 adopts the provisions of 40 CFR 61 Subpart BB and Subpart FF by reference. The applicability of and compliance with 40 CFR 61 is reviewed in Section 4.3 of this application.

4.2 California Environmental Quality Act

CEQA requires a review of potential significant environmental impacts from proposed projects. This project has been determined to be subject to CEQA review by the City of Benicia and will require a Land Use Permit. An application for a Land Use Permit was submitted to the City of Benicia in December 2012. The City of Benicia will serve as Lead Agency.

4.3 Federal Rules and Regulations

4.3.1 40 CFR 52.21 – Prevention of Significant Deterioration of Air Quality

District has been delegated authority by USEPA for implementation and enforcement of the federal PSD requirements as referenced in District Regulation 2-2-304. As previously discussed in Sections 1.5 and 4.1.2.2, the project is not subject to PSD review because project emissions increases are not considered to be a "modification" that would exceed "major modification" applicability thresholds for any pollutant listed in District Rules 2-2-304 through 2-2-306.

Cargo carriers are not subject to PSD applicability review per District Rule 2-2-215.

4.3.2 40 CFR 60 Subpart A – General Provisions

Any source subject to an applicable standard under 40 CFR 60 is also subject to the general provisions of Subpart A. Because the replacement, new, and refurbished storage tanks are subject to 40 CFR 60 Subpart Kb, the requirements of Subpart A apply. Subpart A contains requirements for notification of construction or modification and startup, monitoring, recordkeeping and reporting, and performance testing. Valero will provide notification to the USEPA administrator at least 60 days prior to construction of equipment subject to Subpart Kb and notification of startup, as required. Valero currently complies with the monitoring, recordkeeping, and reporting requirements of Subpart A and will continue to do so following implementation of the proposed project.

4.3.3 40 CFR 60 Subpart Kb – Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

This subpart applies to each storage vessel with a capacity greater than or equal to 75 cubic meters that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984. Subpart Kb requires tanks storing organic liquids to be equipped with an appropriate vapor loss control device (internal floating roof with seals, EFR with seals, or fixed roof tank with vapor recovery and control device).

Tank 1776 would be subject to Subpart Kb because the proposed operational change is considered a modification under Section 60.14 (an operational change that would result in an increase in the emission rate of a pollutant to which a standard applies). Tank 1776 would comply with the requirements of Subpart Kb.

4.3.4 40 CFR 60 Subpart GGGa – Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006

The project's group of equipment (valves, pumps, connectors, and flanges in POC service) is not within a process unit, as defined in §60.590a, and is therefore not an affected facility and not subject to 40 CFR 60 Subpart GGGa.

4.3.5 40 CFR 61 Subpart A – General Provisions

Any source subject to an applicable standard under 40 CFR 61 is also subject to the general provisions of Subpart A. Because the proposed project will be subject to Subpart FF, the requirements of Subpart A apply. Valero currently complies with the monitoring, recordkeeping, and reporting requirements of Subpart A and would continue to do so following implementation of the proposed project.

4.3.6 40 CFR 61 Subpart FF – Benzene Waste Operations NESHAP

Commonly referred to as BWON, or the Benzene Waste Operations national emission standards for hazardous air pollutants (NESHAP), 40 CFR 61 Subpart FF applies to chemical manufacturing plants, coke by-product recovery plants, and petroleum refineries. The proposed project would generate benzene-containing wastes. Valero has in place a BWON program that would ensure continued compliance with this rule.

4.3.7 40 CFR 63 Subpart A – General Provisions

Any source subject to an applicable standard under 40 CFR 63 is also subject to the general provisions of Subpart A. Because the proposed project will be subject to Subpart CC, the requirements of Subpart A apply. Valero currently complies with the monitoring, recordkeeping, and reporting requirements of Subpart A and would continue to do so following implementation of the proposed project.

4.3.8 40 CFR 63 Subpart CC – National Emission Standards for Petroleum Refineries

Commonly referred to as "Refinery MACT," Subpart CC applies to petroleum refining process units and related emission sources that emit or have equipment containing or contacting one or more HAPs listed in Subpart CC, and are located in a petroleum refinery that is a major source of HAPs. Subpart CC establishes standards for miscellaneous process vents, storage vessels, wastewater streams and treatment operations, equipment leaks, gasoline loading racks, and marine vessel loading operations. Tank 1776 and the project's fugitive component equipment leaks would be subject to this rule.

Storage tanks subject to Subpart CC are classified as either Group 1 or Group 2 storage vessels. "Group 1 storage vessel" means a storage vessel at an existing source that has a design capacity greater than or equal to 177 cubic meters (46,758 gallons) and stored-liquid maximum true vapor pressure greater than or equal to 10.4 kilopascals (1.5 pounds per square inch [psi]) and stored-liquid annual average true vapor pressure greater than or equal to 8.3 kilopascals (1.2 psi) and annual average HAP liquid concentration greater than 4 percent by weight total organic HAP. "Group 2 storage vessel" means a storage vessel that does not meet the definition of a Group 1 storage vessel.

Tank 1776 is a Group 1 storage vessel. A Group 1 storage vessel that is also subject to 40 CFR 60 Subpart Kb is subject to the overlap in Subpart CC at 63.640(n)(1) that specifies that such tanks are subject only to the requirements of 40 CFR 60 Subpart Kb with exceptions in Subpart CC at 63.640(n)(8). This will be the case for tank 1776.

5.0 ESTIMATED PERMIT FEES

Estimated permit fees for this ATC application are $16,818. Table 5-1 presents a breakdown of the estimated fees based on tank 1776's capacity. Valero requests District confirmation of these permit fee estimates.

Table 5-1 Estimated Permit Fees

Fee Type	Fee ($)
Filing Fee	$416
Initial Fee	$7,993
Risk Screening Fee	$8,409
Permit to Operate Fee [1]	-
Toxic Surcharge Fee [1]	-
Total	**$16,818**

Fee estimate based on District Regulation 3 (June 6, 2012) and Schedule C (Stationary Containers for the Storage of Organic Liquids).
Initial fee = 0.173 cents per gallon
Risk Screening Fee (RSF) = $416 plus 0.173 cent per gallon (first TAC source in application)
[1] This is a permit modification application for an existing source and there is no incremental increase in Permit to Operate or Toxic Surcharge fees because the tank's capacity will remain unchanged.
Fee estimate assumes a container volume of 4,620,000 gallons (110,000 bbl), as listed in Table II A of Valero's Title V permit. Note that the actual working (useable) volume of the tank is 4,258,000 gallons (101,400 bbl).

6.0 REFERENCES

Bay Area Air Quality Management District (District). 2013. *Best Available Control Technology (BACT) Guideline*. http://hank.baaqmd.gov/pmt/bactworkbook/default.htm.

Bay Area Air Quality Management District (District). 2010. Final Major Facility Review Permit, Valero Refining Co. – California, Facility #B2626. December 20, 2010.

Bay Area Air Quality Management District (District). 1994. Application 12467. S-97 External Floating Roof Tank: TK-1776, storing JP-4 and mogas, 110 thousand barrel capacity. January 21, 1994.

California Air Pollution Control Officers Association (CAPCOA)/California Air Resources Board (CARB). 1999. *California Implementation Guidelines for Estimating Mass Emissions from Fugitive Hydrocarbon Leaks at Petroleum Facilities*. http://www.arb.ca.gov/fugitive/fugitive.htm.

Appendix A
Drawings and Specifications

Attachment A-1 – Process Flow Diagram

Attachment A-2 – Plot Plan

Appendix A contains confidential business information

Appendix B
Emission Calculations

Attachment B-1 – Tank 1776 Baseline Throughput and Emissions

Attachment B-2 – Tank 1776 Post-Project Emissions

Attachment B-3 – Fugitive Component Emissions

Attachment B-4 – Cargo Carrier Emissions

Appendix B, Attachments B-1, B-2, and portions of B-4 contains confidential business information

Attachment B-3
Fugitive Component Emissions

Crude By Rail Project
Fugitive Component Emissions Estimates
2/27/2013

Emission Factors

Component Type	Screening Value (SV)	Correlation Equation	Hourly Emissions	Daily Emissions
	max ppm	kg/hr/comp	lb/hr/comp	lb/day/comp
Pumps	500	5.07E-05(SV)^0.622	5.33E-03	0.12803
Valves	100	2.27E-06(SV)^0.747	1.56E-04	0.00375
Flanges	100	4.53E-06(SV)^0.706	2.58E-04	0.00619
Connectors	100	1.53E-06(SV)^0.736	1.00E-04	0.00240
PSVs/Other	500	8.69E-06(SV)^0.642	1.04E-03	0.02485

Correlation Equation from Table IV-3a (CAPCOA-Revised 1995 EPA Correlation Equations and Factors for Refineries and Marketing Terminals), California Implementation Guidelines for Estimating Mass Emissions from Fugitive Hydrocarbon Leaks at Petroleum Facilities, February 1999.

Screening Value (SV) from BAAQMD Regulation 8, Rule 18 component emission limits

Component Count Estimates

Component Type	Component Count Estimate		
	Total	% Contin	Total (w/Contin)
Pumps	3	0	**3**
Valves	450	15%	**518**
Flanges	2 * valves	2 * valves	**1,036**
Connectors	0.5 * valves	0.5 * valves	**259**
PSVs	0	0%	**0**
Total			**1,816**

Equipment counts per Valero, Feb 2013. Flange count assumes 2.0:1 flange to valve ratio, and 0.5:1 connector to valve ratio. Total component counts for valves includes 15% contingency.

POC and TAC Emissions

Component Type	Total Count	POC Emission Factor (lb/day/comp)	POC Emissions		TAC Emissions				
					Benzene	Ethylbenzene	Hexane (-n)	Toluene	Xylenes (-m)
					0.06%	0.4%	0.4%	1.00%	1.4%
			Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)
Pumps	3	0.12803	0.38	140.2	0.08	0.56	0.56	1.40	1.96
Valves	518	0.00375	1.94	708.3	0.42	2.83	2.83	7.08	9.92
Flanges	1,036	0.00619	6.41	2340.4	1.40	9.36	9.36	23.40	32.77
Connectors	259	0.00240	0.62	226.9	0.14	0.91	0.91	2.27	3.18
PSVs	0	0.02485	0.00	0.0	0.00	0.00	0.00	0.00	0.00
Total	1,816	-	**9.36**	**3415.7**	**2.05**	**13.66**	**13.66**	**34.16**	**47.82**

TAC speciation percentages for crude oil based on EPA TANKS 4.09d default values (same as used for tank emissions).

Emissions Summary (ton/yr)

Component Type	POC	Benzene	Ethylbenzene	Hexane (-n)	Toluene	Xylenes (-m)
Pumps	0.07	0.00	0.00	0.00	0.00	0.00
Valves	0.35	0.00	0.00	0.00	0.00	0.00
Flanges	1.17	0.00	0.00	0.00	0.01	0.02
Connectors	0.11	0.00	0.00	0.00	0.00	0.00
PSVs	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.71	0.00	0.01	0.01	0.02	0.02

Attachment B-4
Cargo Carrier Emissions

Train Criteria Pollutant and GHG Emissions

Marine Vessel Criteria Pollutant and GHG Baseline Emissions

Train
Criteria Pollutant and GHG Emissions

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Summary

Incremental Locomotive Annual Emissions (100 Rail Cars per Day, 25.55 MMbbl Crude Oil per Year)

Type	Annual Emissions (tons/year)						
	CO	ROG	NOx	SOx	PM10	PM2.5	CO_2e
Small Line Haul	0.336	0.178	3.490	0.001	0.081	0.078	149
Large Line Haul	4.224	1.019	21.416	0.015	0.571	0.554	5,058
Switching	1.043	0.501	8.134	0.004	0.180	0.175	387
Total Emissions	**5.602**	**1.698**	**33.04**	**0.020**	**0.832**	**0.807**	**5,593**

Locomotive Emission Factors (100 Rail Cars per Day)

	Emission Factor (lb/kbbl)						
Locomotive Emission Factor	CO	ROG	NOx	SOx	PM10	PM2.5	CO_2e
	0.4385	0.1329	2.5863	0.0016	0.0651	0.0632	437.8

lb/kbbl = pounds per thousand barrels of crude oil delivered

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Input Data

Maximum Daily and Annual Tank Rail Cars and Crude Oil

Project Scenario	Maximum Daily Tank Rail Cars (cars/day)	Maximum Annual Tank Rail Cars (cars/yr)	Maximum Daily Crude (bbl/day)	Maximum Annual Crude (bbl/yr)	Reference
100 railcars per day	100	36,500	70,000	25,550,000	Project Description

Fuel Consumption Index* Calculation (for year 2011)

Railroads Operating in CA	Fuel Consumption (gallons)	Gross-Ton Miles w/ Locomotive (1000 ton-miles)	Gross-Ton Miles w/o Locomotive (1000 ton-miles)	Fuel Consumption Index (gross ton-miles/gal)
BNSF	1,291,164,605	1,200,654,478	101,512,077	851
UP	980,687,454	1,072,705,764	86,678,504	1005
Average	-	-	-	928
Data Source	Form R-1 schedule 750 Line 1	Form R-1 schedule 755 Line 104	Form R-1 schedule 755 Line 98	-

* Based on methodology described in *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources* , EPA420-R-92-009, December 1992

Track Length/Trip Distance Calculation (Miles)

Track Segment	Haul Type	Total Distance (miles)	Distance within BAAQMD (miles)	Reference
Track Length from Roseville Yard to UPRR Mainline Track near Valero Refinery	Large Line Haul	68	22	Google Earth - Roseville Yard to Benecia Refinery
Track Length of Siding Track in Valero Refinery	Small Line Haul	2	2	Google Maps - Tracks 700, 732, 710
R-A-R/Industry Track	Switching	NA	NA	

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Daily Emissions

Year 2014 Daily Locomotive Criteria Pollutant Emissions - 100 Railcars per Day

Parameter	Value	Units	Reference
Maximum Additional Daily Tank Car due to Project	100	Cars/day	Based on Project Description
Maximum Freight Weight	106	short tons/car	TRN Spec Sheet-1
Daily Freight Transported due to Project	10,580	short tons/day	Based on Project Description
Weight of Empty Tank Car	37	short tons/car	TRN Spec Sheet-1
Maximum Total Daily Weight of Empty Tank Cars	3,720	short tons/day	
Maximum Daily Gross Weight Hauled	14,300	short tons/day	Freight Weight + Empty Railcar Weight
Assuming the Facility is Serviced Once daily	1	train/day	
Therefore Daily Number of Railcars per Train	100	Cars/train	
Total Siding Track Length within Valero Facility	2	miles	Google Earth and diagram provided by Valero
Total Mainline Track Length in California	68	miles	Google Earth - UPRR tack from Roseville Yard to Benecia Refinery
Total Mainline Track Length in BAAQMD	22	miles	Google Earth - Portion of UPRR tack from Roseville Yard to Benecia Refinery within BAAQMD
Conversion Factors			
UPRR Fuel Consumption Index (Gross Weight - Locomotive Weight)	1,005	Gross ton-miles/gal	Calculated based on methodology described in Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA420-R-92-009, December 1992
Sulfur Content of Fuel	15	ppmw	California Diesel Fuel Standard
Density of Diesel	3,200	g/gal	Emission Factors for Locomotives, EPA-420-F-09-025, April 2009
Number of Locomotives required for Switching	1	per train	Assumption
Switching Time	2	hr/train	Assumption
Average Train Size	25	cars/train	Project Description
Fuel Consumed during Yard Operation	9.4	gal/hr/locomotive	Revised Inventory Guidance for Locomotive Emissions, Sierra Research, pg 14, footnote 2, June 2004, http://www.metro4-sesarm.org/pubs/railroad/FinalGuidance.pdf
Average Locomotive Power over typical Switch Duty Cycle	177	bhp	Locomotive Emission Standards, Regulatory Support Document, Appendix B, EPA-420-R-98-101, April 1998
Power to Fuel Consumption Conversion Factor	15.2	bhp-hr/gal	Table 3, Emission Factors for Locomotives, EPA-420-F-09-025, April 2009

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Daily Emissions

Year 2014 Locomotive Emission Factors

	Emision Factor (g/gal fuel)[1]						
Operation Type	**CO**	**POC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO_2e[1,2]**
Large Line Haul	26.62	6.42	135	0.096	3.6	3.5	10,314
Switch	27.82	13.37	217	0.096	4.8	4.7	10,314
Small Line Haul	23.30	12.32	242	0.096	5.6	5.4	10,314

1. Emission Factors for Locomotives, EPA-420-F-09-025, April 2009

2. N_2O and CH_4 factors for locomotive from 2012 Climate Registry Default Emission Factors, Released: January 6, 2012. http://www.theclimateregistry.org/downloads/2012/01/2012-Climate-Registry-Default-Emissions-Factors.pdf

Year 2014 Daily Line Haul Emissions (Within BAAQMD)

	Emissions (lb/day)						
Segment	**Operation Type**	**CO**	**ROG**	**NOx**	**SOx**	**PM10**	**PM2.5**
Within Valero Refinery	Small Line Haul	1.84	0.97	19.12	0.01	0.44	0.43
BAAQMD Border to Valero Refinery	Large Line Haul	23.14	5.58	117.35	0.08	3.13	3.04
Total Line Haul Emissions		**24.98**	**6.56**	**136.47**	**0.09**	**3.57**	**3.46**

Year 2014 Daily Switching Emissions

	Emissions (lb/day)						
Segment	**Operation Type**	**CO**	**ROG**	**NOx**	**SOx**	**PM10**	**PM2.5**
From Unloading Rack to Empty Railcar Parking Location (Using Fuel Usage Method)	Switch	4.62	2.22	36.04	0.02	0.80	0.77
From Unloading Rack to Empty Railcar Parking Location (Using Average Power Method)	Switch	5.71	2.75	44.57	0.02	0.99	0.96
Total Switch Emissions		**5.71**	**2.75**	**44.57**	**0.02**	**0.99**	**0.96**

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Annual Emissions

Year 2014 Annual Locomotive Criteria Pollutant Emissions - 100 Railcars per Day

Parameter	Value	Unit	Reference
Additional Annual Tank Car due to Project	36,500	Cars/year	Based on Project Description
Maximum Freight Weight	106	short tons/car	TRN Spec Sheet-1
Annual Freight Transported due to Project	3,861,700	short tons/year	Based on Project Description
Weight of Empty Tank Car	37	short tons/car	TRN Spec Sheet-1
Total Annual Weight of Empty Tank Cars	1,357,800	short tons/year	
Annual Gross Weight Hauled	5,219,500	short tons/year	Freight Weight + Empty Railcar Weight
Assuming the Facility is Serviced Once daily	1	train/day	
Therefore daily Number of Railcars per Train	100	Cars/train	
Total Siding Track Length within Valero Facility	2	miles	Google Earth and diagram provided by Valero
Total Mainline Track Length in California	68	miles	Google Earth - UPRR tack from Roseville Yard to Benecia Refinery
Total Mainline Track Length in BAAQMD	22	miles	Google Earth - Portion of UPRR tack from Roseville Yard to Benecia Refinery within BAAQMD
Conversion Factors			
UPRR Fuel Consumption Index (Gross Weight - Locomotive Weight)	1,005	Gross ton-miles/gal	Calculated based on methodology described in Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA420-R-92-009, December 1992
Sulfur Content of Fuel	15	ppmw	California Diesel Fuel Standard
Density of Diesel	3,200	g/gal	Emission Factors for Locomotives, EPA-420-F-09-025, April 2009
Number of Locomotives required for Switching	1	per train	Assumption
Switching Time	2	hr/train	Assumption
Average Train Size	25	cars/train	Project Description
Fuel Consumed during Yard Operation	9.4	gal/hr/ locomotive	Revised Inventory Guidance for Locomotive Emissions, Sierra Research, pg 14, footnote 2, June 2004, http://www.metro4-sesarm.org/pubs/railroad/FinalGuidance.pdf
Average Locomotive Power over typical Switch Duty Cycle	177	bhp	Locomotive Emission Standards, Regulatory Support Document, Appendix B, EPA-420-R-98-101, April 1998
Power to Fuel Consumption Conversion Factor	15.2	bhp-hr/gal	Table 3, Emission Factors for Locomotives, EPA-420-F-09-025, April 2009

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Annual Emissions

Year 2014 Locomotive Emission Factors

	Emision Factor (g/gal fuel)[1]						
Operation Type	**CO**	**POC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO_2e[1,2]**
Large Line Haul	26.624	6.4233	135	0.096	3.6	3.5	10314
Switch	27.816	13.3731	217	0.096	4.8	4.7	10314
Small Line Haul	23.296	12.3201	242	0.096	5.6	5.4	10314

1. Emission Factors for Locomotives, EPA-420-F-09-025, April 2009
2. N_2O and CH_4 factors for locomotive from 2012 Climate Registry Default Emission Factors, Released: January 6, 2012. http://www.theclimateregistry.org/downloads/2012/01/2012-Climate-Registry-Default-Emissions-Factors.pdf

Year 2014 Annual Line Haul Emissions (Within BAAQMD for Criteria Pollutants and Within California for CO2e)

		Emissions (tons/year)							Fuel Usage
Segment	**Operation Type**	**CO**	**ROG**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO_2e**	**(gal/day)**
Within Valero Refinery	Small Line Haul	0.34	0.18	3.49	0.001	0.081	0.078	149	13,083
BAAQMD Border to Valero Refinery	Large Line Haul	4.22	1.02	21.42	0.015	0.571	0.554	5058	444,834
Total Line Haul Emissions		**4.56**	**1.20**	**24.91**	**0.017**	**0.652**	**0.632**	**5,206**	**457,918**

Year 2014 Annual Switching Emissions

		Emissions (tons/year)							Fuel Usage
Segment	**Operation Type**	**CO**	**ROG**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO_2e**	**(gal/day)**
From Unloading Rack to Empty Railcar Parking Location (Using Fuel Usage Method)	Switch	0.843	0.405	6.577	0.003	0.145	0.141	313	75
From Unloading Rack to Empty Railcar Parking Location (Using Average Power Method)	Switch	1.043	0.501	8.134	0.004	0.180	0.175	387	93
Total Switch Emissions		**1.043**	**0.501**	**8.134**	**0.004**	**0.180**	**0.175**	**387**	**93**

Marine Vessel
Criteria Pollutant and GHG
Baseline Emissions

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Total Emissions Over 3-Year Baseline Period

Sources	Total Emissions Over Baseline Period (lb)									
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
OGV - Main Engine	218,239	18,710	14,480	5,221	4,809	29,772	1,299	9,213,764	469	9,386,595
OGV - Auxiliary Engine	292,408	26,445	12,501	9,136	8,414	50,486	2,164	16,588,373	697	16,849,940
OGV - Auxiliary Boiler	74,692	7,568	4,162	7,568	7,378	115,501	1,135	36,702,931	2,845	37,608,850
Tugboats	85,823	25,437	6,739	4,248	4,248	62	112	5,485,412	247	5,564,409
Total	**671,162**	**78,161**	**37,882**	**26,172**	**24,849**	**195,822**	**4,710**	**67,990,480**	**4,259**	**69,409,794**
Emission Factor (lb/kbbl)	**7.19**	**0.84**	**0.41**	**0.28**	**0.27**	**2.10**	**0.05**	**728**	**0.05**	**743**

Total crude delivered by marine vessel during 3-year baseline period: 93,361,985 barrels

Annual Average Emissions Over Baseline Period

Sources	Annual Average Emissions Over Baseline Period (tons/year)									
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
OGV - Main Engine	36	3	2	1	1	5	0	1,536	0	1,564
OGV - Auxiliary Engine	49	4	2	2	1	8	0	2,765	0	2,808
OGV - Auxiliary Boiler	12	1	1	1	1	19	0	6,117	0	6,268
Tugboats	14	4	1	1	1	0	0	914	0	927
Total	**112**	**13**	**6**	**4**	**4**	**33**	**1**	**11,332**	**1**	**11,568**

Average Emissions per Visit Over Baseline Period

Sources	Average Emissions Over Baseline Period (lb/visit)									
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
OGV - Main Engine	827	71	55	20	18	113	5	34,901	2	35,555
OGV - Auxiliary Engine	1,108	100	47	35	32	191	8	62,835	3	63,826
OGV - Auxiliary Boiler	283	29	16	29	28	438	4	139,026	11	142,458
Tugboats	325	96	26	16	16	0.2	0	20,778	1	21,077
OGV - Total	2,217	200	118	83	78	742	17	236,762	15	241,839

Projected Emissions Offset by Proposed Crude By Rail Project

	Emissions Offset by 25.55 MMbbls/year of Crude by Rail									
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
Emissions (tpy)	91.8	10.7	5.2	3.6	3.4	26.8	0.6	9,303	0.6	9,498

Note: - Greenhouse gases (GHGs) are calculated as carbon dioxide equivalent (CO_2e) = CO_2 + 21*CH_4 + 310*N_2O

21 is the Global Warming Potential of CH_4

310 is the Global Warming Potential of N_2O

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Default or Average Tanker Ship Specifications

Ship/Tanker Type	Crude Capacity (barrels)	DWT	Average Aux Engine Rating of ships visiting the Valero Wharf (kW)	Average Max Speed of ships visiting the Valero Wharf (kW)
Handymax		0 to 49,999	2328	14.5
Panamax	500,000	50,000 to 79,999	2616	14.9
Aframax	750,000	80,000 to 119,999	2492	15.0
Suezmax	1,000,000	120,000 to 199,999	3277	15.6
VLCC	2,000,000	200,000 to 299,999	4,502	15.3
ULCC	4,000,000	300,000+	4,502	15.6

VLCC - VERY LARGE CRUDE CARRIER
ULCC - ULTRA LARGE CRUDE CARRIER

Crude Tanker Specific Cargo Capacity Estimate

Description	DWT[1]	Cargo tank capacity (m^3)[1]	Cargo capacity per DWT (m3/DWT)	Specific Cargo Capacity (bbl/DWT)
Suezmax Oil Tanker	166,300	185,447	1.1151	7.01
Oil Tanker	108,000	126,211	1.1686	7.35
Oil Tanker	114,000	126,210	1.1071	6.96
Oil Tanker	70,700	80,400	1.1372	7.15
Oil Tanker	52,600	58,691	1.1158	7.02
Oil Tanker	45,999	53,100	1.1544	7.26
Chemicals and Oil Products Tanker	46,764	52,969	1.1327	7.12
Oil and Chemical Tanker	47,400	53,100	1.1203	7.05
Alaskan class tankers	193,048	210,902	1.0925	6.87
Average				**7.09**

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

conversion factor:	264.172	gal/m3
conversion factor:	42	gal/bbl

Notes:
1. DWT and cargo tank capacity for oil tankers were obtained from the following websites~
http://www.hb.hr/LinkClick.aspx?fileticket=RetQFnntemc%3D&tabid=74
http://www.nassco.com/products-and-services/comm-dc/bp-tanker-fa
http://www.marinetraffic.com/ais/shipdetails.aspx?MMSI=303656000
2. Emissions from slow cruise and maneuvering mode are apportioned by the ratio of crude delivered for Valero to the total cargo capacity of the oil tanker. It was assumed that the oil
3. Maximum cargo capacity = Average specific cargo capacity x DWT

Default Discharge Rate

DWT	Average Discharge Rate (bbl/hr)
0 -109,999	22707
110,000 - 169,999	22707
170,000 -	22707

POLB Air Emissions Inventory for 2011 -Tanker Specifications

Size	Average Model Year	Avg Age (2011 - Model year)	AVG DWT	Max Speed (knots)	Main Eng Rating (kW)	Aux Eng Rating (kW)
Handysize	2004	7	46,314	14.6	8,257	2,328
Panamax	2004	7	70,912	14.8	11,060	2,627
Aframax	2005	6	109,227	15.1	13,319	2,432
Suezmax	2005	6	178,271	15.3	18,587	5,056
VLCC	2003	8	298,571	15.3	25,288	4,502
ULCC	2004	7	311,294	15.6	28,625	4,502

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Main Engine Emission Factors

Fuel Switching Regulation

Phase	Effective Date	% Sulfur Content for OGV		Comment
		MGO	MDO	
1	7/1/2009	1.5%	0.5%	No HFO to be used
	8/1/2012	1.0%	0.5%	
2	1/1/2014	0.1%	0.1%	

All main engines on oil tankers are slow speed, category 3 engines with displacement > 30 dm3 and power rating b/w 2,500 kw and 70,000 kW

Main Engine Emission Standards

Tier	For US Flagged Vessels (USEPA Standard for Category 3 Engines)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
1	2004	17	$45 \cdot n^{-0.2}$	9.8
2	2011	14.4	$44 \cdot n^{-0.23}$	7.7
3	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Tier	For Foreign Flagged Vessels (MARPOL Annex VI - not based on category)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
I	2000	17	$45 \cdot n^{-0.2}$	9.8
II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
III	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Tier	For All Flagged Vessels (Combination of USEPA and MARPOL)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0	≤1999			
1	2000 - 2010	17	$45 \cdot n^{-0.2}$	9.8
2	2011 - 2015	14.4	$44 \cdot n^{-0.23}$	7.7
3	2016 -	3.4	$9 \cdot n^{-0.2}$	1.96

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Main Engine Emission Factors

Main Engine Emission Factor (g/kW-hr)															
Engine Speed	**RPM**	**Tier**	**Ship Built Year From**	**Ship Built Year To**	**Fuel**	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
Slow	<130	0	0	1999	0.5%S MDO	18.1	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	I	2000	2010	0.5%S MDO	17	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	II	2011	2015	0.5%S MDO	14.4	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	0	0	1999	0.1%S MDO	18.1	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	I	2000	2010	0.1%S MDO	17	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	II	2011	2015	0.1%S MDO	14.4	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	III	2016	9999	0.1%S MDO	3.4	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598

All emission factors, except Tier-based NOx and N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Tables II-6 and II-7
Tier-based Nox emission factors are from on MARPOL Annex IV regulations
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.6) x Fuel Correction Factor
(POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Low Load Adjustment Multipliers (Used when Load factor < 20%)

Load Factor (%)	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**
2	4.63	9.7	21.18	7.29	7.29	1	21.18	1	4.63
3	2.92	6.49	11.68	4.33	4.33	1	11.68	1	2.92
4	2.21	4.86	7.71	3.09	3.09	1	7.71	1	2.21
5	1.83	3.9	5.61	2.44	2.44	1	5.61	1	1.83
6	1.6	3.26	4.35	2.04	2.04	1	4.35	1	1.6
7	1.45	2.8	3.52	1.79	1.79	1	3.52	1	1.45
8	1.35	2.45	2.95	1.61	1.61	1	2.95	1	1.35
9	1.27	2.18	2.52	1.48	1.48	1	2.52	1	1.27
10	1.22	1.97	2.18	1.38	1.38	1	2.18	1	1.22
11	1.17	1.79	1.96	1.3	1.3	1	1.96	1	1.17
12	1.14	1.64	1.76	1.24	1.24	1	1.76	1	1.14
13	1.11	1.52	1.6	1.19	1.19	1	1.6	1	1.11
14	1.08	1.41	1.47	1.15	1.15	1	1.47	1	1.08
15	1.06	1.32	1.36	1.11	1.11	1	1.36	1	1.06
16	1.05	1.24	1.26	1.08	1.08	1	1.26	1	1.05
17	1.03	1.17	1.18	1.06	1.06	1	1.18	1	1.03
18	1.02	1.11	1.11	1.04	1.04	1	1.11	1	1.02
19	1.01	1.05	1.05	1.02	1.02	1	1.05	1	1.01
20	1	1	1	1	1	1	1	1	1

POLB 2011 Emisisons Inventory, Section 2, Table 2.9

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Auxiliary Engine Emission Factors

Fuel Switching Regulation

Phase	Effective Date	% Sulfur Content for OGV		Comment
		MGO	MDO	
1	7/1/2009	1.5%	0.5%	No HFO to be used
	8/1/2012	1.0%	0.5%	
2	1/1/2014	0.1%	0.1%	

All auxiliary engines are assumed to be medium speed engines

According to USEPA's "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, April 2009", Table 2-2 - Auxiliary engines in OGVs are Category 2 engines

Auxiliary Engine Emission Standards

Tier	For Foreign Flagged Vessels (MARPOL Annex VI - not based on category)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
I	2000	17	$45 \cdot n^{-0.2}$	9.8
II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
III	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Auxiliary Engine Emission Factors

USEPA Category 2 engine Standards

Tier	Effective Date	Displacement (L/cylinder)	Power (kW)	Speed (rpm)	Nox (g/kW-hr)	HC + Nox (g/kW-hr)	PM (g/kW-hr)
1	2004	≥ 2.5	≥ 37	rpm < 130	17	-	-
				130 ≤ rpm < 2,000	$45 \cdot n^{-0.2}$	-	-
				rpm ≥ 2,000	9.8	-	-
2	2007	5.0 ≤ Disp < 15	all	-	-	7.8	0.27
		15.0 ≤ Disp < 20	< 3,300	-	-	8.7	0.50
		15.0 ≤ Disp < 20	≥ 3,300	-	-	9.8	0.50
		20.0 ≤ Disp < 25	all	-	-	9.8	0.50
		25.0 ≤ Disp < 30	all	-	-	11.0	0.50
3	2013+	7.0 ≤ Disp < 15	< 2,000	-	-	6.2	0.14
			2,000 ≤ kW < 3,700	-	-	7.8	0.14
	2014+	15.0 ≤ Disp < 20	< 2,000	-	-	7	0.34
		20.0 ≤ Disp < 25	< 2,000	-	-	9.8	0.27
		25.0 ≤ Disp < 30	< 2,000	-	-	11.0	0.27
4	2017+	All	600 ≤ kW < 1,400	-	1.8	0.19 HC only	0.04
	2016+	All	1400 ≤ kW < 2,000	-	1.8	0.19 HC only	0.04
	2014+	All	2,000 ≤ kW < 3,700	-	1.8	0.19 HC only	0.04
	2014-2015	< 15.0	≥ 3,700	-	1.8	0.19 HC only	0.12
	2014-2015	15.0 ≤ Disp < 30		-	1.8	0.19 HC only	0.25
	2016+	All		-	1.8	0.19 HC only	0.06

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Auxiliary Engine Emission Factors

Auxiliary Engine Emission Factors for Foreign Flagged Ships (g/kW-hr)															
Engine Speed	**RPM**	**Tier**	**Ship Built Year From**	**Ship Built Year To**	**Fuel**	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
Medium	130 - 2000	0	0	1999	0.5%S MDO	13.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2010	0.5%S MDO	12.2	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	II	2011	2015	0.5%S MDO	9.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	0	0	1999	0.1%S MDO	13.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2010	0.1%S MDO	12.2	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	II	2011	2015	0.1%S MDO	9.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	III	2016	9999	0.1%S MDO	2.6	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701

Engine Category 2
speed (rpm) 500

All emission factors, except Tier-based NOx and N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-8
Tier-based Nox emission factors are from MARPOL Annex IV regulations. Tier 0, I, and II factors are multiplied by fuel correction factor. Tier III emission factors were not multiplied by fuel correction factors as HFO will not be availale and used in 2016 and thre after.
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.11) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Auxiliary Engine Emission Factors for US Flagged Ships (g/kW-hr)															
Engine Speed	**RPM**	**Tier**	**Ship Built Year From**	**Ship Built Year To**	**Fuel**	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
Medium	130 - 2000	0	0	1999	0.5%S MDO	13.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2006	0.5%S MDO	12.2	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	II	2007	2013	0.5%S MDO	8.4	1.1	0.47	0.11	0.11	2.1	0.09	690	0.029	701
Medium	130 - 2000	0	0	1999	0.1%S MDO	13.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2006	0.1%S MDO	12.2	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	II	2007	2013	0.1%S MDO	8.4	1.1	0.47	0.08	0.08	0.4	0.09	690	0.029	701

Engine Category	2
Displacement (dm3/cyl)	5 ≤ Disp < 30
speed (rpm)	500

All emission factors, except Tier-based NOx and N2O and Tier II ROG and PM, are from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-8
Tier-based NOx and Tier II ROG and PM emission factors are from USEPA commercial marine engine regulations for Category 2 engines. The USEPA Tier II emission standards are based on engine displacement and as the engine displacement is not available, the emission factors are assumed to be an average of emission standards for all displacement categories under Category 2 engines. Tier II NOx and ROG emission factors assumed a 95% to 5% split for the combined NOx+HC standard. Tier 0, I and II NOx factors and Tier II ROG and PM factors are multiplied by fuel correction factor.
Tier II PM 2.5 emissions factors assumed equal to Tier II PM10 factors
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Tables 2.5 and 2.6) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Fuel Correction factor

Actual fuel	**S Content**	**PM**	**NOx**	**SOx**	**CO**	**HC**	**CO2**	**N2O**	**CH4**
HFO	1.50%	0.82	1	0.555	1	1	1	1	1
MDO	1.50%	0.47	0.94	0.555	1	1	1	0.94	1
MGO	0.50%	0.25	0.94	0.185	1	1	1	0.94	1
MGO	0.30%	0.21	0.94	0.111	1	1	1	0.94	1
MGO	0.20%	0.19	0.94	0.074	1	1	1	0.94	1
MGO	0.10%	0.17	0.94	0.037	1	1	1	0.94	1

POLB 2011 Emisisons Inventory, Section 2, Tables 2.17

Auxiliary Boiler Emissions Factors

Auxiliary Boiler Emission Factors (g/kW-hr)										
Fuel	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
2.7% S HFO	2.1	0.2	0.11	0.8	0.78	16.5	0.03	970	0.08	995
0.5%S MDO	1.97	0.20	0.11	0.20	0.195	3.05	0.03	970.00	0.08	993.9
0.1%S MDO	1.97	0.20	0.11	0.136	0.1326	0.61	0.03	970.00	0.08	993.9

All emission factors, except N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-9

N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.15) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Auxiliary Boiler Emission Factors (kg/tonne)										
Fuel	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
2.7% S HFO	6.89	0.66	0.36	2.62	2.56	54.10	0.10	3180	0.26	3264
0.5%S MDO	6.47	0.66	0.36	0.66	0.64	10.0	0.10	3180	0.25	3259
0.1%S MDO	6.47	0.66	0.36	0.45	0.43	2.00	0.10	3180	0.25	3259

Fuel Correction factor

Actual fuel	S Content	NOx	CO	HC	PM10	PM2.5	SOx	CH4	CO2	N2O
HFO	1.50%	1	1	1	0.82	0.82	0.555	1	1	1
MDO	1.50%	0.94	1	1	0.47	0.47	0.555	1	1	0.94
MGO	0.50%	0.94	1	1	0.25	0.25	0.185	1	1	0.94
MGO	0.30%	0.94	1	1	0.21	0.21	0.111	1	1	0.94
MGO	0.20%	0.94	1	1	0.19	0.19	0.074	1	1	0.94
MGO	0.10%	0.94	1	1	0.17	0.17	0.037	1	1	0.94

POLB 2011 Emisisons Inventory, Section 2, Tables 2.17

Auxiliary Boiler Emissions Factors

Fuel Consumption Rates (ARB OGV 2011 Appendix D, Table II-10)

Engine	Engine Speed	Mode	Fuel	Fuel Use Rate (g of fuel/kW-hr)
Auxiliary Engine	All	All	Marine Distillate	217
	All	All	HFO	227
Boiler	NA	All	HFO	305
Main	Slow	Transit	Marine Distillate	185
	Slow	Transit	HFO	195
	Medium	Transit	Marine Distillate	203
	Medium	Transit	HFO	213
	High	Transit	HFO	213
	Slow	Maneuvering	Marine Distillate	185
	Slow	Maneuvering	HFO	195
	Medium	Maneuvering	Marine Distillate	203
	Medium	Maneuvering	HFO	213
	High	Maneuvering	HFO	213

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

OGV and Tugboat Operation in SF Bay Area and Port of Benicia

Speed Requirements per SF Bar Pilot - Steve Teague

Segment	Speed	Distance	Time	Tug assist	
	knots	nm	hrs	Loaded (incoming)	Ballasted (outgoing)
Sea buoy - Mile rock (1 mi west of GG Bridge)	12	10	0.83		
Mile rock (1 mi west of GG Bridge) - SPB Light #5	10	19	1.90	Tug 1	
SPB light #5 - SPB light #15	10	7	0.70		
SPB light #15 - Buoy 25	8	4.5	0.56		
Buoy 25 - Berth	5	2.5	0.50	Additional Tugs	Tugs
Berth - Sea Buoy (out)	12	43	3.58		
Total Round Trip		86	8.08		

Tug Operations and Typical Specs per Capt. Shawn Bennett at Bay Delta Maritime

Segment	Tug Requirement	Incoming - Loaded	Outgoing - Ballasted
Mile rock (1 mi west of GG Bridge) - Near Berth (assumed Buoy 25)	1 Tug	3.2	0.5
Near Berth (assumed Buoy 25) - Berth	Tug 1 and Additional Tugs as required per ship DWT	0.5	0.5

Tug Fleet Main Engine Operating in Bay Area	5000 HP
Tug Fleet Aux Engine Operating in Bay Area	150 HP
Tug Fleet Avg Age	10 years

Conclusion - typical tugboats are Class A

Bay Delta Maritime tugs are docked at SF Pier 17 and Valero dock in Port of Benicia

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Ocean Going Vessels Activity Data

	Mode of Operation					
	Slow Cruise -1	**Slow Cruise - 2**	**Slow Cruise/ Maneuvering**	**Maneuvering/Mooring/Unmooring**	**Hotelling w/o Discharge**	**Hotelling /w Discharge**
Segment Name	Pilot Sea Buoy[1] - GG Bridge and Berth - Pilot Sea Buoy	GG Bridge - San Pablo Bay Light #15	San Pablo Bay Light #15 - Sea Buoy 25	Sea Buoy 25 - Berth	At Berth	At Berth
Speed (knots)	12	10	8	5	---	---
Round-trip distance (nm)	53.0	26.0	4.5	2.5	---	---
Round-Trip Time (hrs)	4.42	2.60	0.56	0.50	6	Crude delivered/ Discharge Rate
Main Engine Load Factor	(12/Max Speed)^3	(10/Max Speed)^3	(8/Max Speed)^3	2%	0%	0%
Auxiliary Engine Load Factor	24%	24%	33%	33%	26%	26%
Auxiliary Boiler Load Factor	0%	0%	12%	12%	100%	100%
Reference	Port of Richmond, 2005 Seaport Air Emissions Inventory, Table, 2-6		Distance measured using Google Earth from Valero Wharf	POLB, CARB, Port of Richmond Emissions Inventory	Assumed 3 hours before and after unloading the crude	

1. Per Alison Kirk of BAAQMD, emissions must be estimated from the point the pilot boards the ship at Sea Buoy

Ocean Going Vessels Activity Data

Operating Modes of Emission Sources			
Source	**Operating Mode**		
	Transit	**Maneuvering**	**Hotelling**
Main Engine	x	x	Not Used
Auxiliary Engine	x	x	x
Auxiliary Boiler	Operate if main Engine LF < 20%	x	x

Emission reduction technology control efficiency (Only for main engine)
2004 and newer main engines assumed to be equipped with fuel slide valves

	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
Control Efficiency	30%	0%	0%	25%	25%	0%	0%	0%	0%	0%

POLB 2011 Emissions Inventory

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Baseline Ocean Going Vessels Emissions

1. IMO # obtained by searching ship name on www.marinetraffic.com
2. DWT obtained by searching IMO # in POLB Air Emissions Inventory OGV Appendices or in www.marinetraffic.com
3. MY obtained by searching IMO # in POLB Air Emissions Inventorys' OGV Appendices or in www.marinetraffic.com
4. Ship Category based on IMO classification by DWT
5. Assumed number of main engines by ship category

Ship Category	Number of Main Engines
Handymax	1
Panamax	1
Aframax	1
Suezmax	2
VLCCS	2
ULCCS	2

6. Main engines power obtained by searching IMO # in POLB Air Emissions Inventorys' OGV Appendices for various years and if not available then estimated using the regression analysis equation provided in EPA "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data" (EPA420-R-00-002, February 2000), Table 4-5.

Horsepower = 9070 + 0.101*DWT

kW = 0.746*(9070 + 0.101 * DWT)

7. Average number of Auxiliary engines on tankers = 2.7, per California ARB 2005 Oceangoing Ship Survey Summary Of Results, Appendix C, Table 9
8. Auxiliary engine rating for ships for which data was not available is equal to the average of auxiliary engine rating for similar category (DWT) of ships that visited the valero Wharf during the baseline period or the average auxiliary engine rating for similar category of ships provided in POLB 2011 Emissions Inventory, Appendix A, Table A.3
9. Auxiliary Boiler rating for ships for which data was not available was assumed equal to the average of auxiliary boiler rating for similar category (DWT) of ships provided in POLB 2011 Emissions Inventory, Section 2, Table 2.16

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Tugboat Specifications and Assumptions

Tug requirements - Sec C.3, Benicia Port Information and Terminal Regulations Manual

Vessel Size	SIZE	MOORING*	MOORING*	UNMOORING*	UNMOORING*
DWT		Class A	Class B	Class A	Class B
0	30,000	0	2	0	2
30,000	65,000	1	1	1	1
65,000	130,000	2	1	2	0
130,000	195,000	4	0	3	0
195,000	999,999	4	0	3	1

http://portal.harleymarine.com/vessels/sms/Shared%20Documents/SF%20Bay%20Area%20Terminal%20Guidlines/Valero%20Benicia,%20Ca/Valero%20Benicia%20Terminal%20Manual%20(Final%20July%2027%202012)%2

Main Engine Assumptions

Tug Class	Average Power per Engine[1]	Number of Main Engines	Assumed Model Year	Useful Life[2]	Emission Factor x FCF (g/HP-hr)									Assumed Date of MY
	HP				NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O	
A	2172	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
B	1563	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
C	1388	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
D	754	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001

1 - Revised PORT OF OAKLAND 2005 SEAPORT AIR EMISSIONS INVENTORY, Table 3-6
2 - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 4

Aux Engine Assumptions

Tug Class	Average Power per Engine[1]	Number of Aux Engines	Assumed Model Year	Useful Life[2]	Emission Factor x FCF (g/HP-hr)									Assumed Date of MY
	HP				NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O	
A	128	2	2001	23	6.93	2.78	0.58	0.26	0.26	0.01	0.01	486.39	0.02	7/1/2001
B	110	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001
C	92	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001
D	110	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001

1 - Revised PORT OF OAKLAND 2005 SEAPORT AIR EMISSIONS INVENTORY, Table 3-6
2 - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 4

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Fuel Correction factor for ULSD

Engine Power (HP)		MY		NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
0	24	0	1994	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
25	50	0	1998	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
51	100	0	1997	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
101	175	0	1996	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
176	5000	0	1995	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
0	24	1995	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
25	50	1999	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
51	100	1998	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
101	175	1997	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
176	5000	1996	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
0	5000	2011	9999	0.948	1	0.72	0.852	0.852	1	0.72	1	0.948

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California and POLB 2011 Air Emissions Inventory

Deterioration Factor

HP Range		NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
25	50	0.06	0.41	0.51	0.31	0.31	0	0	0	0
51	250	0.14	0.16	0.28	0.44	0.44	0	0	0	0
251	5000	0.21	0.25	0.44	0.67	0.67	0	0	0	0

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California

Operation Mode	Tug in-Transit	Tug Assist/Mooring/ Unmooring
Load Factor	**Tug Base - Vessel**	**Vessel - Vessel Berth**
Main	0.5	0.31
Auxiliary	0.43	0.43

Ref - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 2

Tug Mooring/Unmooring Activity rate	Tug in-Transit[1]	Tug Mooring/ Unmooring[2]
(hrs/one-way trip)	**Tug Base - Vessel (in/out)**	**Vessel - Vessel Berth**
Main	0.5	0.5
Auxiliary	0.5	0.5

1. Assumption
2. Assumed equal to time for maneuvering mode

Tug Assisting Activity rate	Tug in-Transit[1]	Tug Assist[2]
(hrs/one-way trip)	**Tug Base - Vessel**	**Vessel - Vessel Berth**
Main	2	3.2
Auxiliary	2	3.2

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

1. Assumption
2. Based on conversation with SF Bar Pilot

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Main	0	1997	25	50	8.14	3.65	1.84	0.72	0.72	0.006	0.0368	486	0.023
Main	1998	1999	25	50	8.14	3.65	1.8	0.72	0.72	0.006	0.036	486	0.023
Main	2000	2004	25	50	7.31	3.65	1.8	0.72	0.72	0.006	0.036	486	0.023
Main	2005	2008	25	50	5.32	3.73	1.8	0.3	0.3	0.006	0.036	486	0.023
Main	2009	2020	25	50	5.32	3.73	1.8	0.22	0.22	0.006	0.036	486	0.023
Main	0	1996	51	120	15.34	3.5	1.44	0.8	0.8	0.006	0.0288	486	0.023
Main	1997	1999	51	120	10.33	2.55	0.99	0.66	0.66	0.006	0.0198	486	0.023
Main	2000	2004	51	120	7.31	2.55	0.99	0.66	0.66	0.006	0.0198	486	0.023
Main	2005	2008	51	120	5.32	3.73	0.99	0.3	0.3	0.006	0.0198	486	0.023
Main	2009	2020	51	120	5.32	3.73	0.99	0.22	0.22	0.006	0.0198	486	0.023
Main	0	1970	121	175	16.52	3.21	1.32	0.73	0.73	0.006	0.0264	486	0.023
Main	1971	1978	121	175	15.34	3.21	1.1	0.63	0.63	0.006	0.022	486	0.023
Main	1979	1983	121	175	14.16	3.21	1	0.52	0.52	0.006	0.02	486	0.023
Main	1984	1986	121	175	12.98	3.14	0.94	0.52	0.52	0.006	0.0188	486	0.023
Main	1987	1995	121	175	12.98	3.07	0.88	0.52	0.52	0.006	0.0176	486	0.023
Main	1996	1999	121	175	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	121	175	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2012	121	175	5.1	3.73	0.68	0.22	0.22	0.006	0.0136	486	0.023
Main	2013	2020	121	175	3.8	3.73	0.68	0.09	0.09	0.006	0.0136	486	0.023
Main	0	1970	176	250	16.52	3.21	1.32	0.73	0.73	0.006	0.0264	486	0.023
Main	1971	1978	176	250	15.34	3.21	1.1	0.63	0.63	0.006	0.022	486	0.023
Main	1979	1983	176	250	14.16	3.21	1	0.52	0.52	0.006	0.02	486	0.023
Main	1984	1986	176	250	12.98	3.14	0.94	0.52	0.52	0.006	0.0188	486	0.023
Main	1987	1994	176	250	12.98	3.07	0.88	0.52	0.52	0.006	0.0176	486	0.023
Main	1995	1999	176	250	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	176	250	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2013	176	250	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2014	2020	176	250	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	251	500	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	251	500	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	251	500	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	251	500	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1994	251	500	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1995	1999	251	500	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	251	500	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2013	251	500	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2014	2020	251	500	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	501	750	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	501	750	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	501	750	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	501	750	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1994	501	750	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1995	1999	501	750	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	501	750	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2012	501	750	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2013	2020	501	750	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	751	1900	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Main	1971	1978	751	1900	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	751	1900	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	751	1900	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	751	1900	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	751	1900	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	751	1900	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2011	751	1900	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2012	2016	751	1900	4.09	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	2017	2020	751	1900	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Main	0	1970	1901	3300	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	1901	3300	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	1901	3300	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	1901	3300	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	1901	3300	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	1901	3300	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	1901	3300	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2012	1901	3300	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2013	2015	1901	3300	4.37	3.73	0.68	0.1	0.1	0.006	0.0136	486	0.023
Main	2016	2020	1901	3300	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Main	0	1970	3301	5000	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	3301	5000	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	3301	5000	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	3301	5000	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	3301	5000	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	3301	5000	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	3301	5000	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2013	3301	5000	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2014	2015	3301	5000	4.94	3.73	0.68	0.25	0.25	0.006	0.0136	486	0.023
Main	2016	2020	3301	5000	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Auxiliary	0	1997	25	50	6.9	5.15	2.19	0.64	0.64	0.006	0.0438	486	0.023
Auxiliary	1998	1999	25	50	6.9	5.15	2.14	0.64	0.64	0.006	0.0428	486	0.023
Auxiliary	2000	2004	25	50	6.9	5.15	2.14	0.64	0.64	0.006	0.0428	486	0.023
Auxiliary	2005	2008	25	50	5.32	3.73	2.14	0.3	0.3	0.006	0.0428	486	0.023
Auxiliary	2009	2020	25	50	5.32	3.73	2.14	0.22	0.22	0.006	0.0428	486	0.023
Auxiliary	0	1996	51	120	13	4.94	1.71	0.71	0.71	0.006	0.0342	486	0.023
Auxiliary	1997	1999	51	120	8.75	3.59	1.18	0.58	0.58	0.006	0.0236	486	0.023
Auxiliary	2000	2004	51	120	7.31	3.59	1.18	0.58	0.58	0.006	0.0236	486	0.023
Auxiliary	2005	2008	51	120	5.32	3.73	1.18	0.3	0.3	0.006	0.0236	486	0.023
Auxiliary	2009	2020	51	120	5.32	3.73	1.18	0.22	0.22	0.006	0.0236	486	0.023
Auxiliary	0	1970	121	175	14	4.53	1.57	0.65	0.65	0.006	0.0314	486	0.023
Auxiliary	1971	1978	121	175	13	4.53	1.31	0.55	0.55	0.006	0.0262	486	0.023
Auxiliary	1979	1983	121	175	12	4.53	1.19	0.46	0.46	0.006	0.0238	486	0.023
Auxiliary	1984	1986	121	175	11	4.43	1.12	0.46	0.46	0.006	0.0224	486	0.023
Auxiliary	1987	1995	121	175	11	4.33	1.05	0.46	0.46	0.006	0.021	486	0.023
Auxiliary	1996	1999	121	175	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	121	175	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2012	121	175	5.1	3.73	0.81	0.22	0.22	0.006	0.0162	486	0.023
Auxiliary	2013	2020	121	175	3.8	3.73	0.81	0.09	0.09	0.006	0.0162	486	0.023
Auxiliary	0	1970	176	250	14	4.53	1.57	0.65	0.65	0.006	0.0314	486	0.023
Auxiliary	1971	1978	176	250	13	4.53	1.31	0.55	0.55	0.006	0.0262	486	0.023
Auxiliary	1979	1983	176	250	12	4.53	1.19	0.46	0.46	0.006	0.0238	486	0.023
Auxiliary	1984	1986	176	250	11	4.43	1.12	0.46	0.46	0.006	0.0224	486	0.023
Auxiliary	1987	1994	176	250	11	4.33	1.05	0.46	0.46	0.006	0.021	486	0.023
Auxiliary	1995	1999	176	250	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	176	250	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2013	176	250	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2014	2020	176	250	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	0	1970	251	500	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	251	500	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	251	500	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	251	500	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1994	251	500	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1995	1999	251	500	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	251	500	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2013	251	500	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2014	2020	251	500	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	0	1970	501	750	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	501	750	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	501	750	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	501	750	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1994	501	750	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1995	1999	501	750	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	501	750	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2012	501	750	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2013	2020	501	750	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Auxiliary	0	1970	751	1900	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	751	1900	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	751	1900	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	751	1900	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	751	1900	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	751	1900	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	751	1900	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2011	751	1900	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2012	2016	751	1900	4.09	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	2017	2020	751	1900	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Auxiliary	0	1970	1901	3300	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	1901	3300	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	1901	3300	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	1901	3300	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	1901	3300	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	1901	3300	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	1901	3300	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2012	1901	3300	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2013	2015	1901	3300	4.37	3.73	0.81	0.1	0.1	0.006	0.0162	486	0.023
Auxiliary	2016	2020	1901	3300	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Auxiliary	0	1970	3301	5000	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	3301	5000	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	3301	5000	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	3301	5000	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	3301	5000	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	3301	5000	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	3301	5000	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2013	3301	5000	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2014	2015	3301	5000	4.94	3.75	0.81	0.25	0.25	0.006	0.0162	486	0.023
Auxiliary	2016	2020	3301	5000	1.3	3.75	0.18	0.03	0.03	0.006	0.0036	486	0.023

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California

Appendix C
District ATC Application Forms

Form P-101B

Form T

Form HRSA

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

1. Application Information

BAAQMD Plant No. B2626 Company Name Valero Refining Co. - California

Equipment/Project Description Crude By Rail Project

2. Plant Information

If you have not previously been assigned a Plant Number by the District or if you want to update any plant data that you have previously supplied to the District, please complete this section.

Equipment Location 3400 East Second Street

City Benicia Zip Code 94510

Mail Address 3400 East Second Street

City Benicia State CA Zip Code 94510

Plant Contact Donald Cuffel Title Manager - Environmental Engineering

Telephone (707) 745 - 7545 Fax ( ) Email don.cuffel@valero.com

NAICS (North American Industry Classification System) see www.census.gov/epcd/naics02/naico602.htm 324110

3. Proximity to a School (K-12)

The sources in this permit application (*check one*) ☐ Are ☒ Are not within 1,000 ft of the outer boundary of the nearest school.

4. Application Contact Information

All correspondence from the District regarding this application will be sent to the plant contact unless you wish to designate a different contact for this application.

Application Contact Susan Gustofson Title Staff Environmental Engineer

Mail Address 3400 East Second Street

City Benicia State CA Zip Code XXXX

Telephone (707) 745 - 7011 Fax ( ) Email susan.gustofson@valero.com

5. Additional Information

The following additional information is required for all permit applications and should be included with your submittal. Failure to provide this information may delay the review of your application. Please indicate that each item has been addressed by checking the box. Contact the Engineering Division if you need assistance.

- ☐ If a new Plant, a local street map showing the location of your business
- ☒ A facility map, drawn roughly to scale, that locates the equipment and its emission points
- ☒ Completed data form(s) and a pollutant flow diagram for each piece of equipment. (See www.baaqmd.gov/Forms/Engineering.aspx)
- ☒ Project/equipment description, manufacturer's data
- ☒ Discussion and/or calculations of the emissions of air pollutants from the equipment

6. Trade Secrets

Under the California Public Records Act, all information in your permit application will be considered a matter of public record and may be disclosed to a third party. If you wish to keep certain items separate as specified in Regulation 2, Rule 1, Section 202.7, please complete the following steps.

- ☐ Each page containing trade secret information must be labeled "trade secret" with the trade secret information clearly marked.
- ☐ A second copy, with trade secret information blanked out, marked "public copy" must be provided.
- ☐ For each item asserted to be trade secret, you must provide a statement which provides the basis for your claim.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

7. Small Business Certification *You are entitled to a reduced permit fee if you qualify as a small business as defined in Regulation 3. In order to qualify, you must certify that your business meets all of the following criteria:*

- ☐ The business does not employ more than 10 persons and its gross annual income does not exceed $750,000.
- ☐ And the business is not an affiliate of a non-small business. (Note: a non-small business employs more than 10 persons and/or its gross income exceeds $750,000.)

8. Green Business Certification *You are entitled to a reduced permit fee if you qualify as a green business as defined in Regulation 3. In order to qualify, you must certify that your business meets all of the following criteria:*

- ☐ The business has been certified under the Bay Area Green Business Program coordinated by the Association of Bay Area Governments and implemented by participating counties.
- ☐ A copy of the certification is included.

9. Accelerated Permitting *The Accelerated Permitting Program entitles you to install and operate qualifying sources of air pollution and abatement equipment* ***without waiting for the District to issue a Permit to Operate****. To participate in this program you must certify that your project will meet all of the following criteria. Please acknowledge each item by checking each box.*

- ☐ Uncontrolled emissions of any single pollutant are each less than 10 lb/highest day, or the equipment has been precertified by the BAAQMD.
- ☐ Emissions of toxic compounds do not exceed the trigger levels identified in Table 2-5-1 (see Regulation 2, Rule 5).
- ☐ The source is not a diesel engine.
- ☐ The project is not subject to public notice requirements (the source is either more than 1000 ft. from the nearest school, or the source does not emit any toxic compound in Table 2-5-1).
- ☐ For replacement of abatement equipment, the new equipment must have an equal or greater overall abatement efficiency for all pollutants than the equipment being replaced.
- ☐ For alterations of existing sources, for all pollutants the alteration does not result in an increase in emissions.
- ☐ Payment of applicable fees (the minimum permit fee to install and operate each source). See Regulation 3 or contact the Engineering Division for help in determining your fees.

10. CEQA *Please answer the following questions pertaining to CEQA (California Environmental Quality Act).*

A. Has another public agency prepared, required preparation of, or issued a notice regarding preparation of a California Environmental Quality Act (CEQA) document (initial study, negative declaration, environmental impact report, or other CEQA document) that analyzes impacts of this project or another project of which it is a part or to which it is related? ☒YES ☐NO If no, go to section 10B.

Describe the document or notice, preparer, and date of document or expected date of completion:

A Land Use Permit application for this project was submitted to the City of Benicia in December 2012.

The City of Benicia will serve as Lead Agency.

B. List and describe any other permits or agency approvals required for this project by city, regional, state or federal agencies:

None.

C. List and describe all other prior or current projects for which either of the following statements is true: (1) the project that is the subject of this application could not be undertaken without the project listed below, (2) the project listed below could not be undertaken without the project that is the subject of this application:

None.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

11. Certification *I hereby certify that all information contained herein is true and correct. (Please sign and date this form)*

Donald Cuffel	Manager - Environmental Engineering	Susan K Gustofson for Don Cuffel	2/28/2013
Name of person certifying (print)	Title of person certifying	Signature of person certifying	Date

Send all application materials to the **BAAQMD Engineering Division, 939 Ellis Street, San Francisco, CA 94109.**

DATA FORM T
Organic Liquid Evaporation
(tankage, loading and handling)

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

939 Ellis Street .. San Francisco, CA 94109. (415) 749-4990 FAX (415)-749-5030

1. Business Name: **Valero Refining Co. - California** Plant No: **B2626** (if unknown, leave blank)
2. SIC No: **2911** Date of Initial Operation **~2014 (planned)** Source No S- **97**
3. Name or Description **TK-1776 (External Floating Roof) – Change to Include Crude Oil Service**
4. Code materials* in order of highest throughputs: 1) **89** (crude oil) 2) ____ 3) ____ 4) ____
5. Total throughput (all materials), last 12 months: _____ thousand gal **or** **0 (crude)** thousand bbl
6. Typical % of total annual throughput: Dec-Feb **25** % Mar-May **25** % Jun-Aug **25** % Sep-Nov **25** %

☐ Check box if loading/handling facility; complete lines 7-11 and omit the remainder of this form. (Also complete one Form T for each storage tank)

~~7. ● Usage type: ☐ Bulk plant (truck/rail car) ☐ Bulk plant (marine) ☐ Vehicle service station ☐ Aircraft/marine servicing Other: ____~~

~~8. ● How many nozzles/loading arms? ____ How many pumps? ____~~

~~9. ● Make and model of nozzles/loading arms: ____~~

~~10. ● Nozzle/arm loads tank by: ☐ splash fill ☐ submerged fill ☐ part splash, part submerged~~

~~11. ● Upon loading, vapor space in tank(s) is: ☐ Vented directly to atmosphere ☐ Collected by nozzle/arm and sent to Abatement Device(s): A ____ A ____~~

12. Annual Average: Storage vapor pressure ___ psia **or** tank temperature ambient°F and RVP **9.4** psia
13. Highest v.p. of all materials stored: ___ psia **or** high tank temperature ambient°F and high RVP **9.4** psia
14. Highest °API of all material stored: **~43.5** Lowest initial B.P. of all materials stored: **80-100** °F
15. Tank Type: ☐ underground ☐ fixed roof ☐ internal floating roof ☒ floating roof ☐ pressure ☐ other: ____
16. Tank volume: ____ thousand gallons **or** **110** thousand barrels
17. Tank Diameter: **128** ft height or length: **~48** ft Check if applicable: ☐ heated ☐ insulated

Fixed Roof Tanks Only

~~18. Maximum fill rate: ____ gal/hr **or** ____ bbl/hr~~

~~19. Average height of vapor space: ____ ft Highest head space reactivity ____ %~~
~~☐ Check box if emissions from this tank are controlled; complete lines 20 and 21.~~

~~20. ● Emissions vent to what source(s) and/or abatement device(s)? S ____ S ____ A ____ A ____~~

~~21. ● Do all gauging/sampling devices have gas-tight covers? ☐ yes ☐ no~~

~~22. Paint color: ☐ Aluminum ☐ White ☐ Light grey ☐ Medium grey ☐ Other ____~~

~~23. Paint Condition: ☐ good ☐ poor~~

Floating Roof Tanks Only

24. Shell Type: ☐ gunited ☐ riveted ☒ welded ☐ other: ____
25. Seal Type: ☐ single ☒ double ☐ other: ____ Condition: ☒ tight ☐ loose
26. Maximum withdrawn rate: ____ gal/hr **or** **~3,000** bbl/hr
27. Do all gauging/sampling devices enter below liquid level and have gas-tight covers? ☒ yes ☐ no
28. Roof type: ☐ pan ☒ pontoon ☐ other: ____ Is emergency roof drain at least 90% covered? ☒ yes ☐ no

Person completing this form **S. Gustofson** Date **2/28/2013**

See Material Code Reference List.

Form HRSA

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street . . . San Francisco, CA 94109. . . (415) 749-4990 . . . FAX (415) 749-5030 OR 4949
WEBSITE: WWW.BAAQMD.GOV

Health Risk Screening Analysis

IMPORTANT: For any permit application that requires a Health Risk Screening Analysis, fill out one form for each source that emits a Toxic Air Contaminant(s) [or for a group of sources that exhaust through a common stack]. Emissions can be from a discrete point source (with stack) or a source with fugitive emissions (area or volume source). You must provide a plot plan (drawn to scale, if possible) and a local map (aerial photos are recommended), which clearly demonstrate the location of your site, the source(s), property lines, and any surrounding buildings [see attached example]. Label streets, schools, residences, and other businesses. List major dimensions of all buildings surrounding the source in Section C.

Plant Name: Valero Refining Co. - California Plant No.: B2626

Source Description: Tank 1776 (external floating roof tank)

Source No.: S-97 (if known) Emission Point No.: P-____ (if known)

SECTION A *(Point Source)*

1. Does the source exhaust at clearly defined emission point; i.e., a stack or exhaust pipe? ☐ YES OR ☒ NO

   (If YES continue at #2, If NO, skip to Section B)

2. ~~Does the stack (or exhaust pipe) stand alone or is it located on the roof of a building? ☐ alone OR ☐ on roof~~

   ~~*Important: If stack is on a roof, provide building dimensions on line B1 in* Section C.~~

3. ~~What is the height of the stack outlet above ground level? ____ feet OR ____ meters?~~

4. ~~What is the inside diameter of the stack outlet? ____ inches OR ____ feet OR ____ meters~~

5. ~~What is the direction of the exhaust from the stack outlet? ☐ horizontal OR ☐ vertical~~

6. ~~Is the stack outlet: ☐ open or hinged rain flap OR ☐ rain capped (deflects exhaust downward or horizontally)~~

7. ~~What is the exhaust flowrate during normal operation? ___ feet^3/min OR ___ meters^3/second~~
8. ~~What is the typical temperature of the exhaust gas? __ degrees Fahrenheit OR ___ degrees Celsius~~

   ~~***(Skip Section B and Go on to Section C)***~~

SECTION B *(Area/Volume Source)*

This section applies to fugitive emissions that are NOT captured by a collection system nor directly emitted through a stack or other emission point. Volume sources have fugitive emissions generally released within a building or other defined space (e.g., dry cleaner, gasoline station canopy). Area sources are generally flat areas of release (e.g., landfill, quarry).

1. Is the emission source located within a building? ☐ YES (go to #2) OR ☒ NO (go to #3)

2. ~~If YES (source inside building), provide building dimensions on line B1 in Section C~~

   ~~a. Does the building have a ventilation system that is vented to the outside? ☐ YES OR ☐ NO~~

   ~~b. If NO (ventilation), are the building's doors & windows kept open during hours of operation? ☐ YES OR ☐ NO~~

3. If NO (source not inside building), provide a description of the source, dimensions, & indicate location on plot plan.

   External floating roof tank. Diameter = 128 ft, shell height = 48 ft. See attached figure for location (and Figures 2-1 and 2-2 of application for surrounding area).

(Go on to Section C)

SECTION C *(Building Dimensions)*

Provide building dimensions. Use Line B1 only for building with source/stack on the roof or with fugitive emissions inside building. Use Lines B2-B9 for buildings surrounding the source (within 300 feet). Distance and direction are optional if map and/or aerial photo are adequately labeled with locations of buildings. Check one for units: ☐ feet OR ☐ meters

B#	Building name or description	Height	Width	Length	Distance To Source	Direction To Source
B1	Building with source:				n/a	n/a
B2						
B3						
B4						
B5						
B6						
B7						
B8						

See attached figure for structures surrounding S-97.

NOTE: Label buildings by B# on plot plan, map and/or aerial photo. Provide comments below for any details that need additional clarification (e.g., list buildings that are co-occupied by your employees and other workers, residents, students, etc).

_____

_____

(Go on to Section D)

SECTION D *(Receptor Locations)*

NOTE: Indicate on maps or aerial photos the residential and nonresidential areas surrounding your facility.

1. Indicate the area where the source is located (check one):
   - ☐ zoned for residential use
   - ☐ zoned for mixed residential and commercial/industrial use
   - ☒ zoned for commercial and/or industrial use
   - ☐ zoned for agricultural use
2. Distance from source (stack or building) to nearest facility property line = ~650 feet OR ____ meters
3. Distance from source (stack or building) to the property line of the nearest residence = ~4,000 feet OR _____ meters
4. Describe the nearest nonresidential property (check one): ☒ Industrial/Commercial OR ☐ Other _____

   _____
5. Distance from source (stack or building) to property line of nearest nonresidential site = ~750 feet OR ___ meters
6. Distance from source to property line of nearest school* (or school site) = _____ feet OR ☒ Greater than 1,000 feet

   [Note: Helpful website with California Dept. of Education data: www.greatschools.net]

   Provide the names and addresses of all schools* that have property line(s) within 1,000 feet of the source:

   _____

*K-12 and more than twelve children only

Form HRSA: Plot plan showing location of S-97 (Tank 1776) .

Source: Google Maps, queried January 2013.

APPENDIX A2

Construction Emissions

This page intentionally left blank

Valero Crude By Rail Project
Construction Emissions

Summary of Construction-Related Emissions

Sources	Average Daily Emissions (lb/day)						
	ROG	CO	NOx	SOx	PM10	PM2.5	CO2e
Equipment Exhaust	6.96	26.60	49.67	0.06	2.56	2.35	5977
Onsite Vehicle Exhaust	0.18	1.63	0.79	0.00	3.57	0.38	297
Offsite Vehicle Exhaust	0.91	8.47	1.43	0.01	0.53	0.17	1307
Fugitive Emissions	0.11	---	---	---	2.63	1.38	---
Total Emissions	**8.17**	**36.7**	**51.9**	**0.08**	**9.28**	**4.29**	**7581**
CEQA Threshold	**54**	**---**	**54**	**---**	**82**	**54**	**---**
Threshold Exceeded (Y/N)	**No**	**No**	**No**	**No**	**No**	**No**	**No**

Sources	Average Annual Emissions (tpy)						
	ROG	CO	NOx	SOx	PM10	PM2.5	CO2e
Equipment Exhaust	0.61	2.33	4.35	0.01	0.22	0.21	523
Onsite Vehicle Exhaust	0.02	0.14	0.07	0.00	0.31	0.03	26
Offsite Vehicle Exhaust	0.08	0.74	0.13	0.00	0.05	0.02	114
Fugitive Emissions	0.01	---	---	---	0.23	0.12	---
Total Emissions	**0.71**	**3.21**	**4.54**	**0.01**	**0.81**	**0.38**	**663**

Civil Work Fugitive PM Emission Factors

Soil handling

Emission Factor [lb/cu. yd] = k x 0.0032 x (mean wind speed [mi/hr] / 5)$^{1.3}$ / (moisture [%] / 2)$^{1.4}$ x (number drops per ton) x (density [ton/cu. yd])
Reference: AP-42, Equation (1), Section 13.2.4, November 2006

Table 1a Soil Handling Reference Data		
Parameter	**Value**	**Basis**
Particle Size Multiplier for PM10 (k)	0.35	AP-42 Chapter 13.2.4
Particle Size Multiplier for PM2.5 (k)	0.053	AP-42 Chapter 13.2.4
Mean Wind Speed (mph)	5	Default, CalEEMod User Manual Appendix D, Table 1.1
Moisture (%)	12	Default, CalEEMod User Manual Appendix A
Number Drops	4	Assumed
Soil Density (ton/cu. yd)	1.264	Default, CalEEMod User Manual Appendix A

Table 1b Soil Handling Emission Factors		
PM10 Emission Factor (Uncontrolled)	4.61E-04	lb/cu. yd
PM2.5 Emission Factor (Uncontrolled)	6.98E-05	lb/cu. yd
Mitigation Efficiency	0%	
Controlled PM10 Emission Factor	4.61E-04	lb/cu. yd
Controlled PM2.5 Emission Factor	6.98E-05	lb/cu. yd

Bulldozing

Emission Factor [lb/hr] = k x C x (silt content [%])^{A} / (moisture)^{B}
Reference: AP-42, Table 11.9-1, October 1998

Table 4-E Bulldozing Reference Data			
Parameter	**PM10**	**PM2.5**	**Basis**
Scaling Factor (k)	0.75	0.105	AP-42, Section 11.9, Table 11.9-1, July 1998
Coefficient (C)	1	5.7	AP-42, Section 11.9, Table 11.9-1, July 1998
Exponent A	1.5	1.2	AP-42, Section 11.9, Table 11.9-1, July 1998
Exponent B	1.4	1.3	AP-42, Section 11.9, Table 11.9-1, July 1998
Silt Content (%)	6.9	6.9	AP-42, Section 11.9, Table 11.9-3, July 1998 for overburden
Moisture (%)	7.9	7.9	AP-42, Section 11.9, Table 11.9-3, July 1998, for overburden

Table 4-F Bulldozing Emission Factors			
	PM10	**PM2.5**	**Units**
Uncontrolled Emission Factor	0.753	0.414	lb/hr
Mitigation Efficiency	0%	0%	%
Controlled Emission Factor	0.753	0.414	lb/hr

Grading

Emission Factor [lb/VMT] = k x A x (mean vehicle speed [mi/hr])^{B}
Reference: AP-42, Section 11.9, Table 11.9-1, July 1998

Table 4-E Grading Reference Data			
Parameter	**PM10**	**PM2.5**	**Basis**
Scaling Factor (k)	0.6	0.031	AP-42, Section 11.9, Table 11.9-1, July 1998
Particle Size Multiplier (A)	0.051	0.04	AP-42, Section 11.9, Table 11.9-1, July 1998
Exponent B	2	2.5	AP-42, Section 11.9, Table 11.9-1, July 1998
Mean vehicle Speed (mph)	7.1	7.1	AP-42, Section 11.9, Table 11.9-3, July 1998
Blade Width (ft)	12	12	Default, CalEEMod User Manual Appendix A

Table 4-F Grading Emission Factors			
Emission Factor	**PM10**	**PM2.5**	**Unit**
Uncontrolled Emission Factor	1.061	0.115	lb/acre
Mitigation Efficiency	0%	0%	
ControlledEmission Factor	1.061	0.115	lb/acre

Notes:

The above equations are used in CalEEMod model to estimate fugitive emissions from demolition of structures.

Fugitive VOC Emission Factors

Architectural Coating VOC Emission Factor			
Parameter	**Value**	**Unit**	**Basis**
Paint VOC Content	250	g/l	BAAQMD Architectural Coating Regulation Requirement
Coating Coverage	180	sq.ft/gal	Default, CalEEMod User Manual Appendix A
Fugitive VOC Emission Factor	0.012	lb/sq.ft	Default, CalEEMod User Manual Appendix A

Asphalt Paving VOC Emissions Factor			
Parameter	**Value**	**Unit**	**Basis**
Fugitive VOC Emission Factor	2.620	lb/acre	Basis: Default, CalEEMod User Manual Appendix A

Equipment and Vehicle Emission Factors (2013)

Equipment	Engine Rating (HP)	OFFROAD Category	Emission Factors (lb/hr)[1]							Fuel Consumption
			ROG	CO	NOx	SOx	PM10	PM2.5[2]	CO2e	gal/hr
Track Hoes (225)	300	Crawler Tractors	0.17018	0.63617	1.49875	0.00170	0.05813	0.05348	173.85033	11.77614
Bulldozer (D-5)	90	Crawler Tractors	0.08657	0.32517	0.51455	0.00052	0.04534	0.04171	44.21753	3.01908
Front End loader (644)	200	Rubber Tired Loaders	0.08425	0.24664	0.81170	0.00112	0.02791	0.02568	99.88438	6.75126
Air Compressor (185)	50	Air Compressors	0.06041	0.16870	0.14804	0.00019	0.01452	0.01336	15.02281	1.03664
Wheel Compactor (small)	60	Other Construction Equipment	0.06734	0.35324	0.47029	0.00063	0.03797	0.03493	54.25431	3.69356
50 Ton Hydraulic Crane	173	Cranes	0.06905	0.32272	0.52007	0.00061	0.02980	0.02742	53.91338	3.66769
25 Ton Hydraulic Crane	130	Cranes	0.06905	0.32272	0.52007	0.00061	0.02980	0.02742	53.91338	3.66769
120 Ton Crawler Crane	600	Cranes	0.17567	0.59574	1.64500	0.00204	0.05921	0.05447	203.19050	13.74438
Welding Machine (300)	30	Welders	0.06424	0.18246	0.16897	0.00022	0.01581	0.01455	17.49801	1.20501
Man Lift (40')	30	Aerial Lifts	0.03874	0.11649	0.12262	0.00017	0.01025	0.00943	13.20215	0.90544
Concrete Pumper (trailer mt.)	30	Pumps	0.06900	0.20670	0.21528	0.00030	0.01815	0.01670	23.11445	1.58573
Forklift - Telehandler TL1255	130	Forklifts	0.03794	0.22116	0.28300	0.00042	0.01628	0.01498	37.59458	2.55555
Bobcat - S770	50	Skid Steer Loaders	0.03461	0.15146	0.15254	0.00022	0.01051	0.00967	17.14806	1.17367
Excavator - 345BL/C	300	Excavators	0.11613	0.35283	0.98828	0.00154	0.03455	0.03179	156.68225	10.58421
Loader - 950G/H	200	Rubber Tired Loaders	0.08425	0.24664	0.81170	0.00112	0.02791	0.02568	99.88438	6.75126
Light Plant - 4,000 Watt Diesel	20	Light	0.06652	0.20859	0.23229	0.00033	0.01833	0.01686	25.30906	1.73303
Scraper - 613C	300	Scrapers	0.21329	0.81078	1.89360	0.00211	0.07357	0.06769	215.56795	14.60463
Off Road Truck - 730 CAT	300	Off-Highway Trucks	0.14523	0.42585	1.19594	0.00179	0.04241	0.03902	182.57509	12.33639
Dozer - D6N LGP	120	Crawler Tractors	0.08657	0.32517	0.51455	0.00052	0.04534	0.04171	44.21753	3.01908
Dozer - D5HXL W/RIPPERS	110	Crawler Tractors	0.08657	0.32517	0.51455	0.00052	0.04534	0.04171	44.21753	3.01908
Blade - 140H/M with GPS	170	Graders	0.09821	0.49170	0.74935	0.00093	0.04227	0.03889	83.13893	5.65398
Loader - John Deere 210 - 4/1 Bucket	90	Rubber Tired Loaders	0.06498	0.27793	0.40270	0.00046	0.03515	0.03234	39.55974	2.69776
Roller - (Dirt) 84" SD	90	Rollers	0.06601	0.27198	0.41860	0.00046	0.03572	0.03286	39.61205	2.70081
Paver - CAT AP800	150	Pavers	0.11898	0.52104	0.92177	0.00097	0.05148	0.04736	86.09952	5.85923
Excavator - 320CL	250	Excavators	0.08317	0.23706	0.76051	0.00120	0.02492	0.02293	106.37955	7.18656
Excavator - Compaction Wheel	0	Excavators	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Compactor - 32" Walk Behind	15	Other Construction Equipment	0.00788	0.04131	0.04932	0.00011	0.00191	0.00176	6.78076	0.46124
Paver - Lee boy Paver	60	Pavers	0.09286	0.33851	0.55942	0.00054	0.04880	0.04490	46.49592	3.17456
Roller - (AC) 42"/47"	60	Rollers	0.06601	0.27198	0.41860	0.00046	0.03572	0.03286	39.61205	2.70081
Loader - 966G/H	200	Rubber Tired Loaders	0.08425	0.24664	0.81170	0.00112	0.02791	0.02568	99.88438	6.75126
Track - Hydraulic Tie Jig	0	Other Construction Equipment	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Track - Low Railer	120	Other Construction Equipment	0.06734	0.35324	0.47029	0.00063	0.03797	0.03493	54.25431	3.69356
Track - Production Tamper	200	Other Construction Equipment	0.09720	0.35038	1.01664	0.00167	0.03288	0.03025	170.37094	11.50093
Track - Regulator	150	Other Construction Equipment	0.06261	0.39312	0.53628	0.00080	0.02811	0.02586	71.42018	4.85059
Loader - Backhoe - 420D	90	Tractors/Loaders/Backhoes	0.04648	0.23621	0.30559	0.00041	0.02564	0.02359	34.71473	2.36493

Vehicles	Fuel	EMFAC Category[3]	Emission Factors (lb/mi)[4]							Fuel Consumption
			ROG	CO	NOx	SOx	PM10	PM2.5	CO2e[5]	gal/mi
Onsite 1/2 Ton Pick-up Truck	GAS	LDT2	0.00062	0.00652	0.00079	0.00001	0.01614	0.00165	1.03463	0.05676
Onsite Dump Truck (Tandum)	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.01689	0.00227	3.97538	0.18054
Onsite Shuttle Truck	GAS	LDT1	0.00126	0.01162	0.00105	0.00001	0.01614	0.00165	0.87092	0.04853
Onsite Concrete Trucks (8 yd)	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.01689	0.00227	3.97538	0.18054
Onsite Truck - Foreman/Superintendent/PM	GAS	LDT2	0.00062	0.00652	0.00079	0.00001	0.01614	0.00165	1.03463	0.05676
Onsite Truck - Crew w/Small Tools	GAS	LDT2	0.00062	0.00652	0.00079	0.00001	0.01614	0.00165	1.03463	0.05676
Onsite Truck - Water	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.01689	0.00227	3.97538	0.18054
Onsite Asphalt Delivery	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.01689	0.00227	3.97538	0.18054
Offsite Concrete Trucks (8 yd)	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.00106	0.00072	3.97538	0.18054
Offsite 18 Wheeler (Deliveries)	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.00106	0.00072	3.97538	0.18054
Offsite Asphalt Delivery	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.00106	0.00072	3.97538	0.18054
Offsite Construction Worker Commute Vehicles	GAS	LDA	0.00054	0.00516	0.00045	0.00001	0.00031	0.00009	0.73759	0.04180

1. Load Factor Correction of 0.67 applied to emissions estimated using OFFROAD2007 emission factors - http://www.arb.ca.gov/regact/2010/offroadlsi10/offroadappd.pdf

OFFROAD2007 Load Factor Correction	0.67

2. PM2.5 Fraction of PM10

	Value	Source
Gasoline Exhaust	0.756	from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5
Diesel Exhaust	0.920	and PM 2.5 Significance Thresholds, SCAQMD, October 2006

3. Vehicle emission factors were compiled by running the California Air Resources Board's EMFAC2011 Emissions Model with EMFAC2007 vehicle categories and dividing calculated daily emissions by daily vehicle-miles-traveled.

4. All vehicle emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions, and PM10 and

5. N_2O and CH_4 factors from 2013 Climate Registry Default Emission Factors, Released: January 2, 2013. http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

Parameters	Onsite Unpaved Road Dust Emission Factor	
	PM10	PM2.5
Particle Size Multiplier (k) - lb/VMT	1.5	0.15
Silt Content (%)	0.03	0.03
Mean Vehicle Weight (W) - tons	20	20
Emission Factor	1.60E-02	1.60E-03

AP-42, Section 13.2.2, November 2006

Parameters	Offsite Paved Road Dust Emission Factor	
	PM10	PM2.5
Particle Size Multiplier (k) - lb/VMT	0.0022	0.00054
Silt Loading (sL) - g/m^2	0.03	0.03
Average Fleet Weight (W) - tons	2.2	2.2
Emission Factor	2.02E-04	4.96E-05

AP-42, Section 13.2.1, January 2011

Fugitive Emissions Activity Rate Estimate

Activity	Value	Unit	Reference
Soil handled	23132	cu. yd Cut	per Sue G's email - 3/27/2013
	711	cu. yd Fill	per Sue G's email - 3/27/2013
Soil hauled	23843	cu. yd	
Truck Capacity	20	cu. yd	URBEMIS/CalEEMOD Default
Asphalt paving	3.9	Acres	per Sue G's email - 3/27/2013
Grading (Acres)	3.9	Acres	per Sue G's email - 3/27/2013
Architectural Coating	800.0	sq. ft	

Disturbed Area Estimate	Value	Unit	Reference
Approximate Distance from Loading rack to Facility Boundary	0.96	miles	Google Earth
	5069	feet	
Approximate Width of Distrubed Area	111	feet	from CBR project drawings
Approximate Area Disturbed/Graded	13	Acres	

Fugitive Emissions

Fugitive Activity Rate		
Source	**Activity Rate Unit**	**Total for Project**
Soil Handling	cu. yd	23,843
Bulldozing/Scraping	hr	578
Grading	Acres	13
Architectural Coating	sq. ft	800
Asphalt Paving	Acres	3.9

Fugitive PM10 Emissions				
Source	**Emisison Factor (lb/Unit)**	**Total Emissions (lb)**	**Average Annual Emissions (tpy)**	**Average Daily Emissions (lb/day)**
Soil Handling	4.61E-04	11	0.005	0.06
Bulldozing	7.53E-01	435	0.218	2.49
Grading	1.06E+00	14	0.007	0.08
Total		**460**	**0.23**	**2.63**

Fugitive PM2.5 Emissions				
Source	**Emisison Factor (lb/Unit)**	**Total Emissions (lb)**	**Average Annual Emissions (tpy)**	**Average Daily Emissions (lb/day)**
Soil Handling	6.98E-05	2	0.001	0.01
Bulldozing	4.14E-01	239	0.120	1.37
Grading	1.15E-01	1	0.001	0.01
Total		**242**	**0.12**	**1.38**

Fugitive VOC Emissions				
Source	**Emisison Factor (lb/Unit)**	**Total Emissions (lb)**	**Average Annual Emissions (tpy)**	**Average Daily Emissions (lb/day)**
Architectural Coating	1.16E-02	9	0.005	0.05
Asphalt Paving	2.62E+00	10	0.005	0.06
Total		**19**	**0.01**	**0.11**

Equipment and Vehicle Activity Rate Data

Construction Duration	25	weeks	June 13 - Dec 31
Number of working days	7	workdays per week	
Number of hours/shirt	10	hours/shift	
Number of shifts/day	2	shifts/day	

Offroad Equipment	Engine Rating (HP)	OFFROAD Category	Fuel	Total Equipment-Hours over Project Duration
			GAS/DSL	
Track Hoes (225)	300	Crawler Tractors	DSL	700
Bulldozer (D-5)	90	Crawler Tractors	DSL	100
Front End loader (644)	200	Rubber Tired Loaders	DSL	800
Air Compressor (185)	50	Air Compressors	DSL	400
Wheel Compactor (small)	60	Other Construction Equipment	DSL	200
50 Ton Hydraulic Crane	173	Cranes	DSL	1000
25 Ton Hydraulic Crane	130	Cranes	DSL	2200
120 Ton Crawler Crane	600	Cranes	DSL	700
Welding Machine (300)	30	Welders	DSL	1100
Man Lift (40')	30	Aerial Lifts	DSL	1000
Concrete Pumper (trailer mt.)	30	Pumps	DSL	50
Forklift - Telehandler TL1255	130	Forklifts	DSL	1608
Bobcat - S770	50	Skid Steer Loaders	DSL	834
Excavator - 345BL/C	300	Excavators	DSL	528
Loader - 950G/H	200	Rubber Tired Loaders	DSL	580
Light Plant - 4,000 Watt Diesel	20	Light	DSL	1400
Scraper - 613C	300	Scrapers	DSL	186
Off Road Truck - 730 CAT	300	Off-Highway Trucks	DSL	386
Dozer - D6N LGP	120	Crawler Tractors	DSL	212
Dozer - D5HXL W/RIPPERS	110	Crawler Tractors	DSL	80
Blade - 140H/M with GPS	170	Graders	DSL	368
Loader - John Deere 210 - 4/1 Bucket	90	Rubber Tired Loaders	DSL	528
Roller - (Dirt) 84" SD	90	Rollers	DSL	488
Paver - CAT AP800	150	Pavers	DSL	200
Excavator - 320CL	250	Excavators	DSL	110
Compactor - 32" Walk Behind	15	Other Construction Equipment	DSL	80
Paver - Lee boy Paver	60	Pavers	DSL	40
Roller - (AC) 42"/47"	60	Rollers	DSL	136
Loader - 966G/H	200	Rubber Tired Loaders	DSL	210
Track - Low Railer	120	Other Construction Equipment	DSL	302
Track - Production Tamper	200	Other Construction Equipment	DSL	302
Track - Regulator	150	Other Construction Equipment	DSL	302
Loader - Backhoe - 420D	90	Tractors/Loaders/Backhoes	DSL	370

Onroad Vehicles	EMFAC (on road vehicle) Category	Fuel: GAS / DSL	Total Equipment-Hours over Project Duration	Estimated speed (MPH)
1/2 Ton Pick-up Truck	LDT2	GAS		5
Dump Truck (Tandum)	T7	DSL	Based on Quantity of Dirt Hauled and Truck Capacity	
Shuttle Truck	LHD1	DSL	1600	5
Concrete Trucks (8 yd)	T7	DSL	Based on Quantity of Concrete Hauled and Truck Capacity	
Truck - Foreman/Superintendent/PM	LDT2	GAS	1824	5
Truck - Crew w/Small Tools	LDT2	GAS	2650	5
Truck - Water	T7	DSL	320	5
Asphalt Delivery	T7	DSL	Based on Quantity of Asphalt Hauled and Truck Capacity	
18 Wheeler (Deliveries)	T7	DSL	180	5
Construction Worker Commute Vehicles	LDA	GAS	Based on man-hours for project	

Concrete Requirement

Manholes, compr. relocation, sub/transformer fndn, fire monitor, custody transfer containment foundation, pipe supports	376	cu. Yd
Tank containment wall footings	420	cu. Yd
Pump pit, etc.	250	cu. Yd
Total Concrete Requirement	1046	cu. Yd
Concrete Truck Capacity	8	cu. Yd
Concrete Supplier - Syar Industries at 885 Lake Herman Rd, Vallejo, CA 94591		
One-way Offsite Concrete Truck Trip Length	4.1	miles

Total Asphalt Requirement	4375	tons
Asphalt Truck Capacity	25	ton/truck
Asphalt Supplier - County Quarry		
One-way Offsite Asphalt Truck Trip Length	8	miles

Construction Worker Trips		
OSBL Manhours	37500	man-hours/project
ISBL Manhours	76300	man-hours/project @ 16 wks, 10 hrs/day, 7 day/wk
Work hours/day	10	
Total Project Worker Trips	11380	

URBEMIS Material Delivery Truck Default Trip Length (	7.3	miles/one-way
Worker Commute Trip Distance (H-W)	12.4	miles/one-way
Onsite Truck Trip Length	2	miles (Assumed)

Equipment and Vehicle Exhaust Emissions

Construction Duration	25	weeks
Number of working days	7	workdays per week
Number of hours/shirt	10	hours/shift
Number of shifts/day	2	shifts/day

Offroad Equipment	Total Equipment-Hours over Project Duration	Total Emissions over The Project Duration (lb/Project)							Fuel Consumption (gal/Project)	
		ROG	CO	NOx	SOx	PM10	PM2.5	CO2e	Diesel	Gasoline
Track Hoes (225)	700	119.12	445.32	1049.12	1.19	40.69	37.44	121695	8243	0
Bulldozer (D-5)	100	8.66	32.52	51.45	0.05	4.53	4.17	4422	302	0
Front End loader (644)	800	67.40	197.31	649.36	0.90	22.33	20.54	79908	5401	0
Air Compressor (185)	400	24.16	67.48	59.22	0.08	5.81	5.35	6009	415	0
Wheel Compactor (small)	200	13.47	70.65	94.06	0.13	7.59	6.99	10851	739	0
50 Ton Hydraulic Crane	1000	69.05	322.72	520.07	0.61	29.80	27.42	53913	3668	0
25 Ton Hydraulic Crane	1100	75.95	354.99	572.07	0.67	32.78	30.16	59305	4034	0
120 Ton Crawler Crane	350	61.48	208.51	575.75	0.71	20.72	19.07	71117	4811	0
Welding Machine (300)	1100	70.66	200.70	185.87	0.25	17.39	16.00	19248	1326	0
Man Lift (40')	1000	38.74	116.49	122.62	0.17	10.25	9.43	13202	905	0
Concrete Pumper (trailer mt.)	50	3.45	10.34	10.76	0.01	0.91	0.83	1156	79	0
Forklift - Telehandler TL1255	1608	61.00	355.62	455.06	0.68	26.18	24.08	60452	4109	0
Bobcat - S770	834	28.86	126.32	127.22	0.18	8.76	8.06	14301	979	0
Excavator - 345BL/C	528	61.32	186.30	521.81	0.81	18.24	16.78	82728	5588	0
Loader - 950G/H	580	48.86	143.05	470.79	0.65	16.19	14.89	57933	3916	0
Light Plant - 4,000 Watt Diesel	1400	93.13	292.03	325.21	0.46	25.66	23.61	35433	2426	0
Scraper - 613C	186	39.67	150.80	352.21	0.39	13.68	12.59	40096	2716	0
Off Road Truck - 730 CAT	386	56.06	164.38	461.63	0.69	16.37	15.06	70474	4762	0
Dozer - D6N LGP	212	18.35	68.94	109.08	0.11	9.61	8.84	9374	640	0
Dozer - D5HXL W/RIPPERS	80	6.93	26.01	41.16	0.04	3.63	3.34	3537	242	0
Blade - 140H/M with GPS	368	36.14	180.94	275.76	0.34	15.56	14.31	30595	2081	0
Loader - John Deere 210 - 4/1 Bucket	528	34.31	146.75	212.62	0.24	18.56	17.08	20888	1424	0
Roller - (Dirt) 84" SD	488	32.21	132.73	204.28	0.23	17.43	16.04	19331	1318	0
Paver - CAT AP800	200	23.80	104.21	184.35	0.19	10.30	9.47	17220	1172	0
Excavator - 320CL	110	9.15	26.08	83.66	0.13	2.74	2.52	11702	791	0
Compactor - 32" Walk Behind	80	0.63	3.30	3.95	0.01	0.15	0.14	542	37	0
Paver - Lee boy Paver	40	3.71	13.54	22.38	0.02	1.95	1.80	1860	127	0
Roller - (AC) 42"/47"	136	8.98	36.99	56.93	0.06	4.86	4.47	5387	367	0
Loader - 966G/H	210	17.69	51.79	170.46	0.24	5.86	5.39	20976	1418	0
Track - Low Railer	302	20.34	106.68	142.03	0.19	11.47	10.55	16385	1115	0
Track - Production Tamper	302	29.35	105.82	307.03	0.50	9.93	9.14	51452	3473	0
Track - Regulator	302	18.91	118.72	161.96	0.24	8.49	7.81	21569	1465	0
Loader - Backhoe - 420D	370	17.20	87.40	113.07	0.15	9.49	8.73	12844	875	0

Vehicles	Total VMT over Project Duration	Total Emissions over The Project Duration (lb/Project)							Fuel Consumption (gal/Project)	
		ROG	CO	NOx	SOx	PM10	PM2.5	CO2e	Diesel	Gasoline
Onsite 1/2 Ton Pick-up Truck	3500	2.18	22.81	2.77	0.04	56.48	5.77	3621	0	199
Onsite Dump Truck (Tandum)	2384	2.76	12.45	56.81	0.09	40.27	5.42	9478	430	0
Onsite Shuttle Truck	8000	10.05	92.95	8.42	0.07	129.16	13.24	6967	0	388
Onsite Concrete Trucks (8 yd)	262	0.30	1.37	6.23	0.01	4.42	0.59	1040	47	0
Onsite Truck - Foreman/Superintendent/PM	9120	5.69	59.43	7.21	0.10	147.17	15.03	9436	0	518
Onsite Truck - Crew w/Small Tools	13250	8.26	86.34	10.48	0.14	213.82	21.84	13709	0	752
Onsite Truck - Water	1600	1.85	8.36	38.12	0.06	27.02	3.64	6361	289	0
Onsite Asphalt Delivery	350	0.40	1.83	8.34	0.01	5.91	0.80	1391	63	0
Offsite 18 Wheeler (Deliveries)	1314	1.52	6.86	31.31	0.05	1.39	0.95	5224	237	0
Offsite Asphalt Delivery	2800	3.24	14.62	66.72	0.11	2.96	2.02	11131	506	0
Offsite Concrete Trucks (8 yd)	1072	1.24	5.60	25.55	0.04	1.13	0.77	4262	194	0
Offsite Construction Worker Commute Vehicles	282224	153.61	1454.93	126.86	2.21	86.77	26.73	208166	0	11797
Total Project Equipment Emissions	lb/project	1218.75	4655.42	8692.99	11.33	447.92	412.09	1045904	70964	0
Total Project Onsite Vehicles Emissions	lb/project	31.49	285.53	138.38	0.52	624.24	66.32	52003	830	1857
Total Project Offsite Vehicles Emissions	lb/project	159.60	1482.02	250.43	2.41	92.26	30.46	228783	936	11797
Total Project All Soucrces Emissions	lb/project	1409.85	6422.96	9081.79	14.27	1164.42	508.87	1326690	72730	13654
Average Daily Equipment Emissions	lb/day	6.96	26.60	49.67	0.06	2.56	2.35	5977	406	0
Average Daily Onsite Vehicles Emissions	lb/day	0.18	1.63	0.79	0.00	3.57	0.38	297	5	11
Average Daily Offsite Vehicles Emissions	lb/day	0.91	8.47	1.43	0.01	0.53	0.17	1307	5	67
Average Daily All Soucrces Emissions	lb/day	8.06	36.70	51.90	0.08	6.65	2.91	7581	416	78
Average Annual Equipment Emissions	tpy	0.61	2.33	4.35	0.01	0.22	0.21	523		
Average Annual Onsite Vehicles Emissions	tpy	0.02	0.14	0.07	0.00	0.31	0.03	26		
Average Annual Offsite Vehicles Emissions	tpy	0.08	0.74	0.13	0.00	0.05	0.02	114		
Average Annual All Soucrces Emissions	tpy	0.70	3.21	4.54	0.01	0.58	0.25	663		

Appendix B.
Scoping Report

ESA

VALERO CRUDE BY RAIL PROJECT

Scoping Report

Prepared for
City of Benicia

November 2013

ESA

VALERO CRUDE BY RAIL PROJECT

Scoping Report

Prepared for
City of Benicia

November 2013

550 Kearny Street
Suite 800
San Francisco, CA 94104
415.896.5900
www.esassoc.com

Los Angeles

Oakland

Olympia

Petaluma

Portland

Sacramento

San Diego

Seattle

Tampa

Woodland Hills

202115.01

TABLE OF CONTENTS

Valero Crude By Rail Project
Scoping Report

Page

1. Introduction 1

2. Description of the Project 2
Project Summary 2

3. Opportunities for Public Comment 2
Notification 2
Public Scoping Meeting 3

4. Summary of Scoping Comments 3
Commenting Parties 3
Comments Received During the Scoping Process 4

Appendices (*Provided on CD*)

A. Notice of Preparation A-1
B. Newspaper Notices B-1
C. Project Website Notification C-1
D. Scoping Meeting Presentations D-1
E. Scoping Meeting Summary/Notes E-1
F. Scoping Period Written Comments F-1
G. Initial Study Comment Period Written Comments G-1

List of Tables

1. Parties Submitting Comments During the Valero Crude by Rail Project EIR Scoping Period 4
2. Parties Submitting Comments During the Valero Crude by Rail Project Initial Study Comment Period 5

SCOPING REPORT

Valero Crude by Rail Project

1. Introduction

This report provides an overview and a summary of the written and oral comments received by the City of Benicia during the public scoping period for the Environmental Impact Report (EIR) that the City is preparing for the Valero Refinery Crude by Rail Project (the proposed Project).[1] CEQA Guidelines Section 15083 provides that a "Lead Agency may…consult directly with any person…it believes will be concerned with the environmental effects of the project." Scoping is the process of early consultation with the affected agencies and public prior to completion of a Draft EIR. Section 15083(a) states that scoping can be "helpful to agencies in identifying the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in an EIR and in eliminating from detailed study issues found not to be important." Scoping is an effective way to bring together and consider the concerns of affected State, regional, and local agencies, the project proponent, and other interested persons (CEQA Guidelines Section 15083(b)).

Scoping is not conducted to resolve differences concerning the merits of a project or to anticipate the ultimate decision on a proposal. Rather, the purpose of scoping is to help ensure that a comprehensive and focused EIR will be prepared that provides a firm basis for the decision-making process. In addition, a primary purpose of this Scoping Report is to document the process of soliciting and identifying comments from interested agencies and the public. The scoping process provides the means to determine those issues that interested participants consider to be the principal areas for study and analysis. Every issue that has been raised that falls within the scope of CEQA during scoping will be addressed and or considered in the EIR.

This report is intended for use by the public to have access to and understand the comments received during the scoping period. It includes verbal and written public comments received during the scoping period (August 9, 2013 to September 13, 2013). The City will use this report as a tool to ensure the preparation of a comprehensive and focused EIR. Pursuant to CEQA Guidelines Section 15082, all public comments *will be considered*[2] in the EIR process.

1 The City of Benicia is the lead agency under the California Environmental Quality Act (CEQA) for the preparation of an EIR for the proposed Project.

2 Comments not within the scope of CEQA will not be addressed through the CEQA Process.

2. Description of the Project

Project Summary

The EIR will examine the environmental impacts associated with construction, operation, and maintenance of the Valero Refinery Crude by Rail Project, and identify and evaluate a reasonable range of alternatives to the proposed Project. The objective of the proposed Project is to allow the Refinery access to additional North American-sourced crudes that have recently become available, and that can be received by railroad. This involves installation and modification of Refinery non-process equipment that would allow the Refinery to receive a portion of its crude oil deliveries by railcar replacing equal quantities of crude currently being delivered to the Refinery by marine vessel. The proposed Project would consist of the following primary components:

- Installation of one rail car unloading rack capable of offloading two parallel rows of 25 crude oil rail cars.
- Construction of two parallel, offloading rail spurs to access the rail car unloading rack and store rail cars in preparation for departure, and a parallel departure track.
- Installation of approximately 4,000 feet of 16-inch diameter crude oil pipeline and associated components and infrastructure between the offloading rack and the existing Refinery crude tankage.
- Replacement and relocation of approximately 1,800 feet of tank farm dikes.
- Relocation of an existing firewater pipeline, compressor station, and underground infrastructure.
- Relocation of groundwater wells along Avenue “A.”
- Construction of a service road adjacent to the proposed unloading rack.

3. Opportunities for Public Comment

Notification

On August 9, 2013, the City published and distributed a Notice of Preparation (NOP) to advise interested local, regional, and state agencies, and the interested public, that an EIR would be prepared for the proposed Project. The NOP solicited both written and verbal comments on the EIR’s scope during a 30-day comment period and provided information on a forthcoming public scoping meeting. Additionally, the NOP presented the background, purpose, description, and location of the proposed Project, potential issues to be addressed in the EIR, and the contact name for additional information regarding the proposed Project.

In addition to the NOP, the City notified the public about the public scoping meeting through multiple newspaper legal advertisements and the City website. The NOP, newspaper legal advertisements, and the City website notification are presented in Appendices A, B, and C respectively. Notifications provided basic Project information, the date, time, and location of the scoping meeting, and a brief explanation of the public scoping process.

The City published legal advertisements in English in the Benicia Herald on August 13, 2013. Additionally, an electronic copy of the NOP was posted on the City's website at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC={C45EA667-8D39-4B30-87EB-9110A2F9CE13}.

The public was encouraged to submit written comments on the scope, content, and format of the environmental document by mail, facsimile, or email to the City. Comments received after the formal comment period ended are also included in this scoping report.

Public Scoping Meeting

The City conducted one scoping meeting. The meeting was held Thursday, September 12, 2013, from 7:00-9:00 p.m. in the City Hall Council Chambers, located at 250 East L Street, Benicia, California. Attending the meeting on behalf of the City of Benicia included Brad Kilger, City Manager; Amy Million, Principal Planner; Kat Wellman, Contract City Attorney; Teri Davena, Recording Secretary; and Tim Morgan and Cory Barringhaus of Environmental Science Associates (ESA). Meeting attendees were provided with materials including presentation slides, a comment card, and a speaker card. Copies of the NOP were available upon request.

A presentation (Appendix D) was given which included an overview of the environmental review process, the regional context, project background and description, and role of the public comments. All attendees were encouraged to provide new comments not previously provided for the Mitigated Negative Declaration. Public comments associated with the Mitigated Negative Declaration were already considered part of the record and taken into consideration as part of the scoping for the EIR. Public comments were taken and summarized by Teri Davena, Recording Secretary (Appendix E). All attendees were encouraged to submit written comments (Appendix F).

4. Summary of Scoping Comments

During the public scoping meeting held on September 12, 2013, participants commented on the scope of issues to be included in the EIR. Written comments were also collected throughout the public comment period. Eighteen participants submitted written comments during the EIR scoping period and eight oral comments were received at the scoping meeting (Table 1). Fifty-two letters also were received during and after the Initial Study comment period (Table 2). Those comments are considered as part of the scoping for the EIR and are included as Appendix G. Appendix E presents the scoping meeting minutes, summarizing oral comments received, and Appendix F contains copies of the written EIR scoping comments.

Commenting Parties

The following individuals and parties submitted comments on the scope of the EIR. Comments received during and after the Initial Study comment period are listed in Table 2.

TABLE 1
PARTIES SUBMITTING COMMENTS DURING
THE VALERO CRUDE BY RAIL PROJECT EIR SCOPING PERIOD

Name	Organization	Date/Received Date
Written Comments		
Linda Scourtis	San Francisco Bay Conservation and Development Commission	August 30, 2013
Erik Alm, AICP	California Department of Transportation	September 4, 2013
Ken Chiang, P.E.	California Public Utilities Commission	August 28, 2013
Marilyn J. Bardet	Individual and Good Neighbor Steering Committee Member	September 12, 2013
Diane Bailey and Elizabeth Forsyth	Natural Resources Defense Council	September 13, 2013
Roger Straw	Individual	August 19, 20 and September 12, 2013
Grant Cooke	Sustainable Energy Associates, LLC	August 13, 2013
Dennis Lewis	Individual	August 26, 2013
Rick Slizeski	Individual	September 10, 2013
Lynne Nittler and Richard McAdam	Individual	September 12, 2013
Milton Kalish, LCSW	Individual and Yolando Climate Action	September 12, 2013
Mary Frances Kelly Poh	Individual	September 12, 2013
Clark Driggars	Individual	September 12, 2013
Kathy Kerridge	Individual	September 12, 2013
Judith S. Sullivan	Individual	September 13, 2013
Ed Ruszel	Individual	September 13, 2013
Donald Dean	Individual	September 13, 2013
Charles Davidson	Individual	September 13, 2013
Oral Comments		
Ed Ruszel	Individual	September 12, 2013
David Jenkins	Individual	September 12, 2013
Roger Straw	Individual	September 12, 2013
Kathy Kerridge	Individual	September 12, 2013
Marilyn J. Bardet	Individual	September 12, 2013
Mary Francis Kelly Poh	Individual	September 12, 2013
Brant Olson	Individual	September 12, 2013
Teagan Clive	Individual	September 12, 2013

Comments Received During the Scoping Process

The following discussion summarizes both the oral and written comments received during the public scoping period. For more detailed information, please see Appendix E, which contains the September 12, 2013 Scoping Meeting Minutes, and Appendix F, which contains written comments submitted during the scoping period.

Specific comments are categorized by topical areas to enable easier review of the comments.

TABLE 2
PARTIES SUBMITTING COMMENTS DURING
THE VALERO CRUDE BY RAIL PROJECT INITIAL STUDY COMMENT PERIOD

Name	Organization	Date/Received Date
Written Comments		
Erik Alm, AICP	California Department of Transportation	June 27, 2013
Randy Scott	AMPORTS	June 27, 2013
Diane Bailey and Elizabeth Forsyth	Natural Resources Defense Council	July 1, 2013
Various	Communities for a Better Environment	July 1, 2013
Dan Broadwater	Local Union 180, International Brotherhood of Electrical Workers	July 1, 2013
Sabina Yates	Individual	June 12, 2013
Harry Newhall	Individual	June 19, 2013
David Lockwood	Individual	June 21, 2013
Susan Hutchinson	Individual	June 27, 2013
Tom Cepernich	Individual	June 28, 2013
Ralph Aguin (s.p.)	Individual	July 1, 2013
Constance Beutel	Individual	July 1, 2013
Sylvia Francisco	Individual	July 1, 2013
Nancy Carey	Individual	July 1, 2013
Larry Fullington	Individual	July 1, 2013
Richard Lim	Individual	July 1, 2013
John Ord	Individual	July 1, 2013
Bea Reynolds	Individual	July 1, 2013
Tim Rose	Individual	July 1, 2013
Rick Slizeski	Individual	July 1, 2013
Pat Toth-Smith and Andy Smith	Individual	July 1, 2013
Don and Gail Stock	Individual	July 1, 2013
Janeen Thomas	Individual	July 1, 2013
Marilyn Bardet	Individual	July 1, 2013
Roger Green	Individual	July 1, 2013
Jerome Page	Individual	July 1, 2013
Jim Ponder	Individual	July 1, 2013
Roger Straw	Individual	July 1, 2013
Steven Goetz	Individual	July 1, 2013
Mary Frances Kelly Poh	Individual	July 1, 2013
Ed Ruszel	Individual	July 1, 2013
Jack Ruszel	Individual	July 1, 2013
Jon Van Landschoot	Individual	July 1, 2013
Kathy Kerridge	Individual	July 1, 2013
Late Received Letters		
Ken Chiang, P.E.	California Public Utilities Commission	July 2, 2013
Ben Espinoza	Cement Masons Local 400	July 2, 2013
Dan Smith	Individual	July 2, 2013
Jeff McEuen	Iron Workers Union Local No. 378	July 3, 2013
Melvin Breshears	Heat and Frost Insulators and Allied Workers Local Union No. 16	July 5, 2013
Sandra Kozak	Individual	July 5, 2013

TABLE 2 (Continued)
PARTIES SUBMITTING COMMENTS DURING
THE VALERO CRUDE BY RAIL PROJECT INITIAL STUDY COMMENT PERIOD

Name	Organization	Date/Received Date
Late Received Letters (cont.)		
Dave Shipley	Individual	July 8, 2013
Diane Bailey and Elizabeth Forsyth	Natural Resources Defense Council	July 9, 2013
Nancy Steele	Individual	July 10, 2013
Rick Slizeski	Individual	July 10, 2013
Richard Freeman	Individual	July 10, 2013
Sabina Yates	Individual	July 11, 2013
Larnie Fox	Individual	July 11, 2013
Nikki Basch-Davis	Individual	July 11, 2013
Mary Frances Kelly-Poh	Individual	July 11, 2013
Kim White	Individual	July 11, 2013
Kathy Kerridge	Individual	July 11, 2013
Steve and Marty Young	Individual	July 11, 12 and 22, 2013
Marilyn Bardet	Individual	July 11, 17 and 29, 2013
George Oakes	Individual	July 19, 2013
Priscilla Whitehead	Individual	July 20, 2013
Roger Straw	Individual	July 26, 2013
Eric Hoglund	Benicia Chamber of Commerce	July 29, 2013

Issues to Be Considered under CEQA

Project Description

- The full scope of the proposed Project is not being evaluated, specifically utilizing tar sands and diluted bitumen from Canada as new sources of crude.
- Include a detailed description of train operations, including train routes, scheduling, potential side lining of empty or loaded crude unit trains within the Benicia Industrial Park and elsewhere. Describe how the trains will be staffed, what kind of rail cars would be used (DOT Class), and the safety of the cars.
- Describe the properties and parameters of crude oil to be transported and refined.
- Clarify Valero's intent to import crude from tar sands.
- Refining the crude oil being brought in by train must be included in the project scope.
- Include an updated site plan.
- Rail operations controlled by Union Pacific must be considered part of the indirect operations that could contribute to offsite, indirect impacts.

- Include proposed lighting in the project description.
- Include a detailed discussion of proposed offloading procedures.
- Describe plans for disposal of petroleum coke.
- Describe the staging of rail cars, including how far off the Valero-Benicia property they will be allowed to extend and how many cars will be stockpiled at any given time.
- Describe the maintenance factors associated with condition and safety of the rails under usage by the proposed Project.

Aesthetics

- Consider the visual impacts of the proposed Project on the Benicia Industrial Park.

Air Quality

- Quantify sulfur emissions and associated odors. Specify how odor impacts to the City of Benicia can be mitigated and if odors would increase with use of unconventional crudes.
- The EIR should explain the BAAQMD permitting process and how it relates to the permits required by the City of Benicia. Explain the timing and provide any information or determinations generated by the BAAQMD for the proposed Project.
- The EIR should consider impacts related to refining the crude oil brought in by the proposed Project in addition to the impacts of the rail terminal and storage tanks. This includes benzene and other toxic emissions resulting from transport, handling and refining crude oils with lower APIs, higher sulfur or higher chemical contaminant levels than the existing crude. The EIR should evaluate and mitigate contaminant emissions such as chromium, nickel, and vanadium. Assess emissions from increased boiler use, heating, steam, hydro-treating, hydrogen use, and other processing. Evaluate additional emissions from more corrosive new crude oils brought in by the proposed Project contributing to an increased frequency of accident, upset, and flaring events at the Refinery; creation of additional toxic byproducts such as petroleum coke, including evaluation of coke dust and toxic constituents with coke dust particles.
- Include mitigation measures such as legally binding requirements to ensure engines meet the latest USEPA emission standards on all diesel equipment, generators, vehicles and locomotives; robust enforcement of engine idling limits; electronic positioning systems for rail cars in the terminal; a permit condition that limits the sulfur levels and levels of other hazardous constituents in crude oil and sets parameters for the quality of crude oil such as a minimum allowable API, in order to reduce the impacts of the proposed Project; and all measures appropriate to address increased refinery emissions resulting from the proposed Project.
- Present and discuss the latest research pertinent to air quality resulting from toxic air emissions and airborne particulate matter.
- Evaluate the impact of the proposed Project on sensitive receptors in the area.

- Estimate vapors escaping during offloading and refining procedures.
- Discuss potential for petroleum coke emissions.
- The assumptions used in the air quality report by ERM, consultant to the applicant are flawed and underestimate air emissions.
- The emissions estimates include the assumption that one locomotive per train would be used when elsewhere in the document states that two or three locomotives would be used per train. Further, the engines are assumed to run for 2 hours when the unloading process would last 8 to 10 hours.

Biological Resources

- The EIR must document the presence of two federally listed endangered species, the Soft Bird's Beak and the Suisun Song Sparrow. The trains pass through the Suisun Marsh, which is a shallow tidal estuary in the Pacific Flyway, in which migratory birds from Alaska travel as far as Patagonia and back. Migratory bird treaties must also be addressed.
- Address effects of hazardous materials spilling into marsh, delta, Carquinez Straight, or Sulphur Springs Creek, which is adjacent to the train tracks and empties into the Suisun Delta, and effects on biological species.
- Request for the EIR to discuss the terms "ecology" and "ecosystem" as equivalent words to "environment".
- Note that there is no tidal gate at the mouth of Sulphur Springs Creek.

Climate Change

- Commenter requested that greenhouse gas emissions produced from obtaining the crude, transporting it, and refining it be estimated.
- Address conformance of the proposed Project with AB32.

Hazards & Hazardous Materials

- Summarize existing and proposed emergency planning efforts and applicable documents.
- Provide specifics on train operations including time needed for train to stop when operating at top speed through Benicia, the length of the trains proposed, what is the explosive force of each tanker car in the event of a crash and the fuel igniting, and how large of an area would be flattened in the event all 50 card ignited.
- Explain what would happen in the event of a derailment in the vicinity of the Industrial Park or any areas the train would pass through. How would first responders be informed about the contents of the cars and be trained to respond to diluted bitumen spills.
- Include mitigation measures in the EIR to address drippings that will take place while transferring oil from the tank cars to the Refinery.

- The EIR must assess and present appropriate mitigation strategies and alternatives for the full range of increased hazards that could result from the proposed Project, including rail car derailment, accidents, fires and spill at any point along the rail line or in the terminal.
- In the event of a leaking tank or an accident related to handling and storage of the crude oil, are adequate emergency response personnel available to respond and does Valero have sufficient response and containment equipment.
- Describe how Valero staff is trained for an effective and safe response.
- Discuss the ability of the proposed Project to accommodate more corrosive crude oils and any upgrades that may be required.
- Describe and analyze emergency response personnel and equipment available.
- The EIR should evaluate the capacity of the Union Pacific Railroad in the event of a spill and compare it to ship transport safety.
- Address hazardous material clean up procedures.
- Consider implementation of an emergency program as a mitigation measure.
- Discuss public health impacts associated with refining diluted bitumen.
- List and describe all guidelines and all applicable laws pertaining to rail transport of hazardous materials, including at grade crossings. Identify any regulations applicable if the trains come in close proximity to sensitive receptors.
- Describe safety standards for rail cars and emergency plans to address runaway trains.
- Include discussion of the County's involvement in an emergency situation such as a spill.
- Describe how Valero and Union Pacific interact in case of an emergency.

Hydrology and Water Quality

- Address impacts from spills at the project site to Sulphur Springs Creek, which is located less than 60 feet from the facility.
- Address impacts resulting from a spill near the Suisun Marsh or other waterway.

Noise

- The EIR should analyze and mitigate increased rail activity, particularly at night and including horns and the additional trains.
- Consider all appropriate mitigation measures, including grade separation.

Public Services

- Describe the ability of the applicable agencies to respond to emergencies.

Transportation/Traffic

- Include mitigation measures to reduce Project impacts on Interstate 680, in particular the intersection of I-680 and Bayshore Road.
- Evaluate the increase in traffic along the entire Union Pacific train corridor.
- The EIR must include a traffic study addressing mitigation measures to prevent traffic from backing up on the freeway from the exit ramp, a grade separation to address traffic and safety hazards, and mitigation measures to address impacts to emergency response access and response times to ensure that the additional rail crossings would not hinder ambulances and other emergency vehicles from reaching Benicia residents.
- The EIR must include an extensive discussion of rail facilities outside Valero property, including existing rail movement through the property.
- Rail traffic from AMPORTS Benicia Terminal should be included in the environmental setting of the EIR.
- Discuss existing, proposed, and future improvements.
- Include a discussion on federal, state, and local authority governing railroads.
- Include applicable mitigation measures to reduce traffic impacts.
- Address safety at existing and proposed at-grade crossings at tracks that serve or are near the Valero Refinery.
- Describe the regulatory framework guiding interstate and intrastate transport of fossil fuels, including at grade crossings. Detail the conditions of authority and enforcement of the regulations relevant to the proposed Project.
- Consider impacts to passenger rail service and potential delays.
- Address traffic movement and potential queuing at Park Lane. Does the analysis assume drivers would utilize the two-way turn lane? Would this be supported by the City or the California Manuel of Uniform Traffic Control Devices?
- IS/MND Mitigation Measure TRANS-2 is inaccurate as it does not discuss emergency services to businesses that could be completely blocked by rail traffic along Bayshore Road.
- Include a switching plan for the Union Pacific Railroad.
- Consider limiting trains to 50 cars per day until a switching plan has been approved.
- Consider a signal to warn of stopped traffic on I-680 offramp.
- Consider modifying the off ramp to be two lanes with a right-hand turn lane.
- Add signage at Park and Industrial to warn of traffic delays.

- Increased tolerance of at-grade crossing delays in the industrial area is questioned.
- Revisit traffic impacts on the I-680 off ramp caused by at-grade crossings.
- Consider impact of stopped trains blocking access to private properties outside the Refinery.
- Evaluate the use of the Y-connector for on-site storage of trains
- Evaluate the impacts of derailment

Socioeconomics

- Consider the economic impacts of the proposed Project on the Community Development Department and other city offices during the permitting process and construction, the financial impacts of emergency response and clean up after an emergency spill, fire, explosion or other disaster on Valero's property or rail lines; financial impacts on current and future businesses in the Benicia Industrial Park; financial impact to the City of Benicia and on healthcare for Refinery workers, industrial park owners and employees and Benicia residents. All should be calculated over a period of at least 50 years.
- How will the proposed Project negatively impact new businesses and the retention of current businesses in the Benicia Industrial Park.
- Address how increased traffic would affect new and existing businesses and employees.
- How will the reduction in shipment by marine vessel impact existing jobs at the port.

Energy

- Include in the EIR accurate calculations of the proposed Project's energy demand.
- Assess the increased energy demand associated with refining heavy bitumen.

Cumulative

- The EIR must consider other projects involving oil importation that are planned in the Bay Area.
- Evaluate cumulative GHG impacts and noxious pollutant effects resulting from alternative sources of crude.
- Discuss an increase in the total Bay Area refining capability enabled by the WesPac Petroleum Storage Depot.
- Include offsite emissions at WesPac Oil Storage Depot, Pittsburg Waterfront Project, and other regional projects.
- Consider cumulative impacts of air pollutants from nearby refineries, including processing diluted bitumen on a regional level.

Alternatives Analysis

- Evaluate a No Project Alternative.
- Rail unloading facility could be located on the lower waterfront to avoid impact to Bayshore Road and Park Road.
- Include an alternative transportation method for analysis in the EIR.

General Comments

- Request to extend the comment period to 60 days and ensure that the Draft EIR public comment period is not in December.
- Encourage the City to consider public safety.
- Support for preparing an EIR rather than a MND.
- Health and safety issues must be addressed.
- The proposed Project is not a “green” alternative.
- Train track construction has commenced at the site already.
- All communities that may be affected by the rail transport with potential oil spills, sulfur dioxide air pollution and GHG emissions should be notified.
- Valero VIP EIR did not acknowledge the need to increase rail traffic.
- Requests to incorporate all comments on the IS.
- Request to include the following sections in the EIR: Public Health, Public Safety, Land Use, Energy, Noise, Aesthetics, Visual Quality, Light and Glare, Public Safety and Utilities, Growth Inducing Impacts and Urban Blight, Marine Terminal Operations, Greenhouse Gas Emissions, and Cumulative Impacts.
- Provide background information on existing shale in the Midwest and gas wells in Texas and Oklahoma that demonstrate a boom in the availability of unconventional crudes.
- Implement Benicia Air Monitoring Program.
- Reject the Valero IS/MND and require a full EIR.
- General support for the proposed Project.
- AMPORTS would be unaffected by the proposed Project.
- EIR should consider the entire length of the rail.
- EIR should document Valero’s statement that this would decrease the dependency on foreign oil.

APPENDIX A

Notice of Preparation

This page intentionally left blank

CITY HALL • 250 EAST L STREET • BENICIA, CA 94510 • (707) 746-4200 • FAX (707) 747-8120

To: Office of Planning and Research
P.O. Box 3044
Sacramento, CA 95812-3044

From: City of Benicia
250 East L Street
Benicia, CA 94510

Subject: NOTICE OF PREPARATION (NOP) OF AN ENVIRONMENTAL IMPACT REPORT (EIR) AND NOTICE OF SCOPING MEETING: Valero Crude by Rail Project

Date: August 9, 2013

On May 31, 2013 the City of Benicia issued a Notice of Intent (NOI) to adopt a Mitigated Negative Declaration (MND) for the Valero CBR project. The issuance of the NOI started a 30-day comment period, which concluded at 5 PM, Monday, July 1, 2013. During the comment period the City received 34 written comments. Subsequent to the closure of the MND comment period the City received an additional 27 written comments as of August 2, 2013.

On July 11, 2013 the Planning Commission held a public meeting on the Valero CBR project. During the meeting 31 speakers commented on the project, in addition to questions from the Planning Commission.

The City received voluminous comments on the draft MND. Many of the comments stated that the project may have a significant effect on the environment, such that the City should prepare an Environmental Impact Report pursuant to CEQA Guidelines Section 15064. In light of the comments, Section 15064, and the desire to ensure full consideration of all environmental issues, the City has decided to prepare an Environmental Impact Report for the project.

Additional information on the project can be found on the City's website at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC={C45EA667-8D39-4B30-87EB-9110A2F9CE13}

Project Description:
The proposed Valero Crude by Rail Project would allow the Valero Benicia Refinery (Refinery) access to additional North American-sourced crude oil for delivery to the Refinery by railroad. The proposed Project would involve the installation and

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
TOM CAMPBELL, *Vice Mayor* . ALAN M. SCHWARTZMAN . MARK C. HUGHES . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
H.R. AUTZ, *City Treasurer*
LISA WOLFE, *City Clerk*

Recycled Paper

Refinery by railroad. The proposed Project would involve the installation and modification of Refinery non-process equipment that would allow the Refinery to receive a portion of its crude oil deliveries by railcar replacing equal quantities of crude currently being delivered to the Refinery by marine vessel. Valero intends to replace up to 70,000 barrels per day of the crude oil currently supplied to the Refinery by marine vessel with an equivalent amount of crude oil transported by railcars. The crude oil to be transported by railcars is expected to be of similar quality compared to existing crude oil imported by marine vessels. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.

Location of the Project
The Valero Refinery is located at 3400 East Second Street, Benicia.

Issues To Be Addressed In The EIR
The EIR will identify the potentially significant environmental effects of the Project, including those resulting from its construction, operation and maintenance. The EIR also will discuss and analyze a reasonable range of alternatives to the Project, including a No Project alternative, and alternatives to the Project that could attain most of its basic objectives while avoiding or reducing any of its significant environmental effects.

Below is a list of the project's potentially significant effects:

Air Quality: Potential air quality impacts during project construction would be reduced by implementation of Bay Area Air Quality Management District's basic control measures during construction.

Biological Resources: Construction activities would avoid nesting season impacts to nesting birds, and buffers would be implemented if nesting birds are identified.

Cultural Resources: Inadvertent discovery of cultural or paleontological resources or human remains would be mitigated by cessation of construction activities, notification of relevant authorities, and proper treatment of resources.

Geology and Soils: Implementation of recommendations contained in a site-specific geotechnical report would reduce impacts regarding groundshaking, liquefaction, and landslide hazards.

Hazards and Hazardous Materials: Potential impacts from upset and accident conditions during transportation of crude oil to the refinery would be investigated in detail and evaluated against existing risks of crude oil transportation by marine vessels.

Hydrology and Water Quality: Implementation of a storm water management plan would reduce water quality impacts during project construction.

Transportation/Traffic: Potential impacts regarding train crossings would be reduced through train scheduling and coordination between the City's Fire and Police Departments and the refinery's emergency response team.

Public Scoping Period for this Notice of Preparation
State law mandates a 30-day time limit after the date of the NOP for the scoping period. The scoping period for this Project begins on Friday, August 9, 2013 and closes at 5:00 p.m. on Friday, September 12, 2013. Public comments received will become part of the public record. Please include a name, organization (if applicable), address, and e-mail address of a contact person on all written comments for future notification related to this process.

Please send your comments to:

Amy Million, Principal Planner
Community Development Department
250 East L Street
Benicia, CA 94510
Fax: (707) 747-1637
amillion@ci.benicia.ca.us

Scoping Meeting
In order for the public and regulatory agencies to have an opportunity to submit comments on the scope of the EIR for the Project, a meeting will be held during the scoping period at the next regularly scheduled Planning Commission meeting. The meeting will be held:

Thursday, September 12, 2013
7:00 p.m. – 9:00 p.m.
City Hall Council Chambers
250 East L Street
Benicia, CA 94510

Following a brief presentation, interested parties will be provided an opportunity to provide comments about the Project. Written comments also may be submitted anytime during the NOP scoping period to the address or facsimile number provided above.

REMINDER:
All comments will be accepted by postmark, facsimile or email through 5 p.m. Friday September 13, 2013. Please be sure to include your name, organization (if applicable), address, and e-mail address. If you submit by email, your email will not be considered accepted until you received an email to confirm it was received.

APPENDIX B

Newspaper Notices

This page intentionally left blank

THE CITY OF BENICIA CALIFORNIA

PUBLIC NOTICE

Subject: NOTICE OF PREPARATION (NOP) OF AN ENVIRONMENTAL IMPACT REPORT (EIR) AND NOTICE OF SCOPING MEETING: Valero Crude by Rail Project

Date: August 9, 2013

On May 31, 2013 the City of Benicia issued a Notice of Intent (NOI) to adopt a Mitigated Negative Declaration (MND) for the Valero CBR project. The issuance of the NOI started a 30-day comment period, which concluded at 5 PM, Monday, July 1, 2013. During the comment period the City received 34 written comments. Subsequent to the closure of the MND comment period the City received an additional 27 written comments as of August 2, 2013.

On July 11, 2013 the Planning Commission held a public meeting on the Valero CBR project. During the meeting 31 speakers commented on the project, in addition to questions from the Planning Commission.

The City received voluminous comments on the draft MND. Many of the comments stated that the project may have a significant effect on the environment, such that the City should prepare an Environmental Impact Report pursuant to CEQA Guidelines Section 15064. In light of the comments, Section 15064, and the desire to ensure full consideration of all environmental issues, the City has decided to prepare an Environmental Impact Report for the project.

Additional information on the project can be found on the City's website at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC={C45EA667-8D39-4B30-87EB-9110A2F9CE13}

Project Description:
The proposed Valero Crude by Rail Project would allow the Valero Benicia Refinery (Refinery) access to additional North American-sourced crude oil for delivery to the Refinery by railroad. The proposed Project would involve the installation and modification of Refinery non-process equipment that would allow the Refinery to receive a portion of its crude oil deliveries by railcar replacing equal quantities of crude currently being delivered to the Refinery by marine vessel. Valero intends to replace up to 70,000 barrels per day of the crude oil currently supplied to the Refinery by marine vessel with an equivalent amount of crude oil transported by railcars. The crude oil to be transported by railcars is expected to be of similar quality compared to existing crude oil imported by marine vessels. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.

Location of the Project
The Valero Refinery is location at 3400 East Second Street, Benicia.

Issues To Be Addressed In The EIR
The EIR will identify the potentially significant environmental effects of the Project, including those resulting from its construction, operation and maintenance. The EIR also will discuss and analyze a reasonable range of alternatives to the Project, including a No Project alternative, and alternatives to the Project that could attain most of its basic objectives while avoiding or reducing any of its significant environmental effects.

Below is a list of the project's potentially significant effects:

PUBLIC NOTICE

Subject: NOTICE OF PREPARATION (NOP) OF AN ENVIRONMENTAL IMPACT REPORT (EIR) AND NOTICE OF SCOPING MEETING:
Valero Crude by Rail Project

Date: August 9, 2013

On May 31, 2013 the City of Benicia issued a Notice of Intent (NOI) to adopt a Mitigated Negative Declaration (MND) for the Valero CBR project. The issuance of the NOI started a 30-day comment period, which concluded at 5 PM, Monday, July 1, 2013. During the comment period the City received 34 written comments. Subsequent to the closure of the MND comment period the City received an additional 27 written comments as of August 2, 2013.

On July 11, 2013 the Planning Commission held a public meeting on the Valero CBR pro[illegible] During the meeting 31 speake[illegible] commented on the project, in addition to questions from the Planning Commission.

The City received voluminous comments on the draft MND. Many of the comments stated that the project may have a significant effect on the environment, such that the City should prepare an Environmental Impact Report pursuant to CEQA Guidelines Section 15064. In light of the comments, Section 15064, and the desire to ensure full consideration of all environmental issues, the City has decided to prepare an Environmental Impact Report for the project.

Additional information on the project can be found on the City's website at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC={C45EA667-8D39-4B30-87EB-9110A2F9CE13}

Project Description:
The proposed Valero Crude by Rail Project would allow the Valero Benicia Refinery (Refinery) access to additional North American-sourced crude oil for delivery to the Refinery by railroad. The proposed Project would involve the installation and modification of Refinery non-process equipment that would allow the Refinery to receive a portion of its crude oil deliveries by railcar replacing equal quantities of crude currently being delivered to the Refinery by marine vessel. Valero intends to replace up to 70,000 barrels per day of the crude oil currently supplied to the Refinery by marine vessel with an equivalent amount of crude oil transported by railcars. The crude oil to be transported by railcars is expected to be of similar quality compared to existing crude oil imported by marine vessels. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.

Location of the Project
The Valero Refinery is location at 3400 East Second Street, Benicia.

Issues To Be Addressed In The EIR
The EIR will identify the potentially sig[illegible] environmental effects of the Project, including those resulting from its construction, operation and maintenance. The EIR also will discuss and analyze a reasonable range of alternatives to the Project, including a No Project alternative, and alternatives to the Project that could attain most of its basic objectives while avoiding or reducing any of its significant environmental effects.

Below is a list of the project's potentially significant effects:

Air Quality: Potential air quality impacts during project construction would be reduced by implementation of Bay Area Air Quality Management District's basic control measures during construction.

Biological Resources: Construction activities would avoid nesting season impacts to nesting birds, and buffers would be implemented if nesting birds are identified.

Cultural Resources: Inadvertent discovery of cultural or paleontological resources or human remains would be mitigated by cessation of construction activities, notification of relevant authorities, and proper treatment of resources.

Geology and Soils: Implementation of recommendations contained in a site-specific geotechnical report would reduce impacts regarding groundshaking, liquefaction, and landslide hazards.

Hazards and Hazardous Materials: Potential impacts from upset and accident conditions during transportation of crude oil to the refinery would be investigated in detail and evaluated against existing risks of crude oil transportation by marine vessels.

Hydrology and Water Quality: Implementation of a storm water management plan would reduce water quality impacts during project construction.

Transportation/Traffic: Potential impacts regarding train crossings would be reduced through train scheduling and coordination between the City's Fire and Police Departments and the refinery's emergency response team.

Public Scoping Period for this Notice of Preparation
State law mandates a 30-day time limit after the date of the NOP for the scoping period. The scoping period for this Project begins on Friday, August 9, 2013 and closes at 5:00 p.m. on Friday, September 13, 2013. Public comments received will become part of the public record. Please include a name, organization (if applicable), address, and e-mail address of a contact person on all written comments for future notification related to this process.

Please send your comments to:

Amy Million, Principal Planner
Community Development Department
250 East L Street
Benicia, CA 94510
Fax: (707) 747-1637
amillion@ci.benicia.ca.us

Scoping Meeting
In order for the public and regulatory agencies to have an opportunity to submit comments on the scope of the EIR for the Project, a meeting will be held during the scoping period at the next regularly scheduled Planning Commission meeting. The meeting will be held:

Thursday, September 12, 2013
7:00 p.m. – 9:00 p.m.
City Hall Council Chambers
250 East L Street
Benicia, CA 94510

Following a brief presentation, interested parties will be provided an opportunity to provide comments about the Project. Written comments also may be submitted anytime during the NOP scoping period to the address or facsimile number provided above.

REMINDER:
All comments will be accepted by postmark or facsimile through 5 p.m. Friday September 13, 2013. Please be sure to include your name, organization (if applicable), address, and e-mail address. If you submit by email, your email will not be considered accepted until you received an email to confirm it was received.

No. 1021
Published Aug. 13, 2013

APPENDIX C

Project Website Notification

This page intentionally left blank

Valero Crude by Rail

Click Here to Sign Up to receive Updates on: Valero Crude by Rail

ANNOUNCEMENT: The City of Benicia will be preparing an EIR for the Valero Crude by Rail Project. The scoping meeting will be scheduled for the September 12, 2013 Planning Commission meeting. A copy of the Notice of Preparation (NOP) and Notice of Completion are available.

August 8th Planning Commission meeting is canceled. Next regularly scheduled Planning Commission meeting is September 12th. **Click here** for more information.

Use Permit Application

Project Description

Project Plans

Initial Study/Mitigated Negative Declaration

- Notice of Intent
- Initial Study/Mitigated Negative Declaration
- Supplemental Reports
  - Draft Transportation Impact Analysis Report, Fehr & Peers May 2013
  - Noise Study, Wilson Ihrig & Associates, March 8, 2013
  - Public Comments
    - Public Comments Received May 30 – July 1, 2013
    - Public Comments Received July 2 - July 5, 2013
    - Public Comments Received July 6 - July 11, 2013
    - Public Comments Received July 11 - August 8, 2013
    - Supplemental Documents for NRDC Comment
      - Goodman Group Report
        - Appendix A

Search

In City Departments:

City Manager
City Attorney
Bus / Transit Services
Community Development
Building
Planning
Housing Element Adoption
Current Projects
Valero Crude by Rail
Forms & Information
General Plan
Zoning
Finance
Fire
Library
Parks & Community Services
Police
Public Works
Employees Access

Printer-friendly Version

- Appendix B
- Appendix C
- Appendix D
- Appendix E
- Appendix F
- Appendix G
- Appendix H
- Appendix I

- Report by Dr. Phyllis Fox
- Resume - Dr. Phyllis Fox
- NRDC Volume 1
- NRDC Volume 2

Use Permit Application (pdf)
Project Description (pdf)
Project Plans (pdf)
Initial Study/Mitigated Negative Declaration (pdf)
Noise Study (pdf)
Valero_CBR_Notice_of_Completion.pdf
CBR_Notice_of_Preparation.pdf
Goodman Group Report (pdf)
Appendix A - Goodman Resume (pdf)
Appendix B - Rowan Resume (pdf)
Appendix C - Valero Investor Relations (pdf)
Appendix D - Valero Presentation UBS Oil and Gas (pdf)
Appendix E - Valero Presentation : Refining 101 (pdf)
Appendix F - Refinery Tour 7/9/07
Appendix G - Refinery Tour 8/17/10 (pdf)
Appendix H - Marathon Petroleum - Refining 101 (pdf)
Appendix I - CCQTA Presentation (pdf)
Report by Dr. Phyllis Fox (pdf)
NOI_-_Final_(color).pdf
Draft_Transporation_Impact_Analysis_May_2013.pdf
Resume_Phyllis_Fox_Ph.D.pdf
NRDC Volume 1 (pdf)
NRDC Volume 2 (pdf)
Valero_Crude_by_Rail_Project_Public_Comments_received_May_30_-_July_1_2013.pdf
Public Comments Received July 2 - July 5, 2013 (pdf)
Public Comments Received July 6 - July 11, 2013 (pdf)
Public Comments Received July 11 - August 8, 2013 (pdf)

APPENDIX D

Scoping Meeting Presentations

This page intentionally left blank

City of Benicia
Scoping Meeting
for the
Valero Crude by Rail
Project

The presentation will include:

- An overview of the Environmental Impact Report (EIR) Process by City staff.
- A description of the proposed Crude by Rail project by Valero representatives.
- A summary of the environmental impacts already identified to be addressed in the EIR by the City's consultant.

Overview of the Environmental Impact Report (EIR) Process

The following are the steps in the EIR process:

1. Initial Study MND
2. Scoping
3. Draft EIR
4. Final EIR with response to comments
5. Certify EIR and MMRP
6. Notice of Determination

1. Initial Study / MND

The City retained the consulting firm, ESA, to prepare the Initial Study.

An IS/MND was prepared and circulated May 30- July 1, 2013.

- 34 written comments
- 27 additional written comments

1. Initial Study/ MND cont.

The project application, public comments, Initial Study/Mitigated Negative Declaration can be reviewed at:

1. Community Development Department office in City Hall
2. Library
3. City's website at www.ci.benicia.ca.us

2. Scoping

The purpose of the scoping session is to help determine what new environmental issues are raised by the project, in addition to those raised during the IS/MND comment period, and how those issues should be addressed in the EIR.

Started on August 9, 2013 with the circulation of the “Notice of Preparation.”

2. Scoping cont.

All interested parties are invited to comment on what issues should be addressed in the EIR including:

- Community Members
- Local Agencies
- Regional Agencies
- State Agencies
- Other members of the Public

2. Scoping cont.

State and Regional agencies contacted:

- ✓ Dept. of Conservation
- ✓ Dept. of Fish and Wildlife
- ✓ Office of Historic Preservation
- ✓ Dept. of Parks and Recreation
- ✓ Resources, Recycling and Recovery
- ✓ California Highway Patrol
- ✓ Caltrans
- ✓ Air Resources Board
- ✓ Regional Water Quality Control Board
- ✓ Resources Agency
- ✓ Dept. of Toxic Substances Control
- ✓ Native American Heritage Commission
- ✓ Public Utilities Commission
- ✓ State Lands Commission
- ✓ Office of Emergency Services
- ✓ Bay Conservation and Development Commission
- ✓ Solano County Clerk
- ✓ Dept. of Water Resources

3. Draft EIR

Following the scoping period, the consultants complete the preparation of a draft EIR, in consultation with the City of Benicia and agencies which have a regulatory role.

The Draft EIR will outline how the project will affect the physical environment, what impacts are significant and what the potential mitigations may be.

3. Draft EIR cont.

The City will give public notice to the public, adjacent jurisdictions, affected state and regional agencies that the Draft EIR for CBR is available.

The preliminary schedule anticipates that the Draft EIR will be released in early October, 2013.

The Draft EIR review period will be 45 days

Planning Commission meeting on Draft EIR

4. Final EIR and preparation of the Response to Comments

The EIR consultant will prepare written responses to testimony received at the Planning Commission's public meeting and to all written comments received in the public comment period.

The preliminary schedule anticipates that the Response to Comments will be released in December 2013.

The Response to Comments on the Draft EIR are published at least 10 days before the public hearing to consider certifying the EIR.

5. Certify EIR and MMRP

The Planning Commission will hold a public hearing to consider whether the EIR adequately describes all significant potential environmental impacts and identifies potential mitigations for such impacts.

As part of certifying an EIR, the Commission would adopt a Mitigation Monitoring Program which indicates how the various mitigations would be carried out.

5. Certify EIR and MMRP cont.

The Planning Commission will also consider the Use Permit for CBR and decide whether to approve the project and with what conditions.

The preliminary schedule anticipates that this hearing will be held in early 2013.

5. Certify EIR and MMRP cont.

The certified EIR and the **Mitigation Monitoring & Reporting Program** would be used throughout the process of building the Crude by Rail Project:

To ensure that the project is carried out in compliance with the mitigations; and

To ensure that the project constructed is consistent with the project evaluated in the EIR.

6. Notice of Determination

Once final action has been taken on the project, the City files the “Notice of Decision” (NOD) with the County Clerk .

The certification of the EIR and filing of the NOD concludes the EIR process. However, if the action on the EIR are appealed to the City Council or challenged in Court, there could be additional hearings or actions.

Presentation:
Crude by Rail project
by Valero

Valero Benicia Refinery
Crude-by-Rail Project

Project Description

Proposed Construction

- Rail Track Constructing two offloading rail spurs, and a parallel railcar storage and departure spur on refinery property to allow receipt of rail cars at an offloading rack.

- Offloading Rack Installing one offloading rack on refinery property capable of offloading two parallel rows of crude rail cars and transferring crude to a refinery storage tank.

- Crude Pipeline Installing approximately 4,000 feet of piping and associated components and infrastructure on refinery property between the offloading rack and existing crude storage tanks.

- Other Relocating approximately 1,500 feet of tank farm dike wall and an existing firewater pipeline on refinery property to accommodate the new rail tracks and offloading rack, and relocating a service road adjacent to offloading rail spurs.

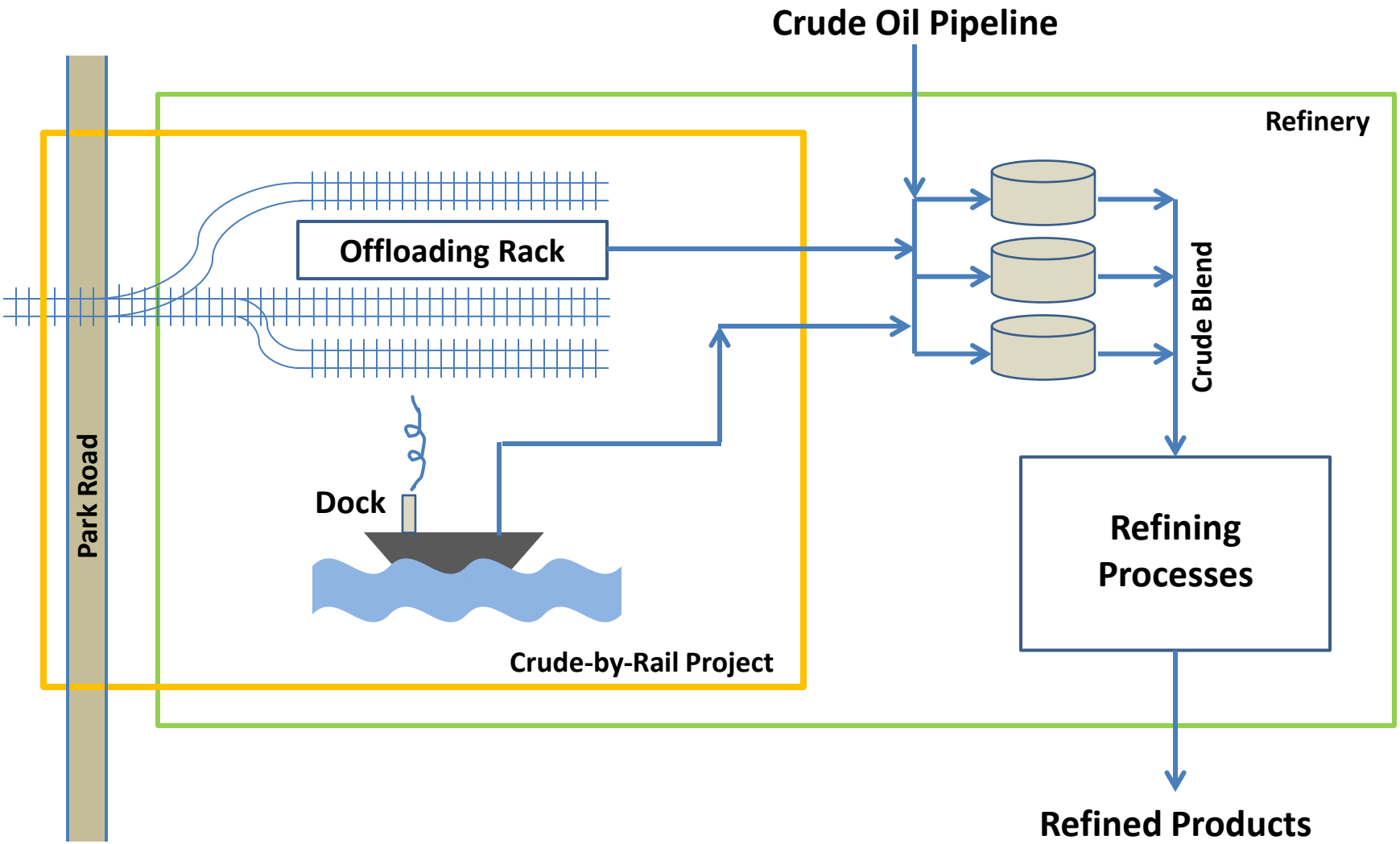
Proposed Activity

- Crude Deliveries by Rail Increasing the volume of crude delivered by railcar by up to 70,000 barrels per day (maximum of 100 rail cars per day, in either one or two deliveries per day).

- Crude Deliveries by Ship Decreasing the volume of crude oil delivered by ship by up to 70,000 barrels per day (which equates to approximately 73 less ship deliveries per year).

- Work Force The project would require at least 20 additional full-time employees or contractors working at the refinery.

September 12, 2013



Valero Benicia Refinery
Crude-by-Rail Project Description

September 12, 2013

Presentation:
A summary of the environmental impacts by ESA

Overview of EIR Scope

- ❑ Aesthetics
- ❑ Agriculture/Forestry
- ✓ **Air Quality**
- ✓ **Biological. Resources**
- ✓ **Cultural Resources**
- ✓ **Geo, Soils & Seismic**
- ✓ **Greenhouse Gas Emissions**
- ✓ **Energy Conservation**
- ✓ **Hazards/Hazardous Materials**
- ✓ **Hydro/Water Quality**
- ✓ **Land Use & Planning**
- ❑ Mineral Resources
- ✓ **Noise**
- ❑ Population & Housing
- ❑ Recreation
- ✓ **Transportation & Traffic**
- ❑ Utilities & Service Sys.
- ✓ **Cumulative Impacts**
- ✓ **Alternatives**

Major Themes in Public Comments on the IS/MND to be Addressed in the EIR

- Change to Refinery Crude Feedstocks including the source
- Air Quality / Greenhouse Gases / Hazards
- Traffic Impacts / Park Road Crossing / Freeway off ramp
- Impacts to Emergency Response in Benicia
- Train Transport Issues
  - Noise
  - Tank Cars
  - Spill Prevention and Safety

Major Themes in Public Comments on the IS/MND to be Addressed in the EIR (continued)

- Potential Impacts from Spills in Sensitive Habitats
  - Sulfur Springs
  - Suisun Marsh
  - San Pablo and San Francisco Bays
  - Locations outside the Bay Area
- On-site Impacts
  - Corrosion of Equipment
  - Spills
  - Air Quality – Employees / Workers
- Cumulative Impacts
  - Identified CBR projects: Pittsburg Oil Terminal, Phillips 66 - Santa Maria, Tesoro – Martinez, Asphalt Refineries – Bakersfield
  - Relationship of CBR to the VIP

Public comments on EIR Scoping can be made:

At the public scoping meeting (September 12)

By mail to Amy Million, Principal Planner
Community Development Department, City of Benicia, 250 East L Street, Benicia, CA 94510

By fax to: 707 747-1637
By e-mail to: amillion @ci.benicia.ca.us

The 30 day scoping period ends at 5:00 p.m. on Friday, **September 13, 2013**.

APPENDIX E

Scoping Meeting Summary/Notes

This page intentionally left blank

SUMMARY OF THE VALERO CRUDE BY RAIL ENVIRONMENTAL IMPACT REPORT SCOPING MEETING

Staff Present: Brad Kilger, City Manager
Amy Million, Principal Planner
Kat Wellman, Contract City Attorney
Tim Morgan, ESA Environmental Consulting
Cory Barringhaus, ESA Environmental Consulting
Teri Davena, Recording Secretary

The meeting began at 7:10 p.m. following the regular Planning Commission Meeting.

Million introduced staff present and reviewed the process for this meeting and advised that Valero has eliminated the repurposing of tank 1776 from the project.

Wellman discussed the duties and makeup of the Planning Commission.

Million presented a PowerPoint overview of the process to date, the process for this meeting, and future step for review of this project.

Chris Howe, Valero, reviewed the proposed project and reviewed a PowerPoint map of the project.

Tim Morgan, ESA Environmental Consulting, reviewed the process to date, including the themes of comments received, and the continuing process via PowerPoint.

Million provided a reminder of ways and when to submit comments to the EIR Scoping.

Ed Ruszel spoke on traffic issues, particularly concerns about existing and future rail traffic, congestion, access, and public safety. Questioned what improvements UP will need to make to their tracks to handle the project, particularly a Y-connector. Encourages Valero to look at other means of transportation. Encourages the EIR look at UP's infrastructure. Encourages a grade-level separation on Park Road and encourage widening of the Park Road off ramp for I-680. Encourages a better emergency response plan so that driveways to Bayshore businesses are not blocked.

David Jenkins spoke on traffic issues. Commented on the work going on at Valero and UP, yet no permit at this time. Traffic is a serious problem with trains blocking roads, and discussed derailments. An accident response plan should be part of the EIR. The EIR should look at train derailments, spill and air quality impacts from the new trains.

Roger Straw discussed crude mining and rail transport in Canada. He read a letter he received from a citizen of Davis, CA. He wants the EIR to consider the entire length of the rail.

Kathy Kerridge requested a 60-day public comment period on the EIR, but not in December. Would like draft EIR to address the economic impacts to the industrial park. Concerned the draft EIR will be limited in scope, not addressing changes in crude mix and

health concerns. Would like the GHG emissions evaluated from the source of the crude to be evaluated. Reviewed a PowerPoint presentation.

Marilyn Bardet discussed several items she'd like to see added to the draft EIR and provided a bag of pet-coke as example of public health concerns. She concentrated her statements on the Public Health and Public Safety impacts of the project. Also requested that the EIR discuss the global issues and AB32.

Mary Frances Kelly-Poh requested at least a 60 day comment period on the DEIR. She discussed safety plans along the route, and endangered species of plants and birds.

Brant Olson representing National Resources Defense Council discussed rewards v. risks, and encouraged the City to investigate the benefits of the project as stated by Chris Howe. Stating that the EIR should document evidence behind Valero's claims in their presentation such as the following: 1) Decrease in emissions; 2) Decrease in foreign crudes ; and 3) 20 new jobs.

Teagan Clive from the City of Rodeo spoke of similar projects in her town, this project and ESA's involvement in both.

Million thanked everyone for coming, as did Kilger.

Completed at 8:31 pm.

APPENDIX F

Scoping Period Written Comments

This page intentionally left blank

Making San Francisco Bay Better

RECEIVED
SEP 03 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

August 30, 2013

Ms. Amy Million
Community Development Department
250 East L Street
Benicia, CA 94510

SUBJECT: Notice of Preparation for Valero Crude by Rail Project
BCDC Inquiry File SL.BN.6927.1; SCH#: 2013052074

Dear Ms. Million:

Thank you for the opportunity to comment on the Notice of Preparation (NOP) of an Environmental Impact Report for the Valero Crude by Rail Project (EIR). Although the San Francisco Bay Conservation and Development Commission (Commission) has not reviewed the document, the following are staff comments based on our review of the NOP in the context of the Commission's authority under the McAteer-Petris Act (California Government Code Sections 66600 et seq.) and the federal Coastal Zone Management Act (CZMA). The Commission exercises permitting authority over San Francisco Bay to the line of mean high tide, including all sloughs and marshlands lying between mean high tide and five feet above mean sea level. The Commission also has jurisdiction within a shoreline band between the edge of the Bay and a line 100 feet landward and parallel to the shoreline. Any person or government agency wishing to place fill, extract materials, or make any substantial change in use to any land, water or structure within the Commission's jurisdiction requires a permit from the Commission. The Commission can issue a permit if the proposed project is consistent with the McAteer-Petris Act and the provisions of the *San Francisco Bay Plan* (Bay Plan).

The Commission also designates certain shoreline areas for uses that must be located on the waterfront, such as ports and water-related industry (which includes the shipment of crude oil and related products), so as to avoid potential filling of the Bay to accommodate water-related uses where the waterfront has been developed for uses that do not require a shoreline location.

According to your letter to Jaime Michaels of our staff dated August 9, 2013, the project is located outside our "shoreline band" permit jurisdiction; however, the refinery is located within a water-related industry priority use area as shown on Bay Plan Map 2. Under the CZMA, in the event a federal permit, license or federal funding is provided the proposed project, the Commission has the authority to determine whether the activity is consistent with its law and policies. If there will be any such federal involvement associated with the project, the project proponent should contact our Chief of Permits, Bob Batha.

We would be particularly interested to know the status of contingency planning in the event of an accident, whereby the crude, or any petroleum product, carried by rail could adversely affect the coastal zone, particularly in light of the proximity of the rail track to a marsh and wildlife refuge priority use area (see Bay Plan Map 2). We note that the EIR will include an evaluation and comparison of risks associated with rail and tanker vessel transport, and look forward to this discussion. Please contact me at 415.352-3644 or lindas@bcdc.ca.gov should you have any questions.

Sincerely,

LINDA SCOURTIS
Coastal Planner

cc: Katie Shulte Joung, State Clearinghouse

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 286-6053
FAX (510) 286-5559
TTY 711

Flex your power!
Be energy efficient!

RECEIVED
SEP 06 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

September 4, 2013

SOL680059
SOL-680-R2.58
SCH#2013052074

Ms. Amy Million
City of Benicia
250 East L Street
Benicia CA 94510

Dear Ms. Million:

Valero Crude by Rail / Notice of Preparation

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the project referenced above. Please also reference our letter to you dated on 6/27/13 regarding the May 2013 Mitigated Negative Declaration.

Lead Agency
As the lead agency, the City of Benicia (City) is responsible for all plan mitigation, including any needed improvements to State highways. The plan's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures. This information should also be presented in the Mitigation Monitoring and Reporting Plan of the environmental document.

Traffic Impact Study (TIS)
One of Caltrans' ongoing responsibilities is to collaborate with local agencies to avoid, eliminate, or reduce to insignificance potential adverse impacts by local development on State highways.

Please consider in your mitigation measures ways to reduce the impacts your project may have on Interstate (I-) 680. We are particularly concerned about how your project will impact I-680 / Bayshore Road intersection. For instance the Level of Service (LOS) on I-680 Northbound off ramp degrades from LOS D to LOS F. Please find ways to mitigate impacts your project has on these intersection ramps to maintain or improve the LOS.

We recommend using the Caltrans Guide for the Preparation of Traffic Impact Studies (TIS Guide) for determining which scenarios and methodologies to use in the analysis. The TIS Guide is a starting point for collaboration between the lead agency and Caltrans in determining when a TIS is needed. The appropriate level of study is determined by the particulars of a project, the prevailing highway conditions, and the forecasted traffic. The TIS Guide is available at the following website address:
http://dot.ca.gov/hq/tpp/offices/ocp/igr_ceqa_files/tisguide.pdf

The TIS should include:

1. Vicinity map, regional location map, and a site plan clearly showing project access in relation to nearby State roadways. Ingress and egress for all plan components should be clearly identified. ROW should be clearly identified. The maps should also include project driveways, local roads and intersections, parking, and transit facilities.

2. Project-related trip generation, distribution, and assignment. The assumptions and methodologies used to develop this information should be detailed in the study, and should be supported with appropriate documentation.

3. Average Daily Traffic, AM and PM peak hour volumes and LOS on all roadways where potentially significant impacts may occur, including crossroads and controlled intersections for existing, existing plus project, cumulative and cumulative plus project scenarios. Calculation of cumulative traffic volumes should consider all traffic-generating developments, both existing and future, that would affect study area roadways and intersections. The analysis should clearly identify the plan's contribution to area traffic and any degradation to existing and cumulative LOS. Caltrans' LOS threshold, which is the transition between LOS C and D, and is explained in detail in the TIS Guide, should be applied to all State facilities.

4. Schematic illustration of traffic conditions including the project site and study area roadways, trip distribution percentages and volumes as well as intersection geometrics, i.e., lane configurations, for the scenarios described above.

5. Identification of mitigation for any roadway mainline section or intersection with insufficient capacity to maintain an acceptable LOS with the addition of project-related and/or cumulative traffic. As noted above, the project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should also be fully discussed for all proposed mitigation measures.

As a result, we encourage the City to coordinate preparation of the study with our office, and we would appreciate the opportunity to review the scope of work. Further, to ensure the State Highway System can facilitate and fund improvements necessary from the increased demand, we recommend the City develop a regional impact fee program to fund any necessary impacts, that result from the proposed update.

Encroachment Permit

Please be advised that any work or traffic control that encroaches onto the State ROW requires an encroachment permit that is issued by Caltrans. To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans clearly indicating State ROW must be submitted to the address below. David Salladay, District Office Chief, Office of Permits, California Department of Transportation, District 4, P.O. Box 23660, Oakland, CA 94623-0660. Traffic-related mitigation measures should be incorporated into the construction plans prior to the encroachment permit process. See the website linked below for more information: http://www.dot.ca.gov/hq/traffops/developserv/permits.

Should you have any questions regarding this letter, please contact Keith Wayne of my staff by telephone at (510) 286-5737, or by email at keith_wayne@dot.ca.gov.

Sincerely,

ERIK ALM, AICP
District Branch Chief
Local Development – Intergovernmental Review

c: Scott Morgan, State Clearinghouse

Amy Million - RE: SCH 2013052074 Valero Crude Oil by Rail project DMND 07022013 (REVISED: NOP due 09/09/2013)

From: "Chiang, Yen K." <yen.chiang@cpuc.ca.gov>
To: "amillion@ci.benicia.ca.us" <amillion@ci.benicia.ca.us>
Date: 8/28/2013 4:08 PM
Subject: RE: SCH 2013052074 Valero Crude Oil by Rail project DMND 07022013 (REVISED: NOP due 09/09/2013)
CC: "Munoz, Rosa" <rosa.munoz@cpuc.ca.gov>, "state.clearinghouse@opr.ca.gov"...

RECEIVED
AUG 28 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Hi, Amy @ (707) 740-4280:

We re-issue the comment letter on the project.

From: Chiang, Yen K.
Sent: Tuesday, July 02, 2013 2:28 PM
To: 'cknox@ci.benicia.ca.us'
Cc: Munoz, Rosa; state.clearinghouse@opr.ca.gov; Wong, Leo; Fristoe, Daniellia
Subject: SCH 2013052074 Valero Crude Oil by Rail project DMND 07022013

This message's contents have been archived by the Barracuda Message Archiver.
SCH 2013052074 Valero Crude Oil By Rail Project DMND 07022013.pdf (1.02 Kb)

Hi, Charlie @ 707-746-4280:

Attached is a comment letter issued by CPUC on the subject project.
Sorry for the delay in getting the comment letter out to you (due to our email system error).
If you have questions on the letter, pls contact me for clarifications/discussions.

Thanks for the opportunity to provide comments on the project.

(Yen) Ken Chiang, P.E.
Utilities Engineer
Rail Crossings Engineering Section
California Public Utilities Commission
320 West 4th Street, Suite 500
Los Angeles, CA 90013
(213) 576-7076//FAX: 576-7029

CPUC Rail Crossings Engineering Section
http://www.cpuc.ca.gov/crossings/

STATE OF CALIFORNIA EDMUND G. BROWN JR., *Governor*

PUBLIC UTILITIES COMMISSION
320 WEST 4TH STREET, SUITE 500
LOS ANGELES, CA 90013
(213) 576-7083

July 2, 2013

RECEIVED
AUG 28 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Charlie Knox
City of Benicia
250 E. L Street
Benicia, California 94510

Dear Mr. Knox:

Re: SCH# 2013052074; Valero Crude Oil by Rail Project, Valero Benicia Refinery DMND

The California Public Utilities Commission (Commission) has jurisdiction over the safety of highway-rail crossings (crossings) in California. The California Public Utilities Code requires the Commission approval for construction or alteration of crossings and grants the Commission exclusive power on design, alteration, and/or closure of crossings in California. The Commission's Rail Crossings Engineering Section (RCES) has received a copy of the *draft Mitigated Negative Declaration (Land Use Permit Application)* from the State Clearinghouse for the proposed Valero Crude by Rail Project. The City of Benicia (City) is the lead agency.

According to the Land Use Permit Application, Valero Benicia Refinery proposes to construct two (2) offloading rail spurs, a parallel engine runaround track and a "wye connector" track on the refinery property to allow receipt of rail cars at the offloading racks. The traffic associated with the project would be two freight trains per day. These proposed tracks will be connected to the existing Union Pacific Railroad (UPRR) tracks.

The proposed project would affect the existing at-grade highway-rail crossing at Park Road (CPUC # 001-37.32-C) and near Bayshore Road. The potential project impacts on the existing and proposed at-grade crossings along the tracks which serve or are near the Valero Benicia Refinery should be identified, discussed and evaluated for necessary safety improvements and mitigations. This includes considering traffic queuing, weaving, emergency service response, pedestrian circulation patterns or destinations with respect to railroad right-of-way, and compliance with the Americans with Disabilities Act. Mitigation measures to consider include, but are not limited to, the planning for grade separations for major thoroughfares, improvements to existing at-grade highway-rail crossings due to increase in traffic volumes and continuous vandal resistant fencing or other appropriate barriers to limit the access of trespassers onto the railroad right-of-way. All identified crossings shall also comply with the requirements of California Manual on Uniform Traffic Control Devices.

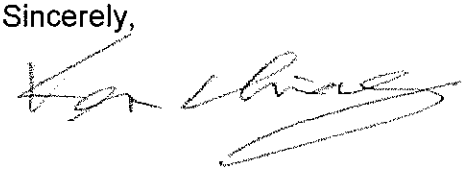
The new tracks shall be constructed in accordance with the Commission General Order (GO) Nos. 26-D (Clearance on railroads and street railroads as to side and overhead structures, parallel tracks and crossings), 72-B (Construction and maintenance – standard

types of pavement construction at railroad grade crossings) and 75-D (Warning devices for at-grade railroad crossings).

Construction of a new public crossing or modification of an existing public crossing requires authorization from the Commission, through the formal application or the General Order (GO) 88-B request processes, respectively. Prior to submission of a formal application or GO 88-B request, the City should arrange a diagnostic meeting with RCES and UPRR to discuss relevant safety issues and requirements for the Commission's authorization. While construction of private crossings may not need the Commission's authorization, compliance with the Commission's GO 26-D (Clearances on Railroads and Street Railroads as to Side and Overhead Structures, Parallel Tracks and Crossings) and GO 75-B (Regulations Governing Standards for Warning Devices for At-Grade Highway-Rail Crossing) standards are still required. RCES representatives are available for consultation on crossing safety matters. See the link for more information: http://www.cpuc.ca.gov/PUC/safety/Rail/Crossings/index.htm.

If you have any questions in this matter, please contact Ken Chiang at (213) 576-7076, yen.chiang@cpuc.ca.gov, or Daniellia Fristoe at (916) 928-2108, dvm@cpuc.ca.gov.

Sincerely,



Ken Chiang, P.E.
Utilities Engineer
Rail Crossings Engineering Section
Safety and Enforcement Division

C: State Clearinghouse
Daniellia Fristoe

MARILYN J. BARDET
333 East K Street, Benicia CA 94510
707-745-9094 mjbardet@comcast.net

September 12, 2013

Amy Million, Principal Planner, Community Development Department
Brad Kilger, City Manager &&
Planning Commissioners
City of Benicia
250 East L Street
Benicia, CA 94510

SUBJECT:
Scoping comments for preparation of the Draft EIR for the Valero Crude-By-Rail Project

Dear Ms. Million, Mr. Kilger and Planning Commissioners,

I fully appreciate the City of Benicia's decision to require preparation of a Draft Environmental Impact Report ["DEIR"] for the Valero Crude-by-Rail Project ["Project" or "Valero Rail Project"]. The voluminous public testimony the City received critical of the conclusions of the Initial Study and recommended Mitigated Negative Declaration [IS/MND] pointed to that necessity. I also appreciate that the City has invited the public to contribute to the preparation of the DEIR through an official scoping process, including the official scoping session scheduled for tonight, September 12th, at the Planning Commission meeting.

I'd read that the DEIR would be intended to be ready for public circulation and review sometime in December-January. Now, tonight at the Scoping, we are told that the DEIR will be ready for circulating to the public by sometime in October for a 45 day review period, and that it would be anticipated that a Response to Comments Document, for public review for 10 days, would be available in December, at which point the Final EIR would be presented to the Planning Commission for its consideration. I want to register here that I am absolutely against scheduling a public review period for any CEQA document, given the apparent rush to get the DEIR prepared, especially the "Response to Comments" document which requires as much review as the DEIR, considering that it is represents the "last word" by the consultant on the subject of public comment and critical review of the DEIR's conclusions. The holiday month of December is typically full of extra family responsibilities and obligations, besides regular jobs. My personal experience of reviewing and commenting on DEIRs over the years, including the Valero Improvement Project DEIR and its Response to Comments, allow me to make this request with justifiable concern. Citizens should not be purposefully disadvantaged in the month of December by having 10 days to study, then comment on a document that could be determinant for approval of a final EIR. The Crude-By-Rail Project has raised extraordinary, critical questions that have opened up the Project to much greater scrutiny and the discussion provided in the DEIR and answers that would be provided by consultants in the Response to Comments doc will deserve very serious attention and focus in preparation for the Planning Commission's hearing on the DEIR. There will be very little extra time for most of us during the holidays for that level of concentrated devotion required to tackle the document and prepare for a final hearing on the Final EIR. Community members should be commended and shown respect for their desire to comment on the sequence of documents, an arduous task at best. I also hereby request that the DEIR review period for the Crude-by-Rail Project be extended to 60 days,

and that the month of December be excluded from any review period of CEQA documents. Thank you in advance for your consideration of my requests, which I know others share.

I believe it would be an appropriate courtesy for the City of Benicia to notify all cities within the region, “up county” and beyond to Roseville, and even farther along the intended train route to Alberta or North Dakota through small towns along the way. After all, the train that exploded in flames and decimated the downtown of Lac-Megantic, Quebec, was meant to “pass through”– go on. Perhaps the notification task would be Valero’s or Union Pacific’s responsibility? By email blast? It would seem more than a gesture. If the Project is approved, unit trains with 50 tanker cars loaded with dangerous crude oil would be rolling through communities on Union Pacific tracks, from the shale plays in the Midwest and tar sands in Alberta through to Benicia’s industrial park and refinery.

I know that I’ve written here more than you could ever want to plow through. I am grateful, just by the thought that you might actually read it all. It’s a measure of my commitment that I’ve given such time and thought to this writing task, because of which many other obligations were put on hold. Part of my effort was spent trying to express the depth of my concern, having read about the tar sands mega-project and the aggressive campaign to promote it by the oil industry and its investors since around 2003, just when the Valero Improvement Project was being presented to the public for review. What and when did Valero’s CEO know about the tar sands opportunity? What did I know then? Not what I know now through my reading[2]! Canadian officials flew to Texas to discuss with leaders in the oil business the prospects for expanding exports of “diluted bitumen” to the US. One name given to the product is “Western Canada Select.” It’s quite likely that Valero’s CEO and investors could have been involved in those early discussions with Albertans that might have prompted or reinforced Valero’s early decision to prepare the refinery, retool it, for processing greater varieties and amounts of sour crudes, as the VIP DEIR had described. After all the technical modifications and upgrades to achieve this goal, Valero is now poised to import unconventional low grade dilbits from the tar sands, albeit they’d rather name the crude from North Dakota’s Bakken shale formation rather than admit they’re aiming for the “money left on the table,” as Valero’s CEO Bill Kleese called it, speaking with investors. Valero Energy Corporation’s given rationale for the Project is to provide access to heretofore inaccessible, advantageously priced North American-sourced unconventional crude oil from Midwest shale formations, and though not admitted to the general public, presumably Western Canada Select from Alberta tar sands. Accessing North American-sourced crude by rail is therefore the *single reason* for the Project proposal, making those particular imported crude products an intrinsic part of the Project, representing the Project’s economic value to Valero. The primary motive for the Project is to increase the refinery’s profit margins, accounting the price-per-barrel discount of tar sands dilbits that could make the Project’s costs zero out after a few years. A very good deal for Valero! But what I see ahead for our community, I also see ahead for the earth and all of life as the climate crisis moves toward irreversibility. It is because of this nexus that I have worked so hard to make my case to get an honest, objective DEIR for review of this Project.

Thank you very much for reading and considering my comments. I can well appreciate the tasks you continue to face in administering this CEQA review process.

Very respectfully,

Marilyn Bardet
member, Good Neighbor Steering Committee

About my Scoping Comments: what they include by reference and citation

The DEIR must be a comprehensive tool for public understanding of the Project and its impacts. It is imperative that the DEIR not piecemeal the Crude-by-Rail Project, as if Project activities and operations were solely confined within Valero property at the proposed rail off-loading rack/terminal. The Project must be portrayed, characterized and analyzed within the full context of its operations on-site and off-site, including rail transport of crude oil by Union Pacific that would be imported by Valero. The Project's direct and indirect impacts must not be reviewed in isolation from those consequences resulting from other similar projects now being considered in the Bay Area. My comments will address these issues.

I request herein that all comments and questions that were *critical of the analyses and conclusions of the IS/MND* and that were officially submitted to the City as part of the official record be incorporated by reference into my Scoping Comments. This would include all comments submitted by me and others, including the National Resources Defense Council [NRDC], as well as reports submitted, the Phyllis Fox Report and the Goodman Group Report, and also, those verbal testimonies offered by members of the public at the Planning Commission hearing on July 11th.

Also, I endorse and wish to incorporate all Scoping Comments submitted to the City by members of the Benicia community, members of the GNSC, Roger Straw, Ed and Jack Ruszel, Bob Berman, NRDC and other citizens who seek to have a thorough, comprehensive DEIR prepared that would disclose the full scope of potential direct and indirect impacts of the Crude-by-Rail Project.

I also request to have incorporated as part of this scoping the comments from residents of Pittsburg that were submitted to the City of Pittsburg on the DEIR for the WesPac Energy Infrastructure Project ["WesPac Project"] proposed for Pittsburg's waterfront, since those comments are pertinent to the review of the Valero Rail Project's foreseeable, potentially significant and cumulative indirect impacts, both projects having enormous repercussions for the Bay Area at large, but also for our particular communities of Benicia and Pittsburg, and all other affected communities hosting refineries, and/or all cities and communities that share the prospect of having 50-car unit trains loaded with unconventional crude chugging through their communities.

I want to express my disappointment that Valero's presentation at the Scoping session held tonite did not reflect any of the concerns raised by citizens at the previous hearing on July 11th or those raised in writing and submitted to the City. There was no hint that Valero really had any concern to answer our questions directly. The company still refuses to talk about the specific sources for the unconventional crudes they intend to import now and over time., the scant description offered about the proposed project's benefits to the community would hardly qualify as reason to permit it.

According to the City's Notice of Preparation [NOP] issued August 9, the DEIR will discuss impacts under the following topics – Air Quality; Biological Resources; Cultural Resources; Geology and Soils; Hazards and Hazardous Materials; Hydrology and Water Quality; Transportation/Traffic. However, <u>given the NOP's limited number of topics listed, the DEIR under preparation would qualify under CEQA guidelines as a "focused EIR,</u>" (not a "full EIR"). I believe that other CEQA topics must be included in this focused DEIR in

order to identify and address the full range of potentially significant and cumulative direct and indirect potentially significant and cumulative impacts resulting from the Project's various operations, on-site and off-site of Valero property. I herein request that additional topic areas be added that are typically found in DEIRs for large-scale industrial projects involving crude oil and other hazardous materials:[1] Public Health; Public Safety; Land Use Plans & Policies; Energy; Noise; Aesthetics, Visual Quality, Light & Glare; Public Services and Utilities; Growth Inducing Impacts & Urban Blight; Marine Terminal Operations; Greenhouse Gas Emissions; Cumulative Effects. My reasons for including these additional topics for the Valero Project DEIR will be made clear through my Scoping Comments.

About the terms "ecology" and "environment"

I request that the DEIR discuss the specific terms "ecology" and "ecosystem" as equivalents of the word "environment," the term used by CEQA especially in reference to a project's potential local and regional negative impacts. The dictionary definition of "ecology" – "the relation of biologic organisms to their physical environment"– makes clear the totality of what CEQA means by "environment." Thus, "environmental protection" means protecting an "ecosystem" encompassing all relations, e.g., those *exchanges* amongst living species with the physical world and conditions in which they find themselves. Humans, wildlife, plants and other forms of biologic life on the land and in waters are in perpetual exchanges of forms of energy in their respective habitats that are dependent for stability on conditions found within them and surrounding them. Those conditions, for whatever natural or man-made cause, are perpetually in flux over time – the critical time period of that flux is what allows for adaption or not. Harm to the environment, therefore, can affect biologic species of all kinds, with their survival and/or ability to adapt in a given area determined by the level of disruption over time to habitat, and causes of disruption and changes, such as industrial or residential development that disrupt the soil and the network of ecologic relations in those surroundings. The ultimate long-term disrupter of existing ecologic order is climate change, which already affects the survival chances of countless species, as scientists have documented for California.[2] The ecology of our local and regional environs is revealed distinctly, from the smallest to the largest evidence that can be discovered and experienced around us. Life depends on the energy of the sun and the quality of the air with its chemical contents, and these essentials determine the earth's climatic conditions for the diverse ecosystems that make up the world's "skin." I would hope that the DEIR would use the term ecology with respect to the need to convey the wide-rippling, relational aspect of *indirect effects* of the Project – how one thing affects another, with an eye to how the continued extraction, processing and consuming and burning of precious fossil fuels contribute to an accelerating climate crisis. Scientific evidence continues to reveal the need to transition to renewable sources of energy for human civilization and to protect the earth's biologic diversity, the wellspring of all life.

The DEIR's purpose, objectives, and what the DEIR must provide and address[3]

---

[1] See Recirculated DEIR (public review ends Sept 13th) for WesPac Energy-Pittsburg LLC's proposed WesPac Energy Infrastructure Project for City of Pittsburg's waterfront, an oil terminal/import/storage/export operation proposed to include import of unconventional crude oil by rail from North American sources to be exported by pipeline to Bay Area refineries. http://www.ci.pittsburg.ca.us/Modules/ShowDocument.aspx?documentid=5651

[2] http://oehha.ca.gov/multimedia/epic/pdf/ClimateChangeIndicatorsReport2013.pdf

[3] CEQA GUIDELINES http://ceres.ca.gov/ceqa/docs/CEQA_Handbook_2012_wo_covers.pdf

Under CEQA, the DEIR's primary **purpose** is to enable the public to review, reasonably understand, fairly evaluate and judge the full scope of the Project, inclusive of its various, foreseeable, potentially significant, as well as *cumulatively considerable*[4] immediate and long-term *direct and indirect* risks and negative impacts posed to local and regional ecology by the "whole of the Project."

The DEIR's **purpose** is also to reveal the best possible solutions for mitigating those impacts that have been analyzed as being potentially significant such that they could result in harm to the environment, human health and safety. The DEIR must allow the public to fairly evaluate and judge the feasibility and effectiveness of specific mitigation measures, to be presented in the DEIR as *completed plans* with monitoring programs that are intended to eliminate or greatly reduce to "less than significant" those impacts identified as "significant" that would foreseeably result from Project activities and operations "on site" and "off site" over the Project's lifespan. The mitigation measures must specifically address the particular risks posed by potential direct and indirect impacts that would be potentially significant and *cumulatively considerable*: for example, negative consequences resulting from the Project's *indirect* emissions impacts to local and regional air quality, and also, foreseeable indirect consequences (accidents, derailments, spills, etc) of transporting crude-by-rail through cities along Union Pacific tracks, potentially threatening public health and safety, and through rural areas, thus posing incredible risks to ecologically fragile and sensitive landscapes. All significant negative direct and indirect impacts must be aggregated as cumulative impacts of the Project that under CEQA must be *"viewed in connection with the effects of past projects, the effects of other current projects and the effects of probable future projects,"*[5] e.g., estimates of aggregated cumulative significant impacts from sources of pollution and transportation hazards, and any and all foreseeable impacts contributed by similar projects being proposed now or anticipated in the near future by other major, large-scale industrial polluters in the region – other refineries and chemical plants. [See further comments].

Thus, the DEIR's **objective** must be to accurately and comprehensively describe and assess the Project's potential direct and indirect impacts foreseeably resulting from operations, on-site and off-site of the Project's physical location within the refinery's perimeter. Obviously, without Union Pacific's trains and rail transport operations, there would be no need for the existence of the "on-site" Project: the proposed rail off-loading racks or two extra rail spurs on site, or 4,000 ft of new piping to carry off-loaded crude to the storage tanks. <u>The Project's extensive rail operations, governed by federal interstate commerce law and therefore controlled by Union Pacific, must be considered as part of *indirect* operations that could foreseeably contribute to off-site indirect Project impacts</u>. Those rail operations must be described, (train routes; proposed scheduling of unit trains; potential sidling of loaded or empty crude unit trains within the Benicia Industrial Park and elsewhere; location of rail hubs, etc) and these rail operations must be analyzed for potential and foreseeable impacts that would be *indirectly* associated to the Project – potentially significant impacts, such as leaks, spills and fires owing, for example, to the structure and condition of DOT-111 tanker cars that are reported to be prone to puncture and/or rupture, thus exposing the risk of leaks, fires, explosions and major cleanup problems that have to be addressed in the DEIR. In the case of derailment when tanker cars contain, for example, highly corrosive and heavy tar sands diluted bitumen ("dilbits") or Bakken crudes that may contain fracking residues of highly corrosive hydrochloric acid and that also emit volatile, flammable gases, we know that it would be imperative to ensure that the tanker cars that would carry these unconventional crudes would be double-walled and proven safe when derailed. But, ". . .the rail industry is fighting a proposal to retrofit

---

[4] From CEQA GUIDELINES_Amendments, 2009: § 15064. (h)(1) " "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."

[5] CEQA Guideline Amendments, 2009: § 15064. (h)(1)

existing cars, saying it could cost as much as US $1 billion." [Bloomberg News[6]]. The DEIR must address the type and current performance history of the tanker cars that Valero has purchased for the Project and discuss specific, potential indirect impacts of crude-loaded 50-car unit trains, loaded with different crudes with different characteristics, if there is an accidental derailment "on site," and accidents "off site" – derailments, spills, fires, catastrophic explosions affecting sensitive ecologic areas (creeks, marshes, wetlands, floodplains, shorelines, and the river – when crude-loaded unit trains are in transit through the Benicia Industrial Park, in sensitive areas within Benicia city limits, the region and beyond.

Thus, however narrowly the Project is described, it is impossible to conceive of the Project without Union Pacific as a partner in its operations, and therefore, it is common sense to link Valero and Union Pacific together when considering off-site indirect impacts that could foreseeably flow from the Project's implementation. The DEIR must address how cleanup of foreseeable rail accidents involving spills of diluted bitumen and/or Bakken crude would be carried out, and who would be responsible for the cleanup and its costs, Valero or Union Pacific and/or both. A Mitigation Measure and its Monitoring Program would have to be specific and cite existing evidence of how spills (from pipeline and trains) of these products have been dealt with in the past. Particularly important to review are the facts about the Enbridge Energy pipeline spill of tar sands diluted bitumen into the Kalamazoo River: the problems that arose in attempting restoration of 35 miles of river and shoreline, and what it has cost to date and how the cleanup bill has been paid for.[7] And, of course, the catastrophic train accident involving derailment, fire and explosion of Bakken crude at Lac-Megantic, Quebec.The most recent article posted on the subject shows that there was a "mislabeling" problem of contents of the train that exploded. The Bakken crude being transported was misclassified, so contents were not understood to be highly explosive. [See Huffington Post article, Sept 12, 2013][8]

The DEIR's Project Description and Impacts Analyses must discuss the regulatory framework governing the Project and its operations, and provide sufficient detail so that the Project and its impacts can be understood in context, that is, from local to global under the rubric of "Sustainability" – the City of Benicia General Plan's overarching goal [General Plan, page 22]– the City of Benicia's Climate Action Plan adopted in 2009, the California Global Warming Solutions Act - AB32 of 2006, and other current and/or pending legislation that supports AB32's implementation, such as SB375, with description of the GHG reduction target levels described for Benicia, Bay Area and the state.

To benefit the public's understanding, the DEIR must **provide** *as part of the draft document* the necessary tools to serve assessment of the Project and its effects as described. The Project should be able to be understood through study of the DEIR as a "stand alone" document, with Appendices to allow for easy access to important references, texts and citations, including a Glossary of Terms, and active weblinks to key documents, charts, graphs, etc., that are pertinent to close-order discussion of topics covered by the DEIR and that support the claims of the DEIR's impact analyses. Thus, readers of the DEIR should not have to seek

---

[6] Fracking chemicals in spotlight as regulators investigate rail car corrosion and flammability of North Dakota crude | Financial Post

[7] Kalamazoo River oil **spill** - Wikipedia, the free encyclopedia, also, EPA Response to **Enbridge Spill** in Michigan | US EPA; also, Enbridge Resisting Final Clean-Up of Its Michigan Oil Spill | InsideClimate News

[8] Safety rules **lag** as oil transport by **train** rises - Canada - CBC News Also: Key things confirmed in the Lac-Mégantic train blast - CBC ; also Lac-Mégantic disaster stirs train vs. pipeline debate - CBC/ Your Community; also, Transport: Bakken crude makeup faces scrutiny in rail car explosion -- Monday, September 9, 2013 -- www.eenews.net; also, Fracking chemicals in spotlight as regulators investigate rail car corrosion and flammability of North Dakota crude | Financial Post; also, http://www.huffingtonpost.com/2013/09/12/lac-megantic-train-mislabeled-oil_n_3909175.html

relevant and expert information beyond the DEIR in order to fairly judge the Project. The Appendices must include current 2012 CEQA Guidelines, and full texts with summary explanations of all relevant, applicable local, county, state and federal laws, regulations and guidelines and "ARARS," ["Applicable or Relevant and Appropriate Requirements"] that would serve as regulatory framework for assessing impacts and for governing the Project's implementation and on-going operations. For example: the Appendix must **provide** web links to state laws AB32 and SB375; CAL-EPA and California Air Resources Board regulations that protect human health and safety; City of Benicia's General Plan, and the City's Climate Action Plan. It must also **provide** web links to the Valero Improvement Project [VIP] EIR (2003) and VIP EIR ADDENDUM (2006), in order that citizens and experts studying the DEIR can compare previous historical statistical analyses of refinery operations impacts with analyses provided by the Project DEIR's analyses of similar impacts.

It is of utmost importance that the DEIR **provide** any and all current federal regulations and guidelines governing rail transport of crude oil and other hazardous materials. The DEIR must provide adequate discussion of Union Pacific's historical performance record, train derailments and other accidents involving hazardous materials as well as the federal standards (if any) for DOT-111 tanker cars with regard to their construction and likely performance in the event of derailments and accidents, with examples given of the "credible worst case scenarios" for accidents involving hazardous, toxic materials. The Dunsmuir and Roseville historic and catastrophic train accidents[9] involving large unit trains carrying hazmat must be discussed. In the case of Dunsmuir derailment, pesticides from a 97 car train spilled into the upper reaches of the Sacramento River killing fish and sickening many people and impacting 38 miles of the river. That accident was considered the most catastrophic in California history. The Roseville disaster, a rail yard explosion of 6,000 Mk-81 bombs, caused massive destruction and injured 350 people. What would happen if a crude-loaded train derailed, caught fire and exploded at the Roseville rail hub today? Or as it passed through any city along the UP tracks? The research that is being done to determine the causes of the Lac-Megantic catastrophe must be fully discussed. The DEIR should discuss the events leading up to these events, how they were dealt with in the immediate wake of the accidents, and what followed in the aftermath with regard to environmental damage, ecological restoration efforts and improvements made to protect public health and safety (emergency response, etc.)

<u>As part of the Project Description and Introduction, the DEIR must account for the anticipated lifespan of the Project – the expected number of years of its construction and operations</u>, (which the IS/MND failed to identify). This estimate is essential to understanding, for example, foreseeable impacts owing to an inevitable change *over time* to the refinery's daily crude slate, which is processed at the permitted annual average throughput rate of 165,000 barrels per day, and at 180,000 bpd, the daily maximum throughput allowable. The DEIR must address and estimate how the crude slate could change over time, given that the Project would be importing 70,000 barrels per day of unconventional crudes from US and Canadian sources, a figure that represents almost *half the amount of the daily average allowable throughput*. In other words, using this example, the public must be able to fairly gage and judge the long-range indirect consequences of the

---

[9] Dunsmuir historic train derailment, toxic spill in river; also recent UP derailment at the same location: ▶ Train derails north of Dunsmuir in area where disaster has struck before - YouTube A Toxic Nightmare: The Dunsmuir Metam Sodium Spill Revisited; Millennium Ark: Hot News Railroad train fires and munition explosions | The History of Insensitive Munitions http://www.ntsb.gov/doclib/reports/2004/RAB0403.pdf

likelihood of processing, *in incremental increases over time,* greater percentages on a daily basis of *unconventional*[10] North American-sourced crudes. *The estimates of those impacts resulting from percentage increases in the crude slate must be based on current statistics for processing the existing crude slate at maximum daily capacity, 180,000 bpd.*

The DEIR must identify and discuss the "unconventional North-American sourced crudes" and their typical chemical constituents (including residues of acids and other chemicals used in the case of crudes extracted by hydraulic fracturing methods) that the Project is likely to import, since foreseeable indirect "off site" impacts associated to refining unconventional crudes with their distinct characteristic chemical signatures would flow from the Rail Project's implementation.

Tar sands and Bakken crudes are highly likely to be the predominant candidates to be imported by rail,[11] despite the fact that Valero has verbally publicly denied that they would import tar sands bitumen – a natural asphalt – which, if imported in its original state would require. At a Valero Community Advisory Panel meeting earlier this year, it was stated that they would not be importing bitumen because it would "require a different kind of offloading terminal and heated tanker cars." They have so far effectively skirted around answering whether they would seek to import tar sands *diluted* bitumen or "dilbits," which would not apparently have those special requirements for transport and offloading.Valero has verbally stated that Bakken would be one of the crudes imported by the Project. There are other Midwestern "shale plays" that may also be sources of crude imported by the Project, but these have not been identified by Valero.

The DEIR must discuss the unconventional crudes being considered for import by rail. They may be highly acidic, "dirty" and "heavy" such as those derived from tar sands bitumen – a natural asphalt – and/or highly volatile and "light," like the type extracted from the Bakken shale formation in North Dakota. In particular, given the probability that both Bakken crude and tar sands dilbits would be imported, the DEIR must describe their respective properties and the different challenges each poses for refining and transport by rail, with regard to concerns and risks to refinery and community safety, air quality, and hazards of spills during a train accident, derailment, etc. For example: processing tar sands diluted bitumen at a certain percentage of a crude slate could significantly increase risks of corrosion of refinery equipment and increase emissions of toxic air contaminants. Increases in production of petroleum coke (toxic carbon residue of the refining process, a particulate containing heavy metals) would result from increases in processing of tar sands dilbits; and processing Bakken oil as a percentage of the crude slate would potentially increase risks of leaks and

---

[10] "unconventional crude" - term in common use to characterize oil derived from energy- and water-intensive extraction methods and techniques, such as hydraulic fracturing ("fracking") used in Midwest and California shale formations that involve use of injected chemicals and water under pressure, and also, highly corrosive acids, (hydrofluoride or "HF" for fracking in CA; and hydrochloric acid, used in Midwest shale plays.) Various methods are used for extraction and upgrading of bitumen derived from Alberta, Canada's tar sands, a vast network of industrial mining operations encompassing 250,000 sq miles, in the midst of what was once a pristine boreal forest. For information on the economic prospects and environmental impacts of extracting and processing unconventional crude types found in the US, see the book "*Snake Oil: How Fracking's False Promise of Plenty Imperils Our Future*" by Richard Heinberg; 2013, Post Carbon Institute, a thoroughly researched, investigative analysis and rebuke to industry hype, giving solid statistical information, promulgated by the US Energy Information Administration (EIA), including the EIA's recent prediction that unconventional oil supply will experience historic decline "within this decade." This prediction alone, based on current production levels at existing shale and gas plays in the US, raises the question of the actual economic reality of the "boom" that current oil industry promotion campaigns describe for production owing to "inexhaustible oil reserves" found in extensive, often very deep, shale formations of the Midwest and California. The real test of this claim is how much "product" can be extracted at what cost, which determines the supply given its level of profitability and thus, the "energy return on energy invested" or "EROEI." The overall cost of the extraction processes are huge and are offset right now by favorable pricing discounts such as offered by the Canadian government for tar sands diluted bitumen products ("dilbits").

[11] See Goodman Group Report

explosive situations involving flammable gases under very high pressure, and also, risk increases of emissions of volatile organic compounds (VOCs) affecting local and regional air quality.[12] Then there are the indirect impacts associated to the transport by rail of unconventional crudes that have to be thoroughly described and analysed for cumulative significant environmental consequences. [See further comments.]

As the City's Notice Of Preparation declares, the DEIR must **provide** full account of the effects of a "No Project Alternative" as well as sufficient description of plausible, feasible "Alternative Projects" and also identify, based on established criteria, the "Preferred Project Alternative."

The City of Benicia as lead agent must **give notice and provide opportunity** for all relevant county and state agencies, offices and departments to comment on the DEIR. In addition to those notified by the City for the IS/MND, notice of the DEIR's preparation should go to Cal-EPA's Office of Environmental Health Hazard Assessment [OEHHA], the Bay Conservation and Development Commission [BCDC], the Solano Land Trust and other county conservation organizations.

The Project's potential indirect, negative environmental "ripple effects" related to global warming and climate change

Based on the preponderance of historical and recent evidence and continuing research, scientists concur that the primary cause of the increases in global warming over the last century and the accelerating rate of change in atmospheric levels of GHG is owing to advanced industrial civilizations' burning and consuming of non-renewable fossil fuels – for which purpose the current "boom" in extraction and processing and burning of "North American-sourced" unconventional oil serves.

There is no doubt that the remaining petroleum in the form of conventional oil should be left in the ground as a protected precious resource for the sake of future generations who would certainly, a hundred years hence, regard its energy-rich properties "like gold." Advanced economies have had access to cheap oil and natural gas for over 100 years and have used it productively, but also wastefully, as if there would be no end to the good fortune and exponential growth it created from the time of its first discovery in the US. We will remain dependent on fossil fuels for transportation and other industrial purposes for years to come. However, today's energy- and water-intensive extraction methods and production costs will inevitably affect supply of unconventional oil sourced in the US and Canada, since it will become more difficult and expensive to technically "melt" the dirty, oily substances out of deeper and deeper shale layers or, in Alberta, deeper layers of sand and clay. Those costs will finally determine the availability of the current unconventional crude supply which now appears to be so readily available – ready in greater quantities for import by rail into the Bay Area.[13]

There is growing public acknowledgement, with plenty of evidence, that we are in the midst of a difficult transition to a different energy future, 30 years hence, that will entail energy production from diverse sources that government sources predict will be dominated still by coal and oil, with wind, solar, geothermal, hydro the minor contributors. However, the federal government's projections recorded in its *International Energy Outlook* present a future scenario for 2040 that is unsustainable, if one thinks of the "staggering consequences" (see quote below) to climate by continued dependence on the extraction and consumption of carbon-based fuels. An alternative post-carbon future must be imagined and worked toward, to conserve non-renewable resources and create a distributed energy system based on renewables to support a more localized

---

[12] See Phyllis Fox Report

[13] *Snake Oil: How Fracking's False Promise of Plenty Imperils Our Future,"* Richard Heinberg, 2013, Post Carbon Institute

economy *not founded on old hopes and false expectations of exponential growth*. I quote extensively below from an article published Sept. 10th, 2013, on the website Common Dreams, called, "Our Fossil-Fueled Future: World Energy in 2040" by Michael Klare, the Five College Professor of Peace and World Security Studies at Hampshire College in Amherst, Massachusetts. Discussing the IEO's projected scenarios about the future of oil, only 30 years away, Mr. Klare writes:

> " . . . .These projections may not in themselves be surprising, but if accurate, the consequences for the global economy, world politics, and the health and well-being of the planetary environment will be staggering. To meet constantly expanding world requirements, energy producers will be compelled to ramp up production of every kind of fossil fuel at a time of growing concern about the paramount role those fuels play in fostering runaway climate change. Meanwhile, the shift in the center of gravity of energy consumption from the older industrial powers to the developing world will lead to intense competition for access to available supplies. . . .Anyone searching for evidence that we are transitioning to a system based on renewable sources of energy will be sorely disappointed by the projections in the 2013 *International Energy Outlook*. Although the share of world energy provided by fossil fuels is expected to decline from 84% in 2010 to 78% in 2040, it will still tower over all other forms of energy. In fact, in 2040 the projected share of global energy consumption provided by each of the fossil fuels (28% for oil, 27% for coal, and 23% for gas) will exceed that of renewables, nuclear, and hydropower combined (21%).
>
> ". . . Oil and coal continue to dominate the fossil-fuel category despite all the talk of a massive increase in natural gas supplies -- the so-called shale gas revolution -- made possible by hydro-fracking. Oil's continued supremacy can be attributed, in part, to the endless growth in demand for cars, vans, and trucks in China, India, and other rising states in Asia. The prominence of coal, however, is on the face of it less expectable. Given the degree to which utilities in the United States and Western Europe are shunning coal in favor of natural gas, the prominence the IEO gives it in 2040 is startling. But for each reduction in coal use in older industrialized nations, we are seeing a huge increase in the developing world, where the demand for affordable electricity trumps concern about greenhouse gas emissions. . . .To fully appreciate the significance of the IEO's findings, it is necessary to consider four critical trends: the surprising resilience of fossil fuels, the degree to which the world's energy will be being provided by unconventional fossil fuels, the seemingly relentless global increase in emissions of carbon dioxide, and significant shifts in the geopolitics of energy. . . .If the trends identified in the Department of Energy report prove enduring, then the world of 2040 will be one of ever-rising temperatures and sea levels, ever more catastrophic storms, ever fiercer wildfires, ever more devastating droughts. Can there, in fact, be a sadder conclusion when it comes to our future than the IEO's insistence that, among all the resource shortages humanity may face in the decades to come, fossil fuels will be spared? Thanks to the exploitation of advanced technologies to extract "tough energy" globally, they will remain relatively abundant for decades to come. . . .So just how reliable is the IEO assessment? Personally, I suspect that its scenarios will prove a good deal less than accurate for an obvious enough reason. As the severity and destructiveness of climate change becomes increasingly evident in our lives, ever more people will be pressing governments around the world to undertake radical changes in global energy behavior and rein in the power of the giant energy companies. This, in turn, will lead to a substantially greater emphasis on investment in the development of alternative energy systems plus significantly less reliance on fossil fuels than the IEO anticipates. . . .Eventually, however, the destructive effects of climate change will prove so severe and inescapable that the pressure to embrace changes in energy behavior will undoubtedly overpower the energy industry's resistance. . . Unfortunately, none of us can

actually see into the future and so no one can know when such a shift will take place. But here's a simple reality: it had better happen before 2040 or, as the saying goes, our goose is cooked. [14]

The DEIR must describe the viability and fate of the Project, thus through the Project's "lifespan," in the context of a near future (10 - 20 years out) when peak and decline of accessible, unconventional oil supplies is predicted.[15] The reader must be enabled to envision the foreseeably widening negative environmental current and future "rippling effects" flowing from implementation of the Project and its potential indirect impacts overall, which may locally include "urban blight" (there is already a problem of attracting new businesses to the heart of the Benicia Industrial Park in the vicinity east of the refinery). But most grave in this context, are the effects over the Project's lifespan resulting from its contributions of greenhouse gases from direct and indirect Project operations (the actual transporting of crude by rail; the processing and refining of unconventional crudes). Impacts accumulate if we trace back to those crudes' sources and the incredible energy requirements to extract and produce the oil, the "cradle to grave" impacts of the Project, all inclusive – the "cradle" being the extraction process and any "upgrading" required such as what must be done to liquify bitumen, to produce diluted bitumen, and the "grave" being the burning of the resultant oil product,(see further comments), which should be considered as a final product, valuable as we understand it to be at the gas pump, of the ruination and destruction of pristine northern boreal forest, the draining of volumes of fresh water daily from three major Canadian rivers that flow to the Arctic, the consumption of natural gas to heat and pressurize water for the extraction processes, etc etc. All of these processes represent the *no-longer-hidden totality of environmental costs* of bringing greater quantities of unconventional oil into the Benicia refinery for processing, especially if all other projects created with similar intent are planned by other energy companies and Bay Area refineries.[16] [see also footnote #5]

Research now demonstrates that there are evident increases of man-made global warming effects in California, as reported in the recently released "Climate Change Indicators Report of 2013"[17] issued from Cal-EPA's Office of Environmental Health Hazard Assessment ["OEHHA"].

The rising level of CO2 and other greenhouse gases – "metric tonnes of equivalent carbon dioxide" [MtCo2e][18] – are now recorded at 400 parts per million,[19] with 350 ppm considered by atmospheric scientists to be the "safe threshold level" that we must return to if we are to stabilize global climate through reducing GHG emissions from all sources to levels cited in state and local regulatory guidelines that call for

---

[14] Our Fossil-Fueled Future: World Energy in 2040 | Common Dreams, article by Michael Klare, posted Sept 10, 2013

[15] *Snake Oil: How Fracking's False Promise of Plenty Imperils Our Future,"* Richard Heinberg, 2013, Post Carbon Institute

[16] " '. . .Every barrel of bitumen produced from the tar sands creates, on average, three times more carbon dioxide emissions (187 lbs) than a barrel of normal [conventional] crude (62 lbs.). . . All unconventional forms of oil are worse for greenhouse gas emissions than petroleum," noted the late Alex Farrell while he was an energy expert at the University of California, Berkeley. 'When we face tradeoffs between economics, security and environment, the environment often ends up getting the short end of the stick.' "" p.129, *Snake Oil: How Fracking's False Promise of Plenty Imperils Our Future,"* Richard Heinberg, 2013, Post Carbon Institute.

[17] http://oehha.ca.gov/multimedia/epic/pdf/ClimateChangeIndicatorsReport2013.pdf

[18] "GHG" represent the panoply of gases, referred to as "CO2EMT, or CO2 Equivalent Metric Tonnes, that continue to contribute to global warming potential (GWT) – gases that linger in the upper atmosphere like a blanket, some far into the future, that besides CO2, include methane, (which immediately has the highest global warming potential), nitrous oxide, carbon tetrafluoride, hexafluoroethane, sulfur hexafluoride, fluoroform, Tetrafluoroethane, difluoroethane.

[19] Climate Tipping Point? Concentration of Carbon Dioxide Tops 400 ppm for First Time in Human History | Democracy Now!

reductions to be ratcheted down, at least back to levels recorded in 2000 by 2020. There are calls now for even greater, more drastic reductions in GHG to be accomplished by 2050. It is agreed by scientists world-wide that reaching a level of 450 ppm of equivalent metric tonnes of CO2 would represent the likely uppermost threshold, at which, at the current rate of increase, could be reached within a few decades if we don't change course. The 450 ppm figure represents a tipping point, after which runaway global warming and climate change are predicted. That prediction is based on solid scientific evidence, through the study of deep ice-core samples from eons past that have trapped molecules of air and thus reveal the historical conditions over eons of the earth's changing atmospheric content of CO2 – research which implicates the reasons for the related conditions known to exist at those times on land and water. In fact, with CO2 recorded at 400 ppm today, the historical evidence, from deep ice core samples that trap air from the Eocene period some 50 million years ago, shows that at today's CO2 level, there were once crocodiles roaming around Colorado and sea level was 300 ft higher than they are today, accounting for the existence of evidence in Colorado of an inland sea.[20] So, at the tipping point of 450ppm it is understood that climate instability would be irreversible, with drastic ecologic consequences for all species and prospects for relatively stable human civilization growing very dim for our children and their future generations.

The foreseeable expansion of the completely unsustainable[21] tar sands extraction operations – which is being promoted by Alberta's provincial government, the Canadian government in Ottawa, as well as key investors in the energy sector, including oil industry giants, Shell, Chevron, ExxonMobil, Tesoro, ConocoPhillips that respectively own direct interests in the network of tar sands mines and greatly benefit from the Canadian and US governments' generous price supports and subsidies – therefore represents a calculated, demonstrable risk of passing the 450 ppm upper threshold for atmospheric CO2, increasing the severity of global warming effects, thus causing greater climate instability overall. THIS, to support a now globalized economy based on the principle of "growth"seemingly at any price, e.g., *grossly unsustainable exponential growth*. Growth, even at the currently sluggish "business-as-usual" rate, is unsustainable in the 21st century, because the earth's ecology is a finite system with finite amounts of essential nonrenewable resources to supply human activities –activities that we have become accustomed to and therefore *assume* as equivalent to basic needs, such as our right to individual happiness through excessive consumerism supported by global manufacturing fueled by carbon-based fuels.

Fooled by oil industry hype, we could dream that North American-sourced crudes represent inexhaustible plenty into the far-flung future, making the US "oil independent." But falling into that industry and investors' dream, we ignore the colossal expense to global ecology including the human community. Consider the fact, for example, that the US population, which represents 5% of the global population, consumes 25% of the world's resources, including oil supply, and considering that US car manufacturers are setting their sites on expansion of the Chinese market for vehicles of all sorts, and that China has recently surpassed the US in production of GHG emissions. Consider also, for the foreseeable future, the contributions to GHG of China's

---

[20] "*Field Notes From A Catastrophe: Man, Nature, and Climate Change*;" Elizabeth Kolbert, 2006. Bloomsbury Publishing. p.127 - 129

[21] *Tar Sands: Dirty Oil and the Future of a Continent;* Andrew Nikiforuk, 2009; David Suzuki Foundation.

"Bitumen is one of the most water-intensive hydrocarbons on the planet. . . On average, the open-pit mines require twelve barrels of water to make one barrel of molasses-lke bitumen." -– p.63.

"Planned expansions could bring the total to 3.3 barrels [of fresh water] per year, a volume that Natural Resources Canada website admits 'would not be sustainable because the Athabasca River does not have sufficient flows.' " – p. 65.

". . .every barrel of bitumen produced from the tar sands creates, on average, three times more carbon dioxide emissions (187 lbs) than a barrel of normal [conventional] crude (62 lbs.) – page 129

continuing use of coal as a fuel for manufacturing and home heating, etc. and add that to their use of refined oil for transportation.

The current drive to import tar sands by pipeline and rail into the US is evidence of what appears to be a Klondike-like "oil rush"by oil and energy companies to gain access – and competitive advantage – to the tar sands of Alberta and to shale formations in the Midwest and California. To get "on board" for those considerably favorable pricing discounts ($3 per barrel)[22] that, for example, Canada is offering for tar sands bitumen and dilbits,Valero has proposed the first, trend-setting Crude-By-Rail Project that would provide rail capacity for bringing into the refinery, *now or in the future, greater quantities of North-American sourced unconventional crudes, including tar sands diluted bitumen*. There can be no doubt, given the competition and pricing structures for tars sands dilbits in place right now,[23] that other Bay Area refineries would be making similar plans. The DEIR must investigate all such prospects by other oil industry players in the region in order to identify cumulatively considerable significant impacts to local affected communities and the region as a whole and considering the huge amounts of GHG emissions resulting from the tar sands mining operations, all told.[24]

The DEIR must discuss these planned or anticipated projects with respect to Contra Costa County's adoption, in 2012, of the "Northern Waterfront Economic Development Initiative,"[25] which envisions, encourages and sanctions, (surely with blessings from the California Energy Commission), more industrial development along the northern shore of the Sacramento River all the way to Stockton, the deepening (dredging) of existing ports and shipping channels for increased ship/tanker traffic on the river, as would be anticipated if such projects as the current one under CEQA review in the City of Pittsburg were to be approved, (the WesPac DEIR is under final public review, comments due on Sept 13, 2013): the WesPac Energy Infrastructure Project, a massive oil terminal proposed for Pittsburg's waterfront, proposed by WesPac Energy-Pittsburg LLC, which I learned about on August 17th, reading a lead story in the Local News section of the Contra Costa Times. [26]

For our Bay Area region, Valero's Rail Project proposal may be the "first" and precedent-setting for other refineries in Contra Costa County; but it is clearly not the only proposal for a crude-by-rail import terminal operations.

Right now, there is potential for a proliferation of proposals for more rail capacity to be permitted for other Bay Area refineries for importing unconventional crude such as is being currently proposed by Valero Energy Corp. and WesPac Energy LLC. And given that the WesPac oil terminal would have the capacity to import by rail and ship, and store and export by pipeline up to 242,000 barrels of crude oil per day (88 million barrels annually) to Bay Area refineries, including Valero, the DEIR must raise the issue of which refinery might bite WesPac Energy-Pittsburg's bait, if the WesPac Project were to be approved this year, considering that The WesPac Project similarly aims to access unconventional crudes from shale "plays" in the Midwest, but also, presumably from the tar sands in Alberta.

Why do both Valero and WesPac fail to publicly admit that they would likely pursue importing tar sands dilbits? The DEIR must find the answers!

---

[22] See Goodman Group Report, 2013

[23] See Goodman Group Report, 2013

[24] *Tar Sands: Dirty Oil and the Future of a Continent;* Andrew Nikiforuk, 2009; David Suzuki Foundation

[25] Northern Waterfront Economic Development Initiative, pdf. available through http://www.cccounty.us/DocumentCenter/View/26503

[26] City of Pittsburg : WesPac Project Info "WesPac Energy Infrastructure Project"

It's my understanding that Phillips 66 in Rodeo currently is permitted for rail export of propane and other products; the company could seek permit for additional rail capability for *importing* and off-loading crude oil. There needs to be a thorough investigation of other potential crude-by-rail projects anticipated or in the planning stages by other Bay Area refineries that would seek the same competitive advantages that apparently have driven Valero Energy Corporation's and WesPac Energy - Pittsburg LLC's project proposals *within the same time-frame*.

Therefore, the DEIR must identify and discuss, under the various CEQA topics to be included in the DEIR, and especially under the governing rubric of sustainability and AB32, the foreseeable and myriad potentially significant local and regional environmental and public health and safety risks potentially stemming from direct and indirect impacts resulting from on-site and off-site operations – all pointing to further considerably cumulative negative ecologic impacts, that both the Valero Rail Project and WesPac Project, *together with other similar anticipated projects*, that if implemented, would pose, not only to respective affected communities, but all cities and rural areas of the region that could be affected by rail transport of crude oil, but also, to the impacts to global ecology such an expansion of extraction of "unconventionals" would represent over time to climate and life on earth.

Hence, the potential ramifying consequences of Valero's proposed Project – a rail terminal offloading facility that, as narrowly defined would be confined to its physical location on Valero's property, offloading 70,000 barrels each day of those unconventional crudes. Yet the amount to be imported represents *nearly half the total average amount of oil processed daily* at Benicia's refinery, with resulting *significant and cumulatively considerable* negative, "cradle to grave" staggering ecologic costs – those that cannot be "discounted" in Alberta and the Midwest, owing to the local devastation wrought to the natural environs in which these massive operations are conducted. When all operations and activities are taken into account that the Project involves directly and *supports indirectly,* the considerably cumulative impacts, especially to global climate, are ominously portentous, heinous and extraordinary; and so, this report would appear in the aggregate to be beyond the scope of CEQA to address. Yet, "cradle to grave" accounting of those accumulating environmental costs are still mostly considered "externalities" by an industry and its investors' community when ringing up a project's price tag, and by the absence of any regulation to do so, these "hidden costs" remain unaccounted for. (It was an initiative in 1994 under the Clinton Administration to require environmental cost accounting to determine the overall cost of a product.) By this time, in 2013, given the climate crisis humanity faces, with the US Defense Department in accord about the national and global security risks posed by rising sea levels, all of the environmental costs particular to the indirect impacts of a project and its operations, *back to the cradle and forward to the end of a project's lifespan,* should be weighed against the very short-term economic benefit to energy companies and their investors, and also against the economic benefits promoted by them to the cities and communities that host their industrial operations, for which only a relative handful of jobs associated to, say, the Valero Crude-by-Rail project would be added. These judgments arise as being at the heart of the meaning of California's Global Warming Solutions Act of 2006, if there is any meaning left to words that we can so casually otherwise throw around, such as "sustainability."

In the spirit of AB32, then, it is imperative that the DEIR reference sources of information outside the oil industry in order to address the whole picture of what the "oil rush" to Alberta and the Bakken fields, or California's Monterrey Shale, would mean with respect to local, regional and global impacts to public health and safety and global climate. What I would characterize as the "business-as-usual-or-economically die" mentality promulgated by representatives of the Western States Petroleum Association is a kind of propaganda that is sometimes used by industry representatives to scare local publics into believing a refining company will "pack up and go" if their project isn't approved.

The DEIR should offer independent analysis about the evidence and research now accumulating from existing shale plays in the Midwest and gas wells in Texas and Oklahoma that demonstrate that the current "boom" in the availability of unconventional North-American sourced crudes, may in fact be peaking already at several sites where such limits were not anticipated; this bears on research that indicates that there will likely be a steady decline of supplies of unconventional crude beginning *within this decade*. [27] In part, this will presumably be owing to the technical methods and difficulties of extraction with exceedingly high and costly energy requirements, such that, if it weren't for current government subsidies and discounting arrangements supporting an expansion of extraction from shale formations and tar sands, the industry and its investors might suffer a "bust" sooner than later – something they would not prefer to envision at all, or at least state publicly and in writing.

The cumulative contributions of GHG are of enormous concern, if we account for the "unconventional crude creep" into the Bay Area – contributions from those anticipated projects in the Bay Area that are comparable to the Valero and WesPac proposed projects. These cumulative impacts have to be added to existing emissions and other impacts that currently are generated by refinery operations. GHG are produced during the energy-intensive extraction and processing requirements for unconventional crudes, which involve hydraulic fracturing ["fracking" and "acidizing"] in shale formations, and for extracting and "upgrading" tar sands. Alberta's tar sands networks of individual companies' mining operations are the largest industrial mega-development project in the world, involving 125,000 acres of what was pristine northern boreal forest, with its planned expansion projected to encompass roughly 250 sq miles of the northern hemisphere's most beneficial "carbon sink." The network of mines and methods of extracting require Niagara Falls-like volumes of water each day, affecting the vast watershed of three major rivers, the MacKenzie, Peace and Athabasca – mighty rivers that flow from sources in the Columbia Icefield glaciers to the Beaufort Sea of the Arctic Ocean. Huge amounts of natural gas are used to heat the water and pressurize it for blast injections into the sands, by various methods, to melt and release the asphalt-like bitumen. The bitumen is a highly corrosive natural asphalt-like substance as viscous as molasses, which, in order to make it fluid enough for transport by pipeline or rail tanker cars, then requires complex "upgrading"processes, which are themselves energy-intensive, to dilute the bitumen.[28] The DEIR must take into account and address the amount of GHG emitted by this extensive, complex pre-refining process that produces the finished "crude product" referred to as tar sands dilbits.[29]

---

[27] *Snake Oil: How Fracking's False Promise of Plenty Imperils Our Future*; Richard Heinberg. 2013, Post Carbon Instittute

[28] *Tar Sands: Dirty Oil and the Future of a Continent;* Andrew Nikiforuk, 2009; David Suzuki Foundation

[29] *Tar Sands: Dirty Oil and the Future of a Continent;* Andrew Nikiforuk, 2009, David Suzuki Foundation.

The Focused DEIR's CEQA TOPICS, with additional topics, and examples of concerns, foreseeable impacts and mitigation measures

The City of Benicia's Notice of Preparation announced calls for discussion of impacts pertaining to:
Air Quality; Biological Resources; Cultural Resources; Geology and Soils; Hazards and Hazardous Materials; Hydrology and Water Quality; Transportation/Traffic. However, disclosure of the full range of potential significant, direct and indirect impacts, including "on-site" and "off-site" operations and activities that contribute to local, regional and global consequences that may be cumulatively considerable would call for additional topics as I've suggested. These additional topics are typically seen in DEIRs for assessing large-scale projects proposed by refineries and energy companies, as well as other industrial or commercial development projects. For example, the following topics are listed (among others) in the index to the DEIR for the WesPac Energy infrastructure Project.
Public Health; Public Safety; Land Use Plans & Policies; Energy; Noise; Aesthetics, Visual Quality, Light & Glare; Public Services and Utilities; Growth Inducing Impacts & Urban Blight; Marine Terminal Operations; Greenhouse Gas Emissions; Cumulative Effects.

Air Quality

Because of the prospect that there will potentially be a greater amount of emissions produced from processing heavy tar sands dilbits, as well as lighter crudes that are highly volatile, it's crucial that the Benicia Air Monitoring Program finally be implemented. The need to implement a comprehensive public and independent air monitoring program that provides for access to real-time data via a website, provides for professional maintenance of equipment and data analysis in perpetuity, and that allows for various educational and early warning uses of the equipment, must be addressed in the DEIR and incorporated as a mitigation and monitoring plan and program.
There is as yet no ambient air monitoring program established in Benicia for residents to access real-time data about what's in our air. This was a required condition of the 2008 GNSC/Valero Settlement Agreement, with modifications made to the Agreement in 2010. The purchasing of equipment was accomplished and a trailer provided and a relatively brief period in which the equipment, housed in the trailer, was utilized, but without public access to the data generated. During that time, the website was not completed; but just as it was being finished, its activation was not allowed because Valero raised the concern that an independent owner of the monitoring equipment had to be identified. The City of Benicia refused to take on the responsibility for the monitoring program, citing that they could not provide staff time, (including fire department's). For these reasons, the Benicia community remains without an independent air monitoring program as called for in the 2008 - 2010 Settlement Agreement, thus, the community still lacks a source of realtime statistics that could register and record, for instance, "spikes" of toxic emissions that could occur at any time, but would be of special concern if and when Valero would be processing their maximum allowable throughput of 180,000 bpd, and considering the proposal that unconventional crudes would be processed with their very distinct chemical qualities. The Air District [BAAQMD] has several ground level monitors at the refinery perimeter measuring only two gases, sulfur dioxide and hydrogen sulfide; however there are no other locally based monitors run by the District measuring ambient air off-site of the refinery in the industrial park or in neighborhoods within a mile of the processing block and tank farm. There was a fenceline monitor purchased through the Settlement Agreement, but to my knowledge it has not yet been installed; Valero has stated that it hasn't been determined which fenceline it should be installed along. Full fenceline monitoring (all four sides) must be part of the mitigation measure. In fact, a second trailer with equipment should be provided so that there would be two monitoring stations, one for the east side of the refinery in the industrial park, and one to

be located near residential neighborhoods and Robert Semple Elementary School. The City of Benicia should contract an outside professional company with experience in air-monitoring systems and data analysis to take charge of the program and its maintenance.

To give one example of the kind of information and discussion that the DEIR needs to provide for the public's understanding of risks to public health posed by impacts to Air Quality:

> The DEIR must present and discuss latest research and studies pertinent to understanding the public health and safety risks posed by the Project's operations, accounting for all foreseeable direct and indirect and cumulative increased toxic emissions which the Project would contribute. Risks that must be assessed are not only those that may induce cancer, but also, risks of inducing *decreased pulmonary function in sensitive receptors* that would be potentially resulting from occasional but repeated exposure to acute, spiking emissions of toxic gases, and also, chronic exposures to low-doses of toxic air pollution over time that could be attributed to proximity to the refinery and its operations and other sources of airborne pollution, and *given the known toxic chemical constituents of the types of unconventional crudes that would be imported from North American sources and processed as a result of the Project*. Exposure risks must be calculated based on *maximum* allowable throughput of a crude slate (180,000 barrels per day) and yearly averaged daily allowable throughput (165,000 bpd). It has been demonstrated that increased amounts of airborne emissions such as Volatile Organic Compounds [VOCs], and, *increased* amounts of the refining processes' residual waste product, petroleum coke, ["pet coke"] result from processing North American-sourced unconventional crudes. [See Phyllis Fox Report, also NRDC "Comments on IS/MND"]. Risks posed to local residents and workers in the vicinity of local railroad tracks and the Port of Benicia may be exposed to increases of *airborne particulate matter*, including increases in pet coke from its transport by rail from the refinery and offloading into ships' hulls from storage silos. Generally, increases in production of particulate matter is of huge significance locally and within the region. Example of an exposure pathway for airborne pet coke to reach human and wildlife receptors: as a residual waste of the refining process, pet coke is transported by rail from the refinery's "coker" to be stored in silos located in the Lower Arsenal. The coke trains pass through the Benicia Industrial Park on local tracks. The trains (as many or more than three per week, according to the VIP EIR) unload the hopper cars into exported as a "fuel product" by ship from the Port of Benicia to Asia. Pet coke is a highly toxic carbon residue when inhaled: its tiny, powdery particles – "particulate matter" measured in microns and ranging in sizes (denoted as PM10 - PM2.5 and smaller) – may contain an assortment of heavy metals such as cadmium, lead and nickel (depending on specific crudes processed), and those carbon molecules also carry with them VOCs and other toxic gases ubiquitously present in the vicinity of major pollution sources, including refineries, shipping terminals and freeways into lung tissue and bloodstream. Regular exposures to PM2.5 are highly destructive of young children's lung development as has been demonstrated and reported by epidemiologists from UC Berkeley's School of Public Health and also by the American Lung Association. Particulate emissions from all sources including from the Project if implemented, contribute to respiratory distress and increases of asthma attacks requiring hospital admissions, as reported.

Benicia Air Quality
Wolfram's Air Quality Research

.

Public Health

1) Consideration for sensitive receptors working or living in the vicinity of the Industrial Park, including near the Port of Benicia, who may routinely be exposed to airborne and/or spilled petroleum coke. Pet coke

must be characterized as a toxic particulate with health risks for inhalation and ingestion cited.

2) There has still never been a baseline health study conducted in the City of Benicia. Currently, there is no basis for comparisons or conclusions, such as were stated in the IS/MND, about either cancer or other non-cancer exposure risks for sensitive receptors living in the vicinity of the refinery and/or working in the industrial park, with no available statistics recording hospital admissions for respiratory distress or asthma, etc. The DEIR must address the need for a baseline health study must be a conditioned requirement of the Project as part of a mitigation measure, with historical and current stats collected from Solano County's Dept. of Public Health. Health statistics of a population, along with other criteria, is a key indicator of a community's health in all respects of livability.
http://www.euro.who.int/__data/assets/pdf_file/0017/101645/WA95096GA.pdf

In the East Bay, we live by enormous freeway systems and also, we have daily diesel exhaust from ship traffic on the strait. The transportation sources, tailpipe emissions and ship diesel, along with trains carrying petroleum coke from the refinery to the Port of Benicia produce carbon soot you see on decks and window sills locally. What's hidden: the soot can carry other metals and also VOC's ("volatile organic compounds"); particulate matter in the form of soot can affect lungs and lung development when the particulate is very small (range 2-5 microns or less penetrates lung tissue and enters bloodstream). The refineries are major pollution sources; but we in Benicia are also regularly impacted by pollution from Phillips 66 refinery in Rodeo, as well as by Shell, Tesoro, and Chevron and other industry polluters depending on variable and seasonal weather and temperature conditions, wind speed and direction.

Public Safety

A specific emergency response program that would be activated in the case of serious or catastrophic train accidents, must be designed for the community as a mitigation measure. The DEIR must review all current public safety protocols and procedures to be practiced at the time of such an accident, whether it occurs on-site or off-site Valero property. This must include designated evacuation routes for industrial park employees and for residential neighborhoods, including the lower Arsenal. Crude-loaded trains with 50 tanker cars take up a long stretch of track. It is foreseeable that a crude-loaded train would stretch along Bayshore Rd., from Park Rd intersection almost all the way to the Bridge. A graphic must be created that shows the actual length of a stationary train stopped along Bayshore Rd. to allow the public to envision the effect of dangerous, even life-threatening entrapment that employees would experience in the vicinity of UP's tracks in the case of a serious derailment/spill and/or fire.

Land Use Plans and Policies/Growth Inducing Impacts and Urban Blight

The appearance of the Industrial Park in the general area of Park Rd, Industrial Way and Bayshore Rd, e.g. the heart of the old park east of the refinery and north toward Lake Herman Rd is a sorry sight. The roads are in terrible condition and the signage is poor, especially at night, when driving on Industrial Way. The refinery dominates and represents the character of the park. If one thinks of adding two crude-loaded 50 car trains on a daily basis, with more coke trains heading for the port, and more empty railcars of all sorts parked on side tracks, with nothing yet done to upgrade the area with the exception of Union Pacific's latest rush to improve, replace and restore railbeds and tracks in the area, it would seem that the park was forever doomed to its look of neglect as long as the refinery was the dominant actor and influence affecting the park's character. The old 'heart of the park', through apparent lack of requirements and funds for any landscaping and road improvements, already looks like a blighted area, at the very least, neglected. This must be discussed in the DEIR, since the additional train traffic and all that has been presented by Ed Ruszel about traffic problems in

the park that would ensue owing to the Valero Project, give reason to address the matter in full through review of the Project and its impacts affecting the future economic outlook for the park and the City of Benicia. Does the Project's contribution to the City's tax base offset the effects of the refinery+Project's overall appearance, odors, transportation/traffic impacts over time? Does the expansion of rail activity cumulatively discourage investment in the park? Discourage potential companies from moving to Benicia and locating in the Bayshore Rd/Industrial Way/Park Rd area?

Energy

It was calculated for the VIP DEIR that the refinery actually would use more electrical energy than was first claimed. The DEIR for the current Rail Project must be explicit in its accounting of the specific and total energy requirements of the Project and its operations, on-site and off-site. Presumably, there are electricity requirements for pumps running crude to the storage tanks over the 8 hour off-loading period for each of the two 50-car trains.

Noise

Currently, we hear many trains throughout the day in Benicia, usually as they pass through the Strait on the Contra Costa side. The trains blast their horns, night or day, and they can be heard even when I am inside my house on East K Street. The DEIR must consider the impact of more horns tooting or blasting, depending on their distance and range. It would be of most concern to people living and working in the Lower Arsenal and Industrial Park, but it's quite possible that residential neighborhoods in Waters End development would hear the horns as well. The geography of the area bounces sounds around with echo effects.What are the reasons for locomotives to blow their horns? For warning on approach to crossings over public roads? What are other reasons that horns are used? Under the regime of the Project with regard to train movements at all hours within city limits how often would the public be subject to blasting horns?

Aesthetics

I've driven extensively around the old industrial park lately, trying to envision how the Project may impact the visual character of the park. I imagine, seeing so many empty rail cars sidelined along existing tracks and spurs along Industrial Way, that the park could begin to look like a train parking lot, especially if Union Pacific doesn't perfectly stick to the proposed schedule of crude-loaded train arrival and departure time. As has been said, Union Pacific controls all train movements and that includes when they decide to sideline a train or a number of empty cars. Amports already has vast amounts of asphalt dedicated to parking cars (on their own properties) in the industrial park. The DEIR must discuss the use of rail spurs for parking empty railcars and define, in a mitigation measure, aesthetic improvements –for example, plant clusters of hardy trees wherever possible!!!– that would screen or soften the general appearance of a train parking lot east of the refinery.

Visual Quality, Light and Glare

At night, there is only spotty lighting at best, if any, along Industrial Way, from Lake Herman Rd to Park Rd and Bayshore intersections. On winter nights, or rainy nights, it is nearly impossible to see while driving; there is hardly any striping down the center or along the sides of the road, making the big curve (nearing Valero's eastern office building) in the road nearly impossible to navigate safely, especially with oncoming cars and trucks barreling along at night and under low visibility conditions (fog, rain) which are typical in winter. For safety, considering new train movements are anticipated at night, the DEIR must identify the

existing lighting situation and address the lack of adequate (any!) street lighting on Industrial Way, as well as Park Road and Bayshore Rd. A mitigation plan is needed that would provide adequate proper lighting for the entire area along very busy roads.

Public Services and Utilities

Given the potential for accidents involving trains, vehicles and people in the industrial park especially, the DEIR must consider the need for a new fire sub-station that could respond within a few minutes to fires and other emergencies within the park extending to the Lower Arsenal area. Although Valero has its own essential fire department, the Initial Study had stated that the City's fire department would also be involved in emergency response, and there was a calculation of the department's response time, which should be analyzed with regard to "credible worst case scenarios" for accidents, spills, fires, explosions and any other emergencies that may occur off-site, while a crude-loaded train is traveling in the marsh or is approaching the industrial park and passing so near buildings/businesses on Bayshore Rd. The DEIR must discuss the need for an equivalent response team as now exists for ensuring rescue and emergency help on water, the Marine Spill Response Team.

Marine Terminal Operations

Because the Project will involve movement of trains in and out of upland areas of the Port of Benicia, the DEIR must consider the impacts around the Bridges and recreation areas provided for public access to the river (for fishing, etc), and ensure that crude-loaded trains (or coke trains) temporarily stopped along Bayshore Rd do not interfere with the public's right of access or need to exit those recreation spots.

Greenhouse Gases

[See Comments!]

Cumulative Effects

[See Comments!]

* * * * * * * * * *

MARILYN J. BARDET
333 East K Street, Benicia CA 94510
707-745-9094 mjbardet@comcast.net

June 30, 2013

City Manager Brad Kilger,
Planning Commissioners: Chair Sherry, Oakes, Smith, Grossman, Spraque, Dean and Young
Mayor Patterson, Vice Mayor Campbell & Councilmembers Hughs, Schwartzman & Strawbridge
City of Benicia, 250 East L Street, Benicia CA 94510

SUBJECT: Valero Crude-By-Rail Project Initial Study/Mitigated Negative Declaration

Dear Mr. Kilger, Planning Commission Chairman Sherry, Planning Commissioners, Community Development staff, and Mayor Patterson and Councilmembers:

My comments overall reject the City's determination that a Mitigated Negative Declaration {MND] is a sufficient level of environmental review of Valero's Crude-by-Rail Project as described and discussed in ESA's Initial Study and Environmental Checklist. With regard to determining whether a more thorough environmental review is necessary, CEQA Guidelines §15064 describe the conditions under which an Initial Study is called for, and when an EIR is determined to be required:

> *"Must A Lead Agency Prepare an Initial Study?*
> - *If the need for an EIR is unclear, the lead agency must prepare an initial study.*
> - *If the lead agency can determine an EIR will be required, an initial study is not required."*

It follows from the fact that an Initial Study was prepared that the City-as-lead-agent was *at the very least unclear, if not confused*, about whether a full EIR was necessary to review the proposed rail project.

We need clarity. There are too many missing discussions in the Initial Study and too many unanswered questions. My hope, and the hope of many, is that you will agree that sufficient, thus, more specific description, evidence and evaluation of potentially significant negative impacts are needed to enable the public to understand *"the whole of the project,"* as required under CEQA. Mitigation measures that would reduce or eliminate the severity of those environmental effects must be designed and submitted *at the time of the environmental review*. The mitigation measures must address the proposed Project's operations *over the course of the Project's lifetime*.

My comments give examples of the regrettable limitations of the Initial Study's Project Description and reject the conclusions of the Checklist. The Initial Study's limited findings suggest that there would be no further concerns than those already exposed by its review, and that the burden of a comprehensive investigation of any other foreseeable and potentially significant adverse impacts should not be necessary. I disagree.

The City's sign-off on an MND on May 31, 2013, by the former Community Development Director, is perhaps owing to the many constraints on staff's time in reviewing the Study. This is understandable, but not acceptable: the MND basically echoes the Initial Study's findings without evidence of independent questioning and further scrutiny. A reader should not have to read between the lines of the Initial Study to

discover the extent of the environmental ramifications of the Project, nor what further discussion is necessary.

Valero's Project would replace equivalent deliveries of crude by ship, and would be the second refinery rail project in the Bay Area. According to online news reports, Phillips 66 (formerly Conoco-Phillips) in Rodeo currently imports crude by rail. This fact was not discussed anywhere in the Initial Study or Environmental Checklist; yet learning this fact from other sources only underscores that we are not yet sufficiently informed by Valero, ESA or the City about the extent of the Project and its contributions to cumulative impacts: for example, the number of foreseeable crude-loaded trains that would be moving through Benicia and the Bay Area on Union Pacific's tracks. Other refineries in Contra Costa may be considering similar rail projects in the future (Tesoro's Golden Eagle, in Martinez). We therefore have no real idea, based on accurate estimates, of the potentially significant and even catastrophic impacts that could occur, given the foreseeably intensified use of Union Pacific's tracks for transporting crude and other hazardous materials. <u>It is required under CEQA to identify and address potential cumulative negative impacts of other similar large-scale projects that would be concurrent or that are planned for the future in the region</u>.

The importation of new "North-American-sourced crudes" – the vague, unqualified term used throughout the Initial Study – is not discussed with regard to the Phillips 66 crude-by-rail operation or other Bay Area refineries' future plans for crude-by-rail projects; nor, for that matter, the cumulative adverse impacts that are foreseeable wherein other CC County refineries, which are now already processing a variety of sour crude types, might also be planning to import by rail, in the near future, and/or by whatever *indirect* means, more heavy "North-American-sourced crudes," especially from Alberta Canada's tar sands. (Chevron Refinery, Richmond).

Valero has declared publicly (at CAP meeting and recent Economic Development Board meeting) that they will not be importing "tar sand crude" and their explanation has been that bitumen has to be transported in heated railcars and would have special off-loading conditions. If this is truly the case, why is there no discussion in the Study that would reflect Valero's commitment and explanation? And if they have made a "spoken" commitment to Benicia residents, why is this not committed in writing? Perhaps because they would not be importing "pure bitumen," which they assume, to their advantage, that members of the public mean when they refer to "tar sands" crude. Neither Valero nor the Initial Study have discussed a "diluted bitumen" blend or "dilbit" such as "Western Canada Select." (see my Comments).

Importing crude by rail using existing RR routes is a relatively recent phenomena now pushed by the oil industry to access various sources of heavy crude types that are being mined from shale formations in North Dakota and elsewhere in the Midwest, in California's Central Valley, and also from the vast network of open pit mining operations in Alberta's tar sands. If we're to grasp and assess "the whole" of the Valero rail project, we must not only ask Valero to be forthcoming about local and regional environmental ramifications of switching to rail as the method of importing crude, but also about the heavy crude types that would be imported under the proposed Project to be processed in Benicia. Getting access to "North American-sourced crudes" explains Valero's switch from ship to rail, and their desire to have had the Crude-by-Rail Project on time and on track for operation by late 2013 or early 2014, (from the Project construction timeline outlined in the Study. See comments).

Over the last 15 years, I've reviewed project applications, initial studies and draft EIR's, and have always tried my best to inquire into the details and facts of a proposed project and to imagine their

foreseeable effects for Benicia: the Koch Industries' "Coke Dome" project for the Port; the Tourtelot military cleanup for Southampton's residential build-out; the Valero Improvement Project [VIP]; Valero's EIR Addendum for VIP; several Seeno project draft EIRs; and also the draft EIR for the Arsenal Specific Plan. These projects envisioned land-use changes and/or long-range consequences for the community over project life-spans of 25 years and beyond. Of those mentioned, only the Tourtelot Restoration Project and Valero's VIP have gone forward successfully, much to everyone's credit.

As a member of the Good Neighbor Steering Committee [GNSC] for 13 years, and as a continuing member and former chair of Valero's Community Advisory Panel, I've worked hard with others to learn about the refinery, its VIP upgrades and local impacts. Representing the GNSC, I also currently serve as a non-voting member on the Community Sustainability Commission. I recognize the global effects of burning fossil fuels – the increasing, higher levels of atmospheric CO2 pumped into our atmosphere by human activities that contribute to global warming and climate changes. There is a growing local, regional and national consensus that we must conserve non-renewable resources, conserve energy and water, and transform our economy into a more sustainable one by working toward creation of reliable, alternative energy systems that do not put global climate further at risk for even more rapid, unprecedented changes.

Challenges made to Valero with regard potential impacts of their VIP and its later additional upgrades were aimed to ensure that their technical improvements would reduce water and energy use, reduce significant "criteria" emissions, and comply with the intent and spirit of AB32, the California Global Warming Solutions Act. The Project also must conform to the Benicia General Plan whose overarching goal is "sustainable development" [General Plan, page 22]. This governing goal explicitly declares the widening and rippling effects of whatever we do here in Benicia – how we conduct business and live our lives. The Benicia Climate Action Plan sets local strategies for modifying and changing our habits to create a more sustainable community.

As part of the VIP's permitting requirements, Valero was required to install a scrubber that ultimately replaced its main stack and has proven to greatly reduce ozone precursor gases – a benefit to our local community and the regional air basin. But now we must look forward and exercise our critical faculties to assess Valero's new Crude-by-Rail Project with its deep and wide ramifications that are local, regional and global.

Thank you for your consideration of my comments. I am glad to join you in the Project's review.

Marilyn Bardet

COMMENTS:

1. General observations regarding the limited scope of review of the Initial Study and Environmental Checklist's Evaluation of Environmental Impacts:

The MND, signed off on May 31, 2013, by the former Community Development Director, summarizes the findings of the City-as-lead-agent:

> *"The City of Benicia finds that although the proposed project could have a significant effect on the environment there will not be a significant effect in this case because mitigation measures have been added to the project that avoid or reduce all impacts to a less than significant level."*

The introduction to the Checklist, "Evaluation of Projects" [p II-1] outlines a number of CEQA criteria for evaluating impacts of a project. Criteria #2 states: ***"All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts."***

In reviewing ESA's Initial Study ["Study"], the City apparently found no foreseeable problems or impacts that were *not* addressed in the Study and the Environmental Checklist ["Checklist"]. The City's review apparently concurred *to the letter* with ESA's narrow Project Description and their assessments of impacts. The Checklist mainly focuses on impacts that would occur *during the Project's construction phases*. The Study does not describe the life-span of the Project, nor, thus, the foreseeable *and cumulative* potential significant negative impacts *over time* to Air Quality, Biological Resources; Geology/Soils; Greenhouse Gas Emissions; Hazards and Hazardous Materials; Hydrology and Water Quality; Land Use Planning; Noise; and Transportation and Traffic. (See further comments for examples). It would be the job of an EIR to fully explore each of the CEQA areas of concern. There is minimal discussion, (seemingly meant to reassure the reader), about the *actual operations* of the Project.

According to the limited Project Description, Project operations would occur almost exclusively at the rail rack off-loading facility, located on Valero property east of the storage tanks. Scant, cursory description is provided about Union Pacific's role and involvement – running Valero-bound, Valero-owned, crude oil loaded railcars. Which corporation will be managing the crude-loaded trains with regard to scheduling, and considering *all trains* running on Union Pacific tracks? There is little or no evidence given to substantiate claims that there would be no significant off-site impacts that could not be mitigated. Mitigation Measure TRAN-1 is an example of an extremely limited view of possible impacts from trains traveling in and out of Valero property and beyond. There is no discussion of potentially *catastrophic* impacts – the potential "off site" impacts – that could foreseeably occur given where the Project's trains would be traveling, conveying "North American-sourced crudes" through miles of sensitive ecological areas.

The Project Description, therefore, seems to piece-meal the Project, as if the Project operations were limited to Valero property, and as if, somehow, they were not extended to the "off-site property" owned by Union Pacific – the RR tracks extending for miles to be used in the transport of crude to Valero's off-loading racks. Further, there is no adequate account of the potential effects over the lifetime of the Project of processing the various "North American-sourced crudes" projected to be imported by rail and processed in Benicia over years or decades.

The Project's construction phase was slated to begin in early 2013 and be completed in late 2013, thus operational by late 2013 or early 2014 [Appendix A1." Air Permit Application. BAAQMD Overview 1.2, p. 1.]. From Valero's time-table for construction and operations' startup, the reader might assume that Valero had counted on the City to recommend its MND, and that therefore, the company, in planning its Project timetable, was not expecting that further environmental review would be required, or, that any other delay would hold up construction.

The Planning Commission hearing is scheduled for July 11; thus, the Project's construction startup date has long passed. Is the delay in reviewing the Project owing to the City's scheduling of the environmental review? Or, is there any *technical* reason for the delay on Valero's part? Although the BAAQMD Air Permit Application [Overview 1.2, p. 1.] reiterates Valero's assertion that no modifications to the refinery processing equipment would need to be made for the Project to proceed, is there any planned VIP technical upgrade that hasn't been completed that would be *required* to be completed and operational in order for the Project to be permitted? Has the Coker Unit expansion project that was scheduled to be completed in March 2013, indeed been completed? [VIP EIR Addendum, Table 2.5.1.1 "Project Schedule: Expand CKR, Light Ends, Silos..."]. I could find no mention in the Study of whether there would be increased production of residual coke from the processing of any of the "North American-sourced crudes" that might be imported – the bitumen-based crude (a diluted bitumen or "dilbit") produced from Alberta Canada's tar sands. (See related comments under #9, "Mandatory Findings of Significance.")

Regarding the Initial Study and Environmental Checklist on global warming effects: The Bay Conservation and Development Commission [BCDC] must be involved in evaluating potential impacts to the Suisun Marsh of the Crude-by-Rail Project. BCDC has issued public reports that present evidence-based modeling of the projected sea level rise that would inevitably affect San Francisco Bay and the Carquinez Strait. BCDC's publicly available map of shoreline areas that would be affected by sea level rise show the effects on Benicia's marsh and floodplain environs over the next 25 - 50 years through the end of the century. The Study and Checklist should reference and discuss the implications of the BCDC map as related to the Union Pacific rail routes through the Suisun Marsh, which is projected to be more prone to greater seasonal flooding over the next decades – the probable lifespan of the Project? – increasing the intensity and number of winter rain storms, whose effects may be made more severe by high tides in the Strait and earlier snow melt. The Union Pacific tracks are visible along a long stretch of Goodyear Rd., within Benicia's city limit. The gravel railbed appears to be elevated approx. 18" - 24" above the marsh. The railbed itself was not flooded during the February, 2011 storm event that occurred along the length of Benicia's marsh surrounding the tracks. In the storm's immediate aftermath, I took pictures capturing the train tracks leading from the Industrial Park through the marsh, and specifically where flooding and pooling of the marsh around the tracks had most severely occurred. One of the only small service roads that crosses the tracks (not far

from Organic Solutions, a company along Goodyear Rd.) was completely submerged except where it briefly crossed the tracks; therefore it was impassable to vehicular traffic, including emergency vehicles. A sign was posted at the dirt road's junction with Goodyear Rd that said "Flooded.") Trains carrying crude could conceivably be threatened if there was any erosion or disturbance of the gravel rail bed and tracks. Trains could be held up, (where? side-lined?), potentially stalled or derailed, with spills of crude oil. Description and analysis of potential significant impacts that might flow from such a *credible* worst case scenario are missing from the Study.

How would crude-loaded railcars be accessed in the case of a flood in Suisun Marsh if there were a train accident and spill of crude? What would be the emergency response plan? What would be the cleanup method? For diluted bitumen? The Initial Study doesn't provide answers.

3. AIR QUALITY IMPACTS:

[Initial Study; Environmental Checklist: 3. Air Quality p. II-10]

Mitigation Measure Air-1, *"added to the project*:" Air-1 references existing Bay Area Air Quality Management District's [BAAQMD] protocols and policies that are meant to protect against dust and diesel emissions during construction phases of development projects. It also refers to "2010 CAP" which is a recent Air District plan. It bears quoting from the Study's *minimal description* of the 2010 CAP. The thresholds for judging significance of air impacts are said by the Study not to be exceeded by the Project. It is not stated whether the air impacts evaluated are ones owing *only* to construction phases.

[From the Environmental Checklist – p. II-10]

> *"The 2010 CAP serves as a multi-pollutant air quality plan to protect public health and the climate." . . ."The 2010 CAP's control strategy includes revised and updated, and new measures in the three traditional control measure categories, including stationary source measures, mobile source measures, and transportation control measures. In addition, the 2010 CAP identifies two new categories of control measures, including land use and local impact measures, and energy and climate measures." . . . . "BAAQMD recommends that the agency approving a project where an air quality plan consistency determination is required analyze the project with respect to the following questions: 1) does the project support the primary goals of the air quality plan?; 2) does the project include applicable control measures from the air quality plan?; and 3) does the project disrupt or hinder implementation of any 2010 CAP control measures? If all the questions are included in the affirmative, BAAQMD considers the project consistent with air quality plans prepared for the Bay Area (BAAQMD,2012)."*

Apparently, ESA expected the public to know what BAAQMD's "control strategies" and "new measures" are, but this is an *unfair* expectation. The Appendix does not include a pdf of the actual CAP 2010 document, or any other explanatory material to help our understanding of the Air District's regulatory guidelines for judging "thresholds" for emissions impacts, etc. The reader should not have to hunt for documentation on the BAAQMD's (nearly inscrutable) website. The reader reviewing the above quoted text can therefore have no idea whether the ESA in drafting the Initial Study, or the City in recommending the MND, accurately analyzed the Project *with respect to the questions the Air District recommended be raised*, as stated in the above quote. Accordingly, the adequacy of Mitigation Measure AIR-1 is highly suspect in this case. For example: there is no description or analysis of local air quality impacts to sensitive receptors who are employees in the industrial park, thus of persons who might be affected by cumulative emissions from *increased daily emissions* from all sources within the refinery, including the Rail Project.

Regarding emissions expected during operation of the Project:

[Environmental Checklist p.II-13]

Under item 3c, the proposed Project's emissions are evaluated relative to BAAQMD's thresholds for "attainment" for the Bay Area air basin that are protective of human health. Project emissions (including diesel, VOC's and Particulate Matter - PM10 and PM2.5) are contributors to smog production. "Net emissions reductions" that are accounted for in the Study, *if they are reliable*, are calculated using statistical averaging to arrive at a figure that would represent a finding of "attainment" or "non-attainment" of federal and state standards for general smog conditions *within the region as a whole*. Accordingly, it is not explained by the Study that *local* emissions impacts *cannot* be assumed to be reduced by evaluations made using BAAQMD calculations that assess emissions impacts to the *whole air basin*.

> *". . . . New stationary sources at the Refinery would include unloading rack and pipeline, which would result in fugitive emissions of ROG. The project would also include a change in service to existing Tank 1776 to allow it to store crude oil; however, because there would be no change in the amount of crude oil stored at the Refinery, there would be no net increase in tank-related storage mass emissions relative to baseline conditions. Overall, the proposed Project would result in reduced*

air emissions compared to the existing operations because delivering crude oil by rail car results in less emissions with the BAAQMD compared to delivering crude oil by marine vessel. See Table 3-2 for a summary of net emissions reductions that would be associated with the Project."

". . . .Regardless, long-term operations of the proposed Project would result in a beneficial impact to air quality in the BAAQMD."

The final sentence in the evaluation reads like a statement of religious belief in the *"beneficial impact to air quality to the BAAQMD* [the Bay Area Air Basin]" that would be brought about by the advantages of the Project, mainly, replacing ship transport by train transport. There is no account of *local* air quality impacts from long-term Project operations, including cumulative impacts of exposure risks to the Benicia community from existing and future-anticipated refinery toxic emissions (including from accidental releases with "spiking" of emissions, leaks, fires, etc.) in addition to Project-related emissions.

Under item 3d, the Study recommends that the lead agent (City of Benicia) evaluate the *"incremental toxic air contaminant (TAC) exposure risk to all sensitive receptors within a 1,000-foot radius of a project's fenceline."* The summary sentences in the discussion are as follows:

[Checklist: Air Quality, 3d, p. II-14].

"Long-term operations associated with the Project would generate TAC emissions from locomotive idling, locomotive transit, locomotive switching and from fugitive equipment and routine Tank 1776 leaks. The Applicant provided a screening level health risk assessment, as summarized in Table 3-3 which modeled the following sources using the ISCST3 air dispersion model: . . . [Table 3-3: Maximum Cancer and Noncancer Risk]." . . .

"The closest sensitive receptors to the proposed Project would be residences off Lansing Circle, approximately 2,700 feet northwest of the proposed Project site. There are no sensitive receptors within 1,000 feet of the proposed Project components."

Lansing Circle is a residential cul-du-sac located in the northeastern corner of the Water's End development that overlooks the refinery processing block, which is just south and east of the cited street, alleged to be the nearest location of "sensitive receptors" to the proposed Project railcar off-loading racks. There is no analysis in the Study or Checklist of emissions from the Project that would affect, for example, sensitive receptors – employees – working in businesses near the Union Pacific tracks and/or near the refinery's off-loading racks.

The air emissions dispersal modeling referred to in the quote cited above is inadequate to address how toxic, volatile emissions can travel given different wind conditions, winds' seasonal patterns and the topography of the area. The "wind rose" pictured in Figure 4.2-2 and Figure 4.2-3, on pages 44 and 45, in the Valero VIP EIR's "Response to Comments" document should be included in the Appendix. Cumulative exposures to refinery emissions over time may present "non-cancer risks" to sensitive receptors – for example, *Benicia residents who are also employees of the industrial park.* It is well known that chronic bronchitis and asthma are aggravated and/or triggered by diesel exhaust emissions and other refinery/industrial processing operations (particulate matter - PM10 and PM2.5; VOCs, black carbon, and other Toxic Air Contaminants). Cumulative and chronic health impacts should be discussed and analyzed for receptors within residential areas nearest the refinery fencelines and also for those employees in the industrial park. Other contributing sources of air pollution must be considered in

evaluating health effects that are related to potential significant *cumulative emissions* – air pollution conditions that can be chronic over time or "spiked" (acute) during releases, fires, etc – that would impact sensitive receptors in the community. (Contributors to cumulative air impacts from sources of PM 10 and PM 2.5 include freeway emissions, diesel emissions from ships and Valero's coke trains, soot from fireplaces, pollen, and TAC emissions from other existing industrial polluters in the area.) To evaluate cumulative air emissions, other similar large-scale development projects that are proposed and planned for the area must be included in the calculations of air emission impacts in addition to Project-associated air emissions over time.

Further, cumulative air emissions from additional trains coming from CC County refineries (Phillips 66 and very possibly other refineries in the future) should be calculated as contributing to total cumulative Air Quality impacts, since Benicia, for most of the year, is downwind of Phillips 66, and Union Pacific's rails run through CC County and into Benicia and continue north and eastward.

Regarding odors, Item 3e [Checklist, Air Quality, p. II-15]. This item discusses whether there would be "objectionable odors" that might affect "a substantial number of people." The limited discussion of both potential impacts from construction phase and operations is as follows:

> *"Diesel equipment used to construct the project may emit objectionable odors associated with combustion of diesel fuel. However, these emissions would be temporary and intermittent in nature, thus odor impacts associated with diesel combustion during construction activities would be less than significant. There would be no change expected in the existing operational odors resulting from implementation of the proposed Project. This impact would be less than significant."*

Diesel fumes are considered by most people as highly noxious and offensive to smell, let alone that diesel exhaust fumes are toxic and can cause respiratory distress in sensitive receptors, *especially if the air is still and emissions are <u>not dispersed</u>*, as during weeks in winter when a cold damp fog sits on the ground and there is no wind. The Study's discussion shows little concern about four train trips daily entering and leaving the industrial park, 365 days a year, that would create "unpleasant odors." Locomotive exhaust would add cumulatively to the daily odors emanating from the refinery's processing block, tank lids, and other sources (asphalt plant) that can be noticed and smelled "off site" in the industrial park southeast and east of the refinery. The Checklist's assumptions do not take into account the numbers of people working in the vicinity of the Project.

<u>Further missing from the Study's discussion of odors and emissions impacts</u>: westerly winds carry toxic gases and their odors eastward from the refinery processing block and would similarly waft emissions from the Project. According to calculations derived from the wind rose published in the VIP EIR "Response to Comments," [cited above; Figures 4.2-2 and 4.2-3] <u>approximately twenty percent (20%) of the of the year, mostly during late fall and winter months, the winds change direction and often die down, causing negative "off site" odors and air quality impacts to Benicia's residential neighborhoods</u> west and south of the refinery but <u>also in the surrounding industrial park</u> northeast, east and south of the refinery fencelines.

Cumulative adverse impacts from odors emanating from the Project should be calculated as potential *additional* effects from *toxic emissions from all sources, under favorable and unfavorable wind conditions*, and, *should be discussed as related to health risks to sensitive receptors in both the industrial park and residential neighborhoods*.

The following comments are intended to lend contextual breadth and depth from a local perspective to the Study's evaluation of Air Quality impacts and are pertinent to my rejection of the Initial Study's Environmental Checklist of Air Quality impacts and the alleged sufficiency of Mitigation Measure Air-1, the Study's lack of analysis of cumulative emissions impacts and concern for health of local sensitive receptors. The comments also discuss the problem of analysis of local ambient air quality. These observations regard BAAQMD's role and public mandate under the federal Clean Air Act.

BAAQMD's mandate under the federal Clean Air Act is, as the Air District repeatedly advises, to ensure the general safety of the Bay Area's air basin *as a whole* for human health. Accordingly, as a department of CAL-EPA, the Air District monitors the Bay Area air basin to ensure that the region meets "attainment" standards – safe thresholds set by federal and state regulation for smog-producing gases – e.g. ozone precursor gases including nitrogen oxides, sulfur dioxides, volatile organic compounds [VOC'shttp://iaspub.epa.gov/sor_internet/registry/termreg/searchandretrieve/termsandacronyms/search.do], greenhouse gases and particulate matter (PM10 and PM2.5). The Air District monitors polluting industries' emissions and quantifies them, using statistical averaging, to calculate the cumulative negative impacts to the air basin *as a whole*, thus to report to state (and federal) EPA regarding non-compliance with "attainment" goals for the region. However, it is little understood that The Air District has generally **not** seen it as their particular responsibility to be concerned or involved with monitoring ambient air quality with respect to human health in *local* neighborhoods and communities *living in close proximity* to a major polluting industry, such as a refinery or chemical plant. Local communities' desires to have monitoring stations installed within neighborhoods affected by refinery or other polluting industrial operations (with the purpose to better understand exposure risks, to accurately monitor for emission "spikes" in real time during accidental releases, etc.), have been mostly dismissed over the years as *not part of the general mission of BAAQMD*, and this is an ongoing frustration and active dispute with the Air District by the concerned communities of Richmond and Rodeo/Crockett, and also by concerned Benicians. A spectacular failure of the Air District to track "off site" emissions in real time during the Chevron Refinery fire in August 2012 is a prime example of the District's lack of preparedness or interest (or mandate as public servants?) to address *local emissions impacts* that may affect ambient air quality and thus human health in the vicinity of a major polluting industry, especially during time of accidental releases, fires or explosions.

Right now, in Benicia, various air-monitors that were purchased *for the benefit of the community* under specific terms of a Settlement Agreement negotiated in 2008 between Valero and the Good Neighbor Steering Committee have been unplugged and the trailer housing them closed up and stored on Valero's property, thus remaining inactive until further notice. Since the equipment's initial installation above Tennys Drive, a public access website has yet to be fully completed. (Participants in its development are Argos Scientific, the Good Neighbor Steering Committee and Valero.) The question hanging over the intended independent program is one of ownership. The City has refused to take ownership of the equipment on the community's behalf for what was intended to be a permanent, independent, educational Benicia Community Air Monitoring Program ["BCAMP"] to sample and analyze ambient air quality in real time and make data available to the public via a public access website. This equipment was meant to be flexibly used, including for mobile monitoring during accidents, monitoring air at school sites, and for such purposeful uses by Benicia High School's Green Academy science students.

It is a fact that the Air District has also shown little interest in the Benicia community's attempt to establish the local air-monitoring program as discussed here. It is unfortunate that the City of Benicia has not wanted to take responsibility for the monitors – equipment purchased for $200,000 by the 2008 Settlement Agreement, which also provided support ($50,000) for two years of maintenance and data analysis by an independent contractor (Argos Scientific). *Funding for an on-going program is not the point here*. It is disturbing that the City would reject ownership of the very tools to be useful for local ambient air monitoring on any given day, yet sign off on an MND for the Project, expecting the public to believe that the City has given the Initial Study its foremost attention with care to Air Quality impacts, with due consideration to protecting the public's health from potential negative "off-site" cumulative emissions effects of the Project, thus the refinery's *total cumulativ*e *emissions impacts* on the local community.

4. Biological Resources, [Checklist, p. II-19]. Mitigation Measure BIO-1: concerns Project construction activities during *"nesting season, Feb. 15 through Aug 31."* If construction occurs during the nesting season, the Study states: *"a biologist experienced in conducting nesting bird surveys shall survey the Project area and all accessible areas within 500 feet."* The account goes on to briefly describe how nests would be protected during construction. Has the Department of Fish and Wildlife been contacted to review the Project?

The problem is, the Project is so narrowly defined that it appears to be limited to the immediate area surrounding the off-loading racks on Valero property.

For example, in item 4c, the following CEQA question is posed: *"Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption or other means?*

The answer given presumes that "the Project" would only materially exist on Valero property, when logically, *by extension, and common sense*, it also exists along Union Pacific's tracks, upon which trains would be carrying crude through significant stretches of protected marsh areas with seasonal pools and wetlands and through river flood plains. The Delta Plan envisions Suisun Marsh as an area for restoration, where certain endangered fish species and plants could be at risk from spills. And although the Project would only add a small amount of new track on Valero property, it is not clear in the Study or Checklist whether potentially significant impacts owing to Valero's crude-loaded railcars traveling through sensitive ecologic areas on existing Union Pacific tracks would actually "count" as being potentially generated *as a result of the Project*, albeit such impacts are foreseeable, and *should* be discussed as a "credible worst case scenario" associated to Project operations. This begs a question about the limited Project Description and what it leaves out: there is no discussion of Union Pacific's rail routes by which crude-loaded railcars would travel, and whether those RR routes are to be considered *part of the Project as a whole.*

5. Mitigation measure GEO-1 [Checklist. Geology & Soils, p. II-29]:

Mitigation GEO-1 is *promised* to be provided, presumably at a later date, which violates CEQA's requirement that mitigation measures be planned and submitted at the time of a project's review.

GEO-1 raises the question of seismic risks to the area of the Project including possible liquifaction. GEO-1 does not discuss what would possibly happen if a severe earthquake occurs when a train is traveling within Benicia along the marsh where subsidence of rails could occur or rail misalignment, or in the case when railcars are off-loading crude at the racks. Given the active seismic area of the Project, this is a "credible worst case scenario" that is not envisioned in the Checklist's discussion of potentially

significant seismic impacts that could indirectly affect the safety of Project operations and increase hazard risks, and also, potentially affect sensitive marsh and wetlands near Union Pacific's tracks.

6. Greenhouse Gas Emissions [Checklist: Greenhouse Gas Emissions. p. II -34,35]

The Study's discussion and Checklist is short on the subject of GHG emissions: according to the Checklist, construction GHG would not have a significant impact, *"directly or indirectly."* The Checklist states that BAAQMD does not identify a *"construction threshold of significance"* for GHG; however, the Air District does *"identify a quantitative threshold for annual operations of 1,100 metric tons of carbon dioxide equivalent (CO2e)."* The Checklist states that this is a conservative estimate, since *"for stationary source projects, the quantitative threshold is 10,000 metric tons of CO2e per year."* BAAQMD's threshold of 1,100 metric tons of CO2e per year for non-stationary sources is applied in analysis of the construction-related Project emissions.

Thus, <u>for operational contributions to GHG, the Project is given a "pass:</u>"

> *"Project operations would result in a net reduction of GHG emissions over existing conditions (see Table 8-2) as the overall capacity of the Refinery would be unchanged, but there would be less crude oil deliveries by marine vessels that have higher emissions compared to deliveries of crude oil by rail transit. The proposed Project would reduce GHG emissions by up to approximately 3,543 metric tons of CO2e per year compared to existing conditions. Therefore, implementation of the Project would represent a beneficial impact."*

<u>The problem in evaluating GHG contributions is that, again, the Project appears to be so narrowly defined as if it were to exist materially only within Valero's property, and not extended through its train movements over miles</u>. Are GHG emissions to be accounted for as Valero railcars, both loaded with crude or "emptied", are moving within Benicia limits? What about leakage of gases from railcars? What about trains moving through other cities and unincorporated areas – e.g., out and beyond Benicia's city limits? <u>Where does the Project begin and end? Under CEQA, the Crude-by-Rail Project must be understood and evaluated in its entirety, "as a whole.</u>" (Please see my further comments on the need to identify, describe and evaluate "the whole of the Project.") There can be no doubt that total GHG emissions from crude oil processing and including the proposed rail Project operations would be even greater if assessments took in GHG emissions from hydraulic fracking and tars sands mining operations as well as long-distance rail transport of crudes – operations that, *by logical extension*, are the essential *raison d'etre* of the Project.

Ultimately, we must know about the extent to which Valero seeks to meet AB32 GHG reduction targets, and how they will achieve those state and federal goals for 2020.

7. Regarding Hazards and Hazardous Materials: [Checklist 8; p. II-37];

Valero's rail project is slated to be completed in 2014. <u>The Study is without benefit of any reporting of crude-by-rail local/regional/national experiences; thus there is no documentation of the kinds of impacts we might expect over the life-time of the project</u>. Yet, there are growing numbers of articles, (see Google news, click on email alerts, and type in "railroad, crude oil") about crude-by-rail transport happening across the country. Available information about other experiences with crude-by-rail transport into refineries, or the transport by rail of other hazardous materials, in the Bay Area and beyond, should be cited and discussed in order that the public be aided to recognize and meaningfully anticipate problems and potentially significant negative impacts. The highly relevant topic of foreseeable, unpredictable

necessary adjustments or changes in train schedules by Union Pacific, considering the number of trains of all kinds including passenger trains that would be passing through CC County and Benicia, is not discussed.

Risks of Union Pacific RR transport of crude oil: What kinds of accidents could happen while trains are traveling? Would there by switching of tracks and change of locomotive engines at any place enroute from the loaded trains point of origin that may be occasion for accidents? What is the safety record of Union Pacific generally as a hauler of hazardous materials in California and elsewhere? Has Union Pacific been a carrier of crude for Phillips 66 or Tesoro (in Washington)? If so, what has been their experience and safety record transporting crude oil? What, if any, are federal policies and regulations that *specifically* govern transport of crude oil by rail? What would be Union Pacific's plans be in the case of stalled trains, derailment and/or failed railcar or uncoupling, etc.? What are "credible worst case scenarios" that are foreseeable hauling crude by rail? What about the *un*expected, therefore *un*anticipated "black swans" – accidents that could be catastrophic in impact? What are the City's emergency measures in the case of catastrophic releases (or fires, explosions) that could require evacuation of parts of the industrial park near Union Pacific tracks? What would the effect of adding Valero's crude-loaded trains to the over-all number of passenger and commercial train trips traveled daily on Union Pacific routes passing through Benicia and cities "up county" and beyond? What kinds of equipment failures could occur at the off-loading racks on Valero property? What about any potential for side-lining of crude-loaded rail cars? Or problems that could occur with scheduling of crude train arrivals and departures that could interfere with schedule for coke trains that travel to and from the refinery to the coke silos and ships at the Port of Benicia?

What are Valero's risk management plans associated to the Project?

[Study: Project Description, p. I-9]

"The new rail car unloading facilities would include liquid spill containment. The rack would be sloped inward toward the centerline of the rack. A roadside curb would be provided east of the tracks near the fenceline to further contain any minor spills and leaks.". . ."

"Part of the existing containment berm for the tank field would be removed and a new concrete berm would be constructed approximately 12 feet west of the existing earthen berm. The resulting containment capacity would continue to meet or exceed minimum regulatory containment requirements."

Is the containment berm, which is described as "*exceeding* ***minimum*** [my emphasis] *regulatory containment requirements"* capable to control a major spill involving more crude released than *"minor spills and leaks?"* What would routine daily risk management involve? What emergency response would be involved in the case of an overflow of the berm, (which, if seen in a larger context, would seem the size of a kid's swimming pool)?

Discussion of "off-site" potential hazards are not considered except as portrayed in Mitigation Measure TRAN-2 of the Checklist, (see comments below on Transportation and Traffic), wherein an accident is envisioned that could occur at the intersection of the RR tracks and Park Road. TRAN-2 is thus narrowly limited in scope. The lack of any descriptive analysis of potential off-site hazards represents to this reader an extreme, obfuscatory oversight of the Project Description, especially given that there is no evidence

given of the performance record of Union Pacific, and the national record to date of accidents involving crude-loaded trains.

8. Transportation and Traffic [Checklist; p. II-62 - 69]

With regard to performance and operational risks: under CEQA, a discussion of credible worst-case scenarios posed by a project must be considered. There will likely be a number of businesses in the industrial park that will want to comment on this issue considering that trains will be passing four times daily to and from Valero through the industrial park and crossing Park Road. Estimates are given with regard the likelihood of accidents at Park Rd. The Checklist's answer to the question "Would the project result in inadequate emergency access?" acknowledges that

> *"According to the 2012 emergency response data provided by the fire department, an average of about two emergency incidents a month occurred along the industrial areas of Park Road and Bayshore Road. The probability of an emergency incident occurring at the same time as a proposed Project train crossing is low. It is unlikely that the Project would cause the average emergency vehicle response time to increase to over 7 minutes for the Park Road and Bayshore Road industrial areas."*

The Mitigation Measure TRAN-2 is designed to ensure that the City of Benicia Fire Department coordinates with Valero, and (presumably) other emergency services or county agencies

> *". . . to prepare an action plan in the event that an emergency occurs during a Project train crossing. The action plan would provide methods of adequately informing the Fire Department of the expected train crossing schedule and alternate routes to access the Park road and Bayshore Rd. industrial areas during the event that a train crosses Park Road."*

CEQA requires that a mitigation measure must actually have a plan prepared and delivered to the lead agency at the time of the environmental review. The public must be able to review the mitigation plan. Thus, a mitigation plan cannot be promised and submitted at a later date, as suggested by the strange wording of TRAN-2, which makes it sound like an emergency response plan would be designed (only) *"in the event that an emergency occurs."* This notion of casual response planning is how the the Kalamazoo River spill in 2010 of "diluted bitumen" was horrendously mismanaged. (See Comment #10)

> [Study: Project Description, p. I-11]
> *"A train with 200 feet of locomotive and 50 railcars in length would take about 7.3 minutes to cross Park Road at a speed of 5 mph. The at-grade crossing traffic controls provide a 30-second buffer time before and after each train crossing on Park Road. Each 50-railcar train movement is estimated to block traffic on Park Road for approximately 8.3 minutes. Operations would occur 24 hours per day/ 7 days per week/365 days per year."*

Would there be need for signaling at Park Road to warn cars and trucks routinely traveling in the Industrial Park of a slow-moving approaching train? Which businesses would be most affected by the Project's use of the Union Pacific tracks through the area? (Traffic, Noise). What is the City's responsibility for traffic risk management in the Industrial Park? What recourse would businesses in the area have that use Park Rd. in the case where trains may be delayed, stalled or stopped on tracks? What "alternate route" plan for vehicles and trucks has been designed?

9. Mandatory Findings of Significance: [Checklist 18; p.11 - 74]

Item 18a

addresses whether the Project would degrade the quality of the environment, substantially reduce habitat of wildlife species, fish, biota etc. No significant impact is imagined. The Checklist of mandatory Findings of Significance apparently does not attempt to envision "off site" toxic spills or releases that could potentially degrade a sensitive ecologic area in the case of a severe, unexpected accident involving a crude-loaded train. Again, the Project is defined in such a way as seeming *not* to include the twice daily crude-loaded trains, each with 50 railcars destined for the Benicia refinery and traveling on Union Pacific tracks "off-site" through ecologically sensitive areas, nor account for potential significant impacts involving hazardous, toxic crude oil spilled into the Suisun Marsh or other such biologically diverse areas (wetlands, vernal pools, etc) in the Delta floodplain through which Union Pacific tracks extend.

A credible worst case scenario would be a train derailment, with leak or spill into the Suisun Marsh during the winter months when seasonal flooding occurs and vernal pools are created, and/or, during nesting season for birds, the Suisun Marsh being part of the Pacific Flyway. Since no accident or spill is discussed as a potential impact scenario, the Checklist doesn't provide any mitigation measure or emergency plan for cleanup and recovery of a spill-site that would have to be sensitive to biota and wildlife.

It has been claimed by Valero publicly that the railcars that would be used are built with double walls, such that punctures to the cars would be next-to-impossible in the case of a derailment. That is a statement of *ideal conditions*. What about the foreseeable possibility of a crude-loaded train colliding with another Union Pacific train traveling at high speed – a "black swan" event? In any case, there is no visual representation in the Initial Study that shows the design features of a railcar built to carry crude oil safely. Are there special valves for off-loading that are safeguarded against accidental releases? Any special connectors for pipes used in loading and off-loading crude? What safety features are there to ensure that spills cannot occur in the case of train collision at usual traveling speeds off-site in the marsh area?

Emergency planning for a potential accident involving crude-loaded railcars cannot be routine. For example: Mitigation Measure TRAN-2 alludes to an *existing* emergency response plan in the limited case of an accident the Study does discuss– an accident envisioned at Park Road, where a crude-loaded train is crossing the road traveling at 5 mph toward the proposed off-loading rail rack on Valero property. The *existing* response plan referred to, (the "plan" is not described in full nor provided in the Appendix) is said to involve Benicia's and Valero's fire departments, and county officials involved with hazmat and public health risks – accordingly, the usual protocol in the case of any accident at the refinery with potential off-site consequences.

However, in the case of an off-site possible spill in Suisun Marsh of a sour crude blend that contains a diluted bitumen called "dilbit" – (bitumen being the actual product/substance extracted from mining Alberta, Canada's tar sands) – there is currently no known method, practiced by EPA, to safely recover bitumen that doesn't cause further damage and destruction to the environment. A case in point: the tragic, still unresolved Enbridge Energy pipeline spill in Michigan, July 2010, involving an Alberta tar sands "dilbit," which poured into a stream that flowed into the Kalamazoo River. Kalamazoo River oil spill - Wikipedia. The Initial Study does not describe bitumen, nor identify it as a particular "problem" constituent of a "North American-sourced crude" type. Bitumen must be described. It is a heavy, thick, viscous, gooey, tacky, highly acidic, corrosive tar-like substance that cannot move through pipelines or be

transported in railcars without having other lighter petroleum based products added to it. When spilled on the ground or in a stream or riverbed, the bitumen has been found to separate from the other lighter, more liquid petroleum-based additives and sink down into whatever material it is spilled into. The volatile compounds themselves become a toxic gas. So, while those "dilutants" disperse in air, (releasing toxic air contaminants and GHG) the heavy sulfur and lead-laden toxic bitumen sinks into the biologically alive and stoney matrix of a riverbed, streambed, pool, marsh, wetland or floodplain, remaining stuck to gravel and rocks and embedded in soil structures. The only cleanup strategy for removing dilute bitumen that had been considered in the Kalamazoo spill was dredging the river bottom – an obviously highly destructive procedure that would further degrade, strip and ruin the 25 - 35 mile-long affected spill area in the river and floodplain. To date, the river and its river bank, its biota, rocks, soils and fish spawning areas remain impacted, subject of a $765 million dollar cleanup effort (as of summer 2012) that still has not been resolved. Reporting on the spill's cause, "NPR reported that "NTSB investigators determined that the six-foot gash in the pipe was caused by a flaw in the outside lining which allowed the pipe to crack and corrode."

Item 18b

addresses the question of whether the Project would have impacts *"that are individually limited, but cumulatively considerable."* The meaning of *"cumulatively considerable"* is given as

> *". . . incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."*

With respect to calculating cumulative air impacts and potential effects to the local environment and our Bay Area region with its many special ecologic areas: There is no mention in the Initial Study of the fact that Phillips 66 is now importing crude by rail, and that other Bay Area refineries may be jumping on board to build rail facilities for importing "North American-sourced crudes." It would be most interesting to know whether Phillips 66's rail project was permitted with an MND signed off by Contra Costa County or if an EIR was required. [Rodeo and Crocket are unincorporated communities]. Was the City of Benicia alerted to the Phillips 66 project at the time of its environmental review for its rail project? And concomitantly, has the City of Benicia, as lead agent, notified surrounding cities and unincorporated areas to let them know about the review of the Valero's Crude-by-Rail Project and to invite their comments?

CEQA requires that cumulative effects of a Project be evaluated that would potentially cause significant adverse impacts to air quality, water, biota and sensitive habitat. The number of trains carrying crude oil into Bay Area refineries is likely to increase because of the new movement in the industry to access "North American-sourced crudes," for which Union Pacific rails and the refineries' rail off-loading facilities would serve. If this is the case, and there is projected to be more crude-loaded train traffic on Union Pacific routes through the Bay Area, the Initial Study lacks any discussion of current and future similar crude-by-rail projects in Contra Costa County that would increase the level of risk of accidents and damage to sensitive ecologic areas through which increased numbers of crude-loaded trains would inevitably pass.

The question of responsibility for "off site" environmental impacts is not dealt with in the Initial Study but deserves to be considered. The crude-loaded trains would be traveling many miles to get to Benicia. Would Union Pacific, as a corporation, account for the "vehicle miles traveled" of Valero's trains? Which

corporate entity would be ultimately responsible to report VMT with respect to AB32, the California Global Warming Solutions Act? Calculations of VMT for Valero's train travel in miles would provide quantified evidence of a crucial transportation cost to the environment of transporting crude by rail; but this subject is not part of the Study's evaluation of GHG contributions of the Project. Nowhere is any mention of AB32 in the Initial Study or Environmental Checklist. Accordingly, there is no respect demonstrated in the environmental review of the intent and spirit of AB32. Where are the origin(s) of the loaded trains? What are the train routes that will be traveled by Union Pacific trains carrying crude to Benicia? How many highly sensitive ecologic areas would Valero's and other refineries' crude-loaded trains pass through? What would the operational risks at the trains' *loading* ends that could impact Air Quality and Biological Resources at that location? Whatever facts exist are hidden from the public by the Initial Study.

10. There is much deserved concern in Benicia, and beyond in the Bay Area, about the issue of what crude types would be imported by railcars to Benicia. There is growing public concern that tar sands "diluted bitumen" is planned to be among those "North American-sourced crudes" transported to Benicia and other Bay Area refineries by rail.

The primary reason for Valero's rail project in the first place is to be able to access certain crude types *"that have recently become available"* in North America. [Overview - I-1]. The 100 railcars per day that would contain sour crude blends with specific chemical properties and densities. These crude types, destined to be refined as part of Valero's daily processing "mix", are *specific* products being transported for processing, so must indeed be considered intrinsic to the Project. Certainly, the essential reason for proposing and implementing the Project is to be able to import the various *"North American-sourced crudes"* that heretofore have been *inaccessible* to Valero by other means of transport (pipeline and marine vessel). Without this reason, the Project could not be characterized as needing to exist.

Among the heavy "North American-sourced crudes," some, if not all, have presumably been "off limits" for Valero's Benicia refinery because of lack of feasible access; for even if the Keystone XL Pipeline were to be approved, Valero Benicia would not be accessing the particular tar sands "dilbits" (diluted bitumen) at the end of the Keystone pipeline's route. Rail transport from the midwest and Canada would serve to provide that access. In other words, without rail transport, there would be little opportunity, economically speaking, for Valero to import certain North American crude blends into Benicia, including tar sands blends from Alberta Canada. This issue was not discussed in the Initial Study. The general descriptive term "North American-sourced crude" implicitly suggests "proprietary information" that is not, *by corporate insistence*, to be disclosed. Regulatory agencies participate in protecting company "trade secrets." The Project Description basically tells the reader, "trust Valero's word:" that it will make little or no difference where the "North American-sourced crudes" actually come from or what their chemical composition consists of.

[Study; Project Description, p. I-2]

> *"The Refinery does not anticipate a need to change the existing Refinery operations or process equipment, nor would emissions from Refinery operations change (with the exception of the storage tank service and rail unloading emissions) as a result of accepting and refining the proposed North American-sourced crudes."*
>
> AND,

[Study, Project Description, I-6]
"The North American-sourced crude oil gravity is expected to range from 20 to 43.5^{o} API, so it would be similar or somewhat lighter than some of the current constituent crude oils used in blending. The North American-sourced crude oil sulfur content would range from 0.06 to 3.1 by weight percent, <u>but on average</u> [my emphasis] *would be similar to that of the current constituent crude oil used in blending. The North American-sourced crude oils are expected to replace crude oils of similar gravity and sulfur content that are currently brought in by ship. The Refinery's crude oil feedstock is currently blended to achieve Refinery feedstock specifications, and the North American-sourced crude oils would be blended in the same manner. Since the North-American sourced crude oils would replace crude oils with similar properties, it is anticipated that the Refinery would continue to operate within its existing specifications for crude oil gravity and sulfur content range."*

<u>The public has a right to know more about higher levels of sulfur and other constituents such as lead that the Study studiously avoids being clear about, especially alluding to "on average" comparisons with currently processed sour crude types.</u> The obfuscation is dramatic. Obviously, the Study hits a sensitive nerve: there is no account of the corporation's reasons for non-disclosure, nor acknowledgement of "trade secrets." The most extensive reference in the Study to the types of crude to be imported is given as *"North American-sourced crudes that have recently become available"* [Study: Overview, p I-1]. This is hardly informational. On the contrary, <u>*what it doesn't say* represents the Initial Study's enormous data gap.</u> The *only mention* in the MND of the crude to be imported by rail into Benicia is entombed in the following sentence in the MND's introduction:

"The crude oil to be transported by rail cars is expected to be of similar quality compared to existing crude oil imported by marine vessel."

The Study does not say what specific types of "North American-sourced crudes" are intended to be imported to Benicia and where they would be coming from. This omission is purposeful and morally wrong, especially given the context of global warming and climate change caused by human activities and the increased GHG emissions represented by "the whole of the Project." The Project Description gives no account of those actual sources, e.g., *actual locations where trains would be loaded with types of crude oil* (shale oil, "tight oil", tar sands bitumen/dilbit). The Description gives only generalities about crude mixtures in feedstocks and similarities of "North American-sourced crudes" to currently imported and processed sour crude types; thus, <u>basic information required to evaluate potential negative effects of the "Project as a whole" is *wholly* lacking!</u>

The Study's Overview [p.I-1.2] asks the public to accept generalities and comparisons about the range of qualities of acidity and density of "blended crude oil slate" regularly processed. The description wants to assure the reader that nothing possibly could be different, nor needs changing as a result of adding a percentage of the newly accessible "North American-sourced crudes" to the feedstock mix of crudes processed daily. Where is the actual evidence and data to support the Initial Study's conclusions and assumptions about "benefits" to Air Quality, or that contribution to Greenhouse Gases will be minimal during the Project's operations over time? Again, the Project Description doesn't account for the intended lifespan of the Crude-by-Rail Project, nor its extensions, reaching out by rail far and wide.

[Initial Study, Overview, p I-1,2] :

> *"The quality of crude oil varies by oil well locations and reservoir formations; therefore, the quality of crude oil received from the same source may vary over time. Refineries are designed and equipped to process crude oil of a specific quality that is broadly defined by a range of gravity and sulfur content."* . . . .
>
> *"A blended crude slate is comprised of multiple individual crudes that when combined provide a crude mix that refinery hardware is designed to process. The proposed North American-source crudes will be a constituent in the Refinery's blended crude oil slate.". . . ."The Refinery's various crude oil feedstocks are currently blended to achieve Refinery feedstock specifications, and the North American-sourced crude oils would be blended in the same manner. Since the North American-sourced crude oils would be replacing crude oils* [that have been imported by marine vessel] *with similar properties, it is anticipated that the Refinery would continue to operate within its existing specifications for crude oil gravity and sulfur content range.*
>
> *The Refinery does not anticipate a need to change the existing Refinery operations or process equipment, nor would emissions from Refinery operations change (with the exception of the storage tank service and rail unloading emissions) as a result of accepting and refine the proposed North American-sourced crudes."*

Why be concerned? The MND seems to say, "don't be."

We have known since the Valero Improvement Project was introduced to the community in 2002-03 that Valero would be retooling/upgrading the refinery to be able to accommodate a greater variety of heavy sour crudes. These were explained to be more corrosive (because of higher sulfur content) and also more productive of certain emissions; but the Valero Improvement Project would make technical improvements to account for the requirement to reduce increased sulfur emissions and other toxic air contaminants associated to processing more types of sour crudes and sour crude feedstock blends. It is my understanding, from conversations over the years with Valero regarding VIP, that early on after purchase of the refinery from Exxon, Valero foresaw that the corporation – the largest independent refiner in the U.S. – would be more dependent on purchasing sour crudes on the open market, after their initial 10-year contract with Exxon expired that had allowed Valero to continue to process a great percentage of Alaskan sweet, light crude (that had been extracted from Exxon's own fields near Prudhoe Bay). And since the Benicia refinery had originally been designed to process Alaskan sweet crude, the VIP Project was essential to Valero's intention to import more types of sour crudes.

The higher levels of sulfur in sour crudes also contributes to a growing risk of corrosion, which was the presenting cause of what became a catastrophic leak and fire at Chevron's Richmond Refinery in August, 2012. <u>The refining industries' increased processing of more sour and heavier crude types represents a potential cumulative risk to safety of local communities, local air quality and public health.</u>

> "*The North American-sourced crude oils are expected to replace crude oils of similar gravity and sulfur content currently brought in by ship."* [Study: Overview, p. I-2]
>
> *"Thus, the proposed Project could reduce marine vessel deliveries by up to 25,550,000 bbl per year. Based on a 3-year baseline period from December 10, 2009 through December 9, 2012, annual marine vessel deliveries could be reduced by up to 81 percent. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline."* (Study: Overview, p. I-6]

The first sentence quoted does not claim *absolutely* that "North American-sourced crude oils" would replace crude oils of similar gravity and sulfur content as those crudes imported by ship; it simply says that Valero has the *expectation* that the crude oil types imported by rail will be *comparatively similar* to those sour crudes now being imported by marine vessels. The meaning of the second sentence, about advantages of replacing ships with trains, which would cause a reduction in total annual diesel emissions, may be taken at face value as a "good." However, such value statements should be contextualized in the larger frame of total emissions calculated for the Project; thus, such a "good" must be factored as part of the the refinery's *total emissions over time* that are owing to the processing of more sour crudes with greater sulfur content, metals such as lead, and other toxic air contaminants present, for example, in highly corrosive, acidic diluted bitumen, to make the point clear.

Cumulative potentially significant negative impacts to air quality and an account of *cumulative* GHG emissions that are related to the specific "North American-sourced crudes" planned to be imported must be described and discussed in sufficient detail with data to support claims in the context of the projected life-span of the Valero Project and other existing and planned Bay Area rail projects as well as other existing and planned large-scale industrial developments: therefore, to evaluate the cumulative impacts from all existing emissions sources within the vicinity of the Project, so that emissions contributed by specific "North American-sourced crudes" can be understood in full context of cumulative risk.

Accordingly, if Valero's crude feedstock may, by virtue of permitting the Crude-by-Rail Project, regularly have as part of its mix a percentage of those tar sand dibits, this must raise the potential for significant and catastrophic foreseeable environmental effects of diluted bitumen (dilbit) if and when spilled. Without details of the chemical makeup of tar sands blends as well as other crude types imported by rail, the public cannot judge the toxicity and extent of potential environmentally significant impacts, and the difficulty, *if not impossibility* of cleaning up after a spill, say, in the Suisun Marsh or Sacramento River floodplain or Carquinez Strait or other such sensitive interior landscape through which Union Pacific tracks pass.

So I ask: if Alberta's tar sands bitumen blends are intended to be transported by rail to Benicia, then, with as little information as provided by ESA's Initial Study, how can the public accept a finding of *no potential significant impact to the environment anticipated that cannot be mitigated*?

Enbridge Resisting Final Clean-Up of Its Michigan Oil Spill | InsideClimate News. See also The Exxon Oil Spill in Mayflower, Ark.: Slide Show of Annotated Photographs and Maps | InsideClimate News

One only has to "think Kalamazoo."

11. Under the rubric of the full intent of AB32, the Project should be discussed and evaluated with regard to the vision for a sustainable economy that AB32 upholds – an economy and way of life that doesn't continue to destroy the environment and the atmospheric conditions that make life on earth livable. I am talking about how I believe this Project represents the status quo and a level of desperation in the industry to continue to pursue the mining for crudes of every type, in every possible place of "reserves" in North America, to reap the benefits near term, in the case we are reviewing here, of what the industry would like to consider an "inexhaustible supply of crude" that would be consumed indefinitely into the future.

Twenty-five percent (25%) of America's "oil" is now coming from Alberta's vast network of tar sands mining operations, Alberta Energy: Facts and Statistics , by means of a highly energy intensive and water-demanding open pit mining operation to extract bitumen – a tar-like substance which is not an oil, but which is naturally occurring in deep sand formations. It is heavy, highly acidic and so thick it must be washed out of the sand deposits by extraordinary amounts of hot water under pressure, using tons of natural gas to supply the energy to heat the water, and thus contributing to massive GHG emissions. The bitumen itself is too dense and heavy to be pumped through a pipeline without being made "lighter." To get the consistency required for pipelines or unheated railcars, the raw bitumen must be diluted with other lighter more liquid petroleum products.

To my knowledge, BAAQMD has not described the heavy crude "blended" types that have been created from the bitumen extracted from Alberta tar sands. Although the Initial Study doesn't give it a name, or any specifics, easy research online tells that the Canadian government is price-supporting Alberta tar sands' "crude blend," which is called "Western Canada Select," to compete against "West Texas Intermediate", the light sweet crude used historically as the pricing benchmark in the industry. Bitumen may contain metals –high lead levels – besides its high concentration of sulfur. Has the Air District made public whatever it knows about the processing of "Western Canada Select?" We need to know from the Air District or other experts if this particular blend would be imported to Benicia and whether it would cause emissions that might meet or exceed "thresholds of significance."

Wikipedia entry on WCS
Cenovus Marketing page for WCS
CrudeMonitor.ca technical profile for WCS

In the absence of more information from Valero, the public has the burden of trying to imagine the consequences of a 10 - 50 year life-span of the project. Again, there's no indication in the Initial Study of the Project lifespan.

12. [Initial Study: Overview p I-5]

"The Refinery is limited by its BAAQMD permit (condition 20820, part 50) to processing crude oil at a feed rate of 180,000 barrels per day on a maximum daily basis and 165,000 barrels per day on an annual average basis."

Thus, we must try to understand how the community might be impacted on any given day when the processing "feed rate" is at its maximum capacity permitted, of 180,000 barrels per day, as compared to how those impacts might be seen in the context of an annual average permitted feed rate of 165,000 barrels per day. To add to the complexity of estimating and evaluating emissions impacts, we have to consider the possible increased health risks from processing diluted bitumen blends if and when they are added to the feedstock to be processed a*t its maximum capacity* on any given day.

13. There are no facts mentioned in the Study about other Bay Area importers of tar sands crude blends, yet getting the facts is essential to assessing the claims in the MND with regard to potential cumulative air quality impacts of the project and the possibility especially of dilbit-loaded trains involved in accidents.

"The crude-by-rail spike has also led to more U.S. railway oil spills -- 14 from 2007-09 to 158 between 2010-12, according to the Pipeline and Hazardous Materials Safety Administration. In a recent International Energy Agency report based on U.S. Department of Transportation data, the risk of a train spill was six times greater than a pipeline incident between 2004 and 2012. . . . On March 27, a train derailed in Minnesota, spilling 15,000 gallons of Canadian tar sands crude."
Canadian tar sands crude heads to refineries, Benicia's Valero may be on list - Vallejo Times Herald

14. FINALLY, IN CONCLUSION:

Under CEQA, a thorough environmental review, a full EIR, should enable the public and stakeholders to understand the "whole of Valero's Crude-by-Rail Project" and its ramifications and thereby to fairly judge, based on sufficient evidence and scientific information, the long-term, potentially significant and cumulative environmental impacts that would affect our local community, our local and regional lands and waters. CEQA would also require, in a full EIR, a thorough discussion of "Alternatives" to the Project, including the option of "No Project", in order to more fully capture the contexts in which the proposed Project should be judged.

There is considerable concern across the region and nation for the ultimate impact of increasing GHG emissions from the processing of more varieties of dirty crudes for which the Valero Crude-By-Rail project is designed to enable. Although the Initial Study is 190 pages, and contains statistics and charts about GHG emissions *during construction phases*, there are very important concerns and questions regarding the long-term consequences for global warming and climate change if we as a nation continue to support the kind of environmentally destructive mining processes which could allow "business as usual" to be pursued for years to come, for the economic benefit in the short-run, since ultimately – in not so many years ahead – fifty? – we can mine ourselves out of crude oil, wherever reserves are located in North America that are technically made "easy to get at" now.

But what about the ethics, considering the future of our children and their children? Extracting, refining and indefinitely burning Alberta's tar sands "dilute bitumen" is not sustainable, if we want to maintain civilization and the semblance of a temperate climate for humans and other living members of our "more-than-human-world." This is the conclusion reached by the preeminent earth scientist and former director of NASA's Goddard Institute, Dr. James Hansen.

There is no reference anywhere in the Initial Study to *any* literature on the subject of global warming and the impacts of continuing extraction and burning of fossil fuels. This is a significant omission. I hereby reference Dr. Hansen's trenchant book "Storms of My Grandchildren," and Canadian author, Andrew Mikiforuk's widely acclaimed and quoted "Tar Sands: Dirty Oil and the Future of a Continent."

The dangers represented by the *total, extreme environmental costs* of importing diluted bitumen from Alberta tar sands should be factored into evaluation of Valero's proposed Project with respect for state and national goals for reducing GHG: the destruction and disappearance of thousands of square miles of pristine northern boreal forest, which serves as a carbon sink for the world; the excessive daily demand for fresh water and energy (natural gas) to extract bitumen from the sand; the miles of toxic lakes formed from the waste water after extraction; the degradation of regional and local air quality at the locations of the vast network of tar sands open pit mines (and hydraulic fracturing mining operations) and in communities with refineries processing the heavy crudes in their midst; degradation of rivers' sensitive ecologies where spills and accidents leave their permanent imprint; the accelerating rate of the melt of permafrost, ice sheets and glaciers around the globe; the continuing, dangerously accelerating rise, in a short time of recent decades, of CO2 in the atmosphere to 400 ppm, which is beyond what atmospheric scientists consider the "safe" threshold, at 350 ppm for human civilization. We thus continue to contribute

to climate change in the quest to burn more and more fossil fuels, and THIS should be raised as a moral imperative, an ethical, environmental issue of the Valero Crude-by-Rail venture, since the Project would materially support "business as usual", (as evidently railroaded by the MND). This is a cruel fact that looms over the "whole of the Project" under review. Gross environmental costs are still considered "externalities" when evaluating projects, so they are not accounted for in the review of Valero's proposed rail project. The brief discussion in the Initial Study regarding reductions of GHG during construction phases minimizes the whole larger question.

So, where does the "chain of custody" stop? From oil fields, tar sand mines, and fracking sites in shale oil country, to refinery to consumers – we're all in this, allegedly trying to see our way to a sustainable economy and way of life that would depend for basic energy and transport on alternatives to fossil fuels. Pipe dream? We the people, burning fossil fuels, are part of the "chain of responsibility." We can no longer say that what any one person does, or any one company or industry does, doesn't matter. To protect communities at risk, we who have an industrial giant in our midst, need to raise our questions and be reasonably considered sane and responsible for doing so.

The long-range, dangerous environmental effects of encouraging further mining operations in Alberta's tar sands, or at fracking sites in shale formations around the country; the encouragement for continuing "business as usual" by use of rail transport that makes "North American-sourced crudes" readily accessible and available to refiners, thus, bringing these sour crudes for processing here in the Bay Area: for all of these reasons and more, the Initial Study and MND for the Valero Crude-by-Rail Project represents a failure of responsibility to address the extent and reasonable concern of the public, for protection of the environment generally, and the health and safety of our community and the planet our children will inherit.

In my view, for all of my questions and reasons stated, the MND that would permit the proposed Valero Crude-by-Rail Project must be rejected by the Planning Commission, and a full Environmental Impact Report be required.

* * *

APPENDIX:

CEQA GUIDELINES §15064.4. Determining the Significance of Impacts from Greenhouse Gas Emissions.

(a) The determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency consistent with the provisions in section 15064. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, todescribe, calculate or estimate the amount of greenhouse gas emissions resulting from a project.A lead agency shall have discretion to determine, in the context of a particular project, whether to:

(1) Use a model or methodology to quantify greenhouse gas emissions resulting from a

project, and which model or methodology to use. The lead agency has discretion to select the model or methodology it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; and/or

(2) Rely on a qualitative analysis or performance based standards.

(b) A lead agency should consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

(1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;

(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.

(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

Note: Authority cited: Sections 21083, 21083.05, Public Resources Code. Reference: Sections 21001, 21002, 21003, 21065, 21068, 21080, 21082, 21082.1, 21082.2, 21083.05, 21100, Pub. Resources Code; Eureka Citizens for Responsible Govt. v. City of Eureka (2007) 147 Cal.App.4th 357; *Mejia v. City of Los Angeles* (2005) 130 Cal.App.4th 322; *Protect the HistoricAmador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099; *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98; *Berkeley Keep Jets Over the Bay Com. v. Board of Port Comm*. (2001) 91 Cal.App.4th 1344; and *City of Irvine v. Irvine Citizens Against Overdevelopment* (1994) 25 Cal.App.4th 868.

MARILYN J. BARDET
333 East K Street, Benicia CA 94510
707-745-9094 mjbardet@comcast.net

July 11th, 2013

City Manager Brad Kilger, and staff, Amy Million,
Planning Commissioners: Chair Sherry, Oakes, Smith, Grossman, Spraque, Dean and Young
Mayor Patterson, Vice Mayor Campbell & Councilmembers Hughs, Schwartzman & Strawbridge
City of Benicia, 250 East L Street, Benicia CA 94510

SUBJECT: Additional comments: Valero Crude-By-Rail Project Initial Study/Mitigated Negative Declaration [IS/MND]

Dear Mr. Kilger, Planning Commission Chairman Sherry, Planning Commissioners, and Mayor Patterson, Councilmembers and Amy Million and staff of the Community Development Department.

Please add the following comments to those I officially submitted on July 1, to be included as part of the public record on the review of the IS/MND for the Valero Crude-by-Rail Project [“Project”].

The massive numbers of comments, reports, questions and documents that have been submitted on the Project to date express the level of concern of our citizenry that the City would consider adopting the Valero rail project with an incomplete Project Description, false and unsubstantiated claims, obfuscations, and therefore *fatally flawed and failed* Initial Study and Environmental Check List, and with the incredibly deficient account of potentially significant impacts with only a few mitigation measures called for. What has been presented to you to review would constitute a virtual “scoping session’s worth” of comments for preparation of an EIR.

First, I want to incorporate by reference all comments provided by the Natural Resources Defense Council, both oral testimony given at the planning commission hearing tonight and the written reports submitted July 1st, including the expert reports by Phyllis Fox and The Goodman Group.

I also want it to understood that 70 people attended the open public community meeting, held on July 9th at the Benicia Community Center, hosted by the Good Neighbor Steering Committee. Valero was personally invited by the GNSC to attend and answer questions, but they cordially declined. The community meeting offered Benicia residents a chance to hear from NRDC’s Brant Olson and Diane Bailey, one of NRDC’s staff scientists assigned to review the Project. NRDC is a highly respected national environmental organization with 1.4 million members. Their team of researchers learned of Valero’s initial application and recognized it as a the first crude-by-rail project proposed for a Bay Area refinery.

NRDCs comments, and those of Phyllis Fox and the Goodman Group regard the Initial Study and findings of the MND to be wholly flawed and inadequate, and that therefore, the Initial Study should be immediately withdrawn and a full EIR be drafted.

Some of the most important reasons cited by NRDC for rejecting the Initial Study and MND:

- there are no specifics given about the intended crudes to be imported and where they would come from. The importance of this information goes to the heart of the fatal flaw of the Initial Study and Environmental Checklist;
-
-

- the complex specifics about the chemical constituents of the types of crudes that will be imported are not revealed or discussed with regard their characteristics during processing, thus emissions cannot be evaluated – generalities and assumptions substitute for evidence;
- There is no *current* emissions baseline to make comparisons with projected emissions increases from the Project plus refinery operational emissions;
- In the Initial Study, baseline emissions stats borrowed from VIP FEIR are considered by NRDC to be obsolete since they are up to 10 years old and were produced before new regulations were promulgated by BAAAQMD, such as for PM 2.5 emissions;
- there is no discussion of increased cumulative emissions for entire refinery operations plus Project emissions, including also analysis of other contributors to those cumulative impacts from other industrial large-scale projects current or planned in the area, including the still-to-be-constructed new hydrogen unit which is intrinsic to processing dirty sour crudes;
- The Goodman Group reviewed the market trends in the industry and specifically what Valero Corp reports to its investors regarding the economic advantages of importing heavily discounted tar sands crude types that are diluted bitumen blends, or "dilbits" and light sweet crude from North Dakota's Bakkan shale formation, neither of which would be accessible to Valero Benicia refinery without rail transport;
- Phyllis Fox's report points out tar sands crude dilbits are the most dangerous to process from a public health and safety perspective, because of the constituents of bitumen including highly corrosive sulfur, lead, cadmium, nickel and other metals, as well as VOC's from the lighter diluents that are mixed with the bitumen to make it flow, thus causing highly volatile gases to potentially leak more frequently from valves, compressors, stacks, and piping;
- potential for increasing numbers of accidental releases, fires and explosions from processing highly acidic dilbits, as described above, owing to more tendency to metal corrosion in pipes and pipe failure, such as the resulting huge catastrophic fire at the Chevron refinery fire in Richmond, August 2012;
- there is currently no BAAQMD regulatory framework or enforcement to ensure maintenance and strict performance testing for corrosion of piping, nor standards for upgrading piping, considering the age of metals, metal types used for pipes;
- potential increases in corrosion problems is especially troubling given that refineries are modifying their units to allow for greater processing of sour crude types, and without special consideration that Valero Corp has stated to its investors that it intends to import heaviest dirtiest crude, the tar sands dilbits;
- there will be a higher rate of petroleum coke production, thus more particulate matter (petcoke PM2.5 enters lung tissue, carrying VOC's and other toxic emsissions that attach to the particulate coke dust – more coke ships and coke trains are planned for under VIP.
- Health risks for cancer and non-cancer risks are inaccurately portrayed and underestimated, considering the highly possible crude slate that is likely to be processed on any given day, if up to 42% of crude imported by rail are "dilbits" would be coming from Alberta tar sands with the consequences of increased toxic emissions overall.

ADDITIONAL COMMENTS:

Concerning Project Operations: regarding rail car safety, accidents, schedules and Project Operations:

1) Estimates are that Valero purchased 5,000+ tank cars. What is the DOT class to be used? What types of rail cars has Valero purchased? Please compare to the typical DOT-111A – the standard, cylindrical tank car that currently makes up 69% of the US tank car fleet and 80% of Canada's fleet? (according to Transport Canada).

2) Will the tank cars recently purchased by Valero for importing crude oil be modified and enhanced for security and safety? If so, how? Would thick (how thick?) doubled walls provide maximum strength in the case of collision or derailment?

3) Please cite any and all federal requirements regulating tank car construction for transporting crudes. If there are none that are specific to transporting crude, what kind of modification to the tank cars can be made that would especially address the problem of possible puncture that would cause dilbits to leak out (and catch fire) to prevent the kind of disaster that occurred in Lac-Megantic, Quebec?

4) Please describe the failure rate of DOT-111A tank cars from punctures to tank car walls during accidents (derailments, collisions, etc), according to *current and historic* Department of Transportation or other agency statistics, and factoring the increase daily train trips, accounting cumulative potential impacts, considering all clients' hazmat and other trains traveling on Union Pacific tracks that will also be carrying Valero crude trains.

5) Please describe Valero's, Union Pacific's and the City of Benicia's clean up strategy for removing bitumen in the case of a train accident with leaking tank cars enroute through wetlands, flood plains and marshes. Please consider the fact that EPA to date has not found any ecologically safe method to restore 35 miles of the Kalamazoo River, its riverbed and shoreline, following the Embridge Energy crude pipeline spill in 2010 that put 877,000 gallons of a tar sands dilbit into the river-- the largest on land oil spill in US history? Please address the indirect economic impact of the Kalamazoo disaster spill, considering that by 2012 more than $765 million dollars had been spent trying to clean the river *without destructive dredging*, and the spill hasn't been resolved after 3 years?

6) Does the Federal Department of Transportation or other agency overseeing hazmat freight transport by rail have any special enforceable requirements or regulatory framework for RR operations involving shipments of crude oil in large "single unit" trains? Is there any federal limit on the number of railroad tank cars that can be part of one single train carrying crude oil?

7) On a daily schedule, how many *total number of trains*, managed and run by Union Pacific for Valero will be "on the tracks," and how far do Union Pacific's rail routes run that would be carrying crude in Valero's trains? Does Union Pacific have to switch operators for trains at any point enroute, that is, use another RR company and its tracks to reach Alberta and North Dakota?

8) How many trains of all sorts run daily by Union Pacific pass through Benicia? How many hazmat-loaded freight trains?

8) Who is financially responsible for spill cleanups "off-site" of the Project? On site? Who manages the coke trains now and who would manage crude trains if the Project is permitted?

9) How would the City of Benicia, Union Pacific and Cal Trans be involved if a train were backed up at Park Road and vehicles exiting I-680 were backed up trying to get into Benicia via Industrial Way and/ or other access roads? Please consider this scenario in the case of a train derailment or collision, whether large or small accident?

10) How would Union Pacific handle a delay or change in crude train schedule on any particular day or night? Will crude trains take priority over passenger (AMTRAK) or other freight trains, including Valero coke trains?

11) Would there always be an engineer "on board" the crude trains? How will the trains be managed on site if "side-lined"?

12) What improvements and physical, mechanical upgrades have been made to date on Union Pacific tracks in Benicia and Solano County? Is Union Pacific prepared for the addition of two 50 car crude-loaded trains per day? What still needs to be done to ensure the safety of the rail bed and tracks themselves for handling crude-by-rail safely?

13) Please describe the hoses and valve connectors on the tank cars that would allow the off-loading of crude oil into the pipes leading to the #1776 Storage Tank. How long would it take to fix the hoses onto the connectors on a 50 car train? How many workers would be involved in this operation? What types of fugitive emissions from this operation are anticipated and what is the emission threshold for fugitive emissions during this operation? How would the emissions be measured in real time? Would vapors escape at the top of the crude tank cars? Will any valve or "top" be open to the atmosphere? Would the tank cars be pressurized? What reduces the volatile gases under pressure?

14) From a reliable source of information, it has been emphatically stated that it can be expected routinely that there would be a "liquid mess" underneath the rail cars, especially given the length of time of off-loading operation, the two 50 car trains off-loading daily, etc. How will the emissions from spilt crude be measured and mitigated?

Concerning AB32, the Benicia General Plan and Climate Action Plan:

1) Please describe Valero's plan to meet AB32 requirements for GHG reductions by 2020, considering that Valero is the largest industrial producer of GHG emissions in the city. The Initial Study addresses GHG emissions during construction phases, but does not reference AB32 as a regulatory framework for the Project and refinery operations nor AB32's targets for GHG reductions by 2020.

2) Please reference and supply hot links to all regulatory statutes, frameworks and guidelines that would govern the Project and refinery as related to potential and cumulative negative impacts on site and "off site," for all areas of concern: Air Quality; Public Health; Biologic REsources; Transportation; Hazards; Odors; Seismic; Soils; Noise; etc, thus all CEQA areas of concern and public concern of the local community.

3) In the absence of enforceable regulations, (state or federal) please list issues of concern that depend on the refinery's "voluntary compliance" to mitigate such concerns and impacts, such as potential, foreseeable problems with corrosion in pipes, valves, etc. wherein replacement of damaged parts could be warranted and whereas structural integrity can no longer be guaranteed.

4) Please specifically describe conditions and criteria for the City of Benicia to judge the sustainability of a project, as it contributes to the city's well-being and economic health as a whole. "Sustainable development"is the integrating, overarching goal of Benicia's 1999 General Plan. [General Plan, page 22]. The goal outlines the rippling effect of what we do here in our city. Please provide specific criteria and performance measures that would ensure that industrial polluters and newly planned developments, such as Valero's Crude-by-Rail Project, would be obliged to adhere to and be evaluated by to meet the General Plan's essential goal, which would be consistent also with AB32 and Benicia's Climate Action Plan.

5) Please reference Benicia's Climate Action Plan and the efforts that have been made by the Benicia Community Sustainability Commission to address the strategies pertinent to energy and water conservation and how the Crude-by-Rail project fits into the model for conserving energy and resources generally. Please do not use obsolete emission baseline stats for data comparisons. [See Phyllis Fox Report]

Thank you for your attention to my comments.

Marilyn Bardet, member of the Good Neighbor Steering Committee

From Greg Karras: Communities for a Better Environment, email, Sept 12, 2013. on WesPac Project for Pittsburg.

Page 23 of PDF:

Combustion emissions from refining lower quality oil

Presented at the City of Richmond 4 April 2012 Greg Karras, CBE

Full WesPac DEIR Comment/Document:

Addressed below are my concerns pertaining to:

POTENTIAL ENVIRONMENTAL IMPACTS NOT ADDRESSED IN THE PITTSBURG WesPac DEIR :

From Greg Karras: Communities for a Better Environment, email, Sept 12, 2013. on WesPac Project for Pittsburg.

I. PHYSICALLY-INTERRELATED REFINERY PROJECTS FOR THE EVALUATION OF CUMULATIVE REGIONAL EFFECTS,

II. CUMULATIVE REGIONAL GREENHOUSE GAS AND NOXIOUS POLLUTION EFFECTS, AND

III. A CRITICALLY SIGNIFICANT INCREASE IN TOTAL BAY AREA REFINING CAPABILITY ENABLED BY THE WesPac PETROLEUM STORAGE DEPOT.

CONCLUSION: The WesPac PITTSBURG ENERGY INFRASTRUCTURE PROJECT, aka THE PITTSBURG PETROLEUM STORAGE DEPOT, WILL CRITICALLY ENABLE A SIGNIFICANT INCREASE IN TOTAL BAY AREA REFINING CAPABILITY AND OFF-SITE GREENHOUSE GAS PRODUCTION; LIKELY OFF-SITE EMISSIONS NOT DOCUMENTED IN THE DRAFT EIR.

Off-site emissions due to additional regional refining capability are dependent upon the WesPac Oil Storage Depot and are not directly addressed in the DEIR, but can be inferred by the size and scope of the overall oil storage and associated marine/ railroad/pipeline enhancement project.

From Greg Karras: Communities for a Better Environment, email, Sept 12, 2013. on WesPac Project for Pittsburg.

The Pittsburg WesPac DEIR omits mention of the potential deleterious impacts on regional air quality, which the aforementioned Bay Area's destination refineries for WesPac crude will accrue when the WesPac Project is completed.

The WesPac oil terminal and storage tank project should not be seen in isolation in terms of off-site air emissions that it will enable and that need a full regional emissions assessment. The WesPac DEIR neglects to mention the recent and proposed changes in refinery technology and throughput that will impact WesPac's off-site emissions assessment. The WesPac DEIR, therefore, omits mention of the potential impacts that the destination refineries will engender for crude transiting the terminal, namely a significant increase in volume of refined products, in addition to refining a likely increased percentage of high-sulfur heavy crude oil, such as Canadian Tar Sands crude.

These quantity and quality factors related to the WesPac-transited crude will require far larger volumes of regional refinery hydrogen production and more heat production. Consequently, the refineries will also produce more greenhouse gasses and other airborne pollutants in the Bay Area and beyond, when considering the increased volume of manufactured end-products. Therefore, it is inaccurate and misleading to mention only the WesPac project's on-site air emissions analysis into emissions declarations, while ignoring

secondary off-site emissions for purposes of invoking the presumption that the project will have no significant regional impact.

The Pittsburg WesPac DEIR should be amended to include off-site GHGs, from the terminal's various destination refineries and also from their end-products, which will be engendered both by the terminal-enabled increase in yearly Bay Area refinery input quantity and the probable lower quality of the crude passing through the facility, in order to produce a more complete cumulative evaluation of regional effects. Furthermore, for the WesPac DEIR to be in compliance and to have a more complete cumulative evaluation of regional air pollution effects, all recent and proposed major, relevant upgrades to WesPac crude destination refineries, which were omitted in the draft EIR, must be considered in detail.

Table 2-6: Refineries that May Receive-Crude-Oil-from and/ or Deliver- Crude-Oil-to the Terminal Oil Refines

Address:

From Greg Karras: Communities for a Better Environment, email, Sept 12, 2013. on WesPac Project for Pittsburg.

Shell Martinez Refinery - 3485 Pacheco Boulevard Martinez, California 94553

Conoco Phillips Refinery - 1380 San Pablo Avenue Rodeo, California 94572

Tesoro Golden Eagle Refinery - 150 Solano Way Martinez, California 94553

Valero Benicia Refinery - 3400 East 2nd Street Benicia, California 94510

The Pittsburg WesPac Draft EIR failed to mention, as required, these "POTENTIAL PROJECTS FOR CUMULATIVE EFFECTS EVALUATION," which are collectively listed below and are either proposed or recently completed, namely:

WesPac Pittsburg Petroleum Tank Project: Proposed

ConocoPhillips proposed the Clean Fuels Expansion Project (CFEP): Completed

[The Clean Fuels Expansion Project (CFEP) added new facilities and modified existing facilities to produce additional low-sulfur clean fuels. The Refinery would use the Heavy Gas Oil (HGO) that is normally produced at the Refinery and is currently sold into the HGO market, to produce cleaner-burning gasoline and ultra-low-sulfur diesel (ULSD) fuels targeted for the California market or fuel oil for the global market.]

PHILLIPS 66 PROPANE RECOVERY PROJECT: Currently Proposed (*Propane and butane currently used as refinery gasses (RFGs) for heat, electricity and hydrogen production will subsequently be sold as de-sulfured commercial end-products and the RFG would be replaced by currently inexpensive natural gas*)

Chevron Richmond Revised [Hydrogen] Renewal Project and (proposed) Hydrogen pipeline to Martinez Shell Refinery.

City of Benicia: Valero Crude by Rail Project:

Plus: Marine Terminal Leases for Shell Martinez Refinery, NuStar Selby Marine Terminal and Tesoro Amorco.

The collective and significant increase in refining volume of the five local Bay Area Refinery Projects that are not on the Pittsburg WesPac site, but will be connected to WesPac, will

generate additional refinery and end-product Greenhouse Gasses and other pollutants in significant volumes. This enhanced Bay Area and consumer end-point GHG production will be significantly facilitated when the WesPac Project is completed. ***Off-site emissions due to additional regional refining capability dependent upon the WesPac Oil Storage Depot are not directly addressed in the DEIR, but can be inferred by the size and scope of the overall oil storage and associated marine/railroad/pipeline enhancement project.*** According to the WesPac DEIR:

"The total annual throughput for the entire Terminal would be approximately 70,200,000 BBLs of crude oil and/or partially refined crude oil per year."

The regional refineries that will be connected to WesPac each have their own aforementioned projects that lock in coking, a process that require dense crude, such as the cheapest diluted bitumen from Canadian tar sands and high-sulfur heavy California shale oil. Coking removes carbon from the remaining refinery feed, leaving a product that can

be burned in the place of coal for electrical plants or for making steel. All Bay Area refineries have increased or plan on increasing hydrogen production, pipeline transport and consumption in order to accomplish desulfurization and hydrocracking, thereby increasing greenhouse gas production inherent in currently used methods of industrial hydrogen production. The coking for heavy process requires greater heat than is required for refining lighter crudes, and therefore, more production of GHGs and other airborn pollutants. Koch Carbon owns a petroleum coke (i.e., petcoke) storage/shipping plant in Pittsburg, right on the water at 707 E. 3rd St.. Several Bay Area refineries use this bulk storage plant to send their petcoke to Asia from there.

Phillips 66 CEO Greg Garland "told analysts that the company was looking at railcars capable of transporting Canadian heavy crude to the West Coast." The Valero project would provide the ability to process lower grades of raw crude and provide flexibility to substitute raw crudes. In addition, the project would optimize operations for efficient production of low-sulfur fuels, requiring more hydrogen production and consumption.

The EIR process for this WesPac Project presents a critical opportunity to engage in a genuine and thorough review of the full environmental impacts of WesPac's proposed Project, specifically in the context of both the increased crude delivery capacity, the overall switch to lower crude quality by Bay Area

refineries connected to WesPac and the increased need for regional refinery hydrogen production.

The proposed WesPac Project makes fundamental transportation (marine terminal and rail roads spurs), storage and associated equipment changes *designed specifically* to *enable the long-term crude quality switch* in refineries connected to WesPac. These Bay Area refinery changes are potentially irreversible, and although they are indirect to the WesPac Depot itself, the depot project will have *regional* environmental impacts that demand public and agency attention, and a full review from an air quality management perspective.

---

http://www.ci.pittsburg.ca.us/Modules/ShowDocument.aspx?documentid=5675

September 13, 2013

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Via Fax and Email to
City of Benicia Community Development Department
Attn: Amy Million
250 East L Street
Benicia, CA 94510
Fax: (707) 747-1637
Email: amillion@ci.benicia.ca.us

Re: Notice of Preparation for an Environmental Impact Report for the Valero Crude by Rail Project

On behalf of the Natural Resources Defense Council (NRDC), which has over 1.4 million members and activists, 250,000 of whom are Californians and approximately 100 of whom reside in Benicia, we submit the following comments on the Notice of Preparation (NOP) for an Environmental Impact Report (EIR) for the Valero Crude by Rail Project (Project). The NOP for the Project was issued on August 9, 2013 and indicated that the public comment period closes on September 13, 2013. Valero applied for a land use permit from the City of Benicia in December of 2012 to allow Valero to receive crude oil by train in quantities up to 70,000 barrels per day, in 100 rail cars per day.

We appreciate that the City of Benicia is preparing an EIR for this project. We also appreciate the list of potentially significant effects slated for evaluation. Our comments seek to enhance and broaden the list of important issues addressed in the EIR.

To avoid the harms presented by the project, the EIR must discuss alternatives and mitigation measures to reduce or avoid these significant environmental impacts. The EIR must describe a range of project alternatives, including a no-project alternative, and must analyze the environmental effects of each alternative. Cal Pub Res C § 21002; 14 Cal Code Regs § 15126.6. The EIR must also describe all feasible mitigation measures for each potentially significant impact that it identifies. These mitigation measures must be enforceable through conditions of approval, contracts, or other legally-binding means. *See* Cal Pub Res C § 21081.6(b); 14 Cal Code Regs § 15126.4(a)(2). In addition, when approving mitigation measures, the City must adopt a mitigation monitoring or reporting program to ensure compliance during project implementation. Cal Pub Res C § 21081.6(a)(1). This monitoring program should be described in the EIR so that the public and responsible agencies may comment on its effectiveness.

In particular, the EIR must fully evaluate the following potential impacts and mitigations measures:

Characteristics of the Crude Oil

The specific characteristics of the crude oil that this Project will bring to the Valero refinery are crucial pieces of information necessary to properly assess the impacts of the project during transport, handling and refining; this is because certain types of crude oils can have much greater air quality impacts when refined, can present increased risks of upset events at the refinery, and can present additional hazards when spilled relative to conventional crude. The following crude oil parameters must be disclosed and addressed in the EIR for each specific type of crude oil that the Project may handle:

- Trace elements (As, B, Cd, Cl, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, U, V, Zn)
- Nitrogen (total & basic)
- Sulfur (total, mercaptans, H_2S)
- Residue properties (saturates, aromatics, resins)
- Acidity (total acid number)
- Aromatics content
- Asphaltenes (pentane, hexane and heptane insolubles)
- Hydrogen content
- Carbon residue (Ramsbottom, Conradson)
- Distillation yields
- Properties by cut
- Hydrocarbon analysis by gas chromatography

In addition to the crude assay information listed above, each crude oil must be identified by API or specific gravity, and must describe the source of crude oil, indicate whether it has been blended, and identify the chemical materials with which it was blended. It is imperative that this information be disclosed and analyzed in the EIR in order to inform an accurate assessment of the full suite and magnitude of impacts of the Project and to inform appropriate project mitigation and project alternatives.

Air Quality Impacts

Air quality impacts from this Project are expected to be significant. Impacts will be even greater than anticipated in the Initial Study and Mitigated Negative Declaration for the Project, if the Project will result in Valero importing and refining dirtier crude oils than the current

slate, as is likely.[1] It is paramount that the EIR consider impacts related to *refining* the crude oil brought in by the Project in addition to the impacts of the rail terminal and storage tanks. The following must be fully evaluated and mitigated:

- Benzene and other toxic air emissions resulting from the transport, handling and refining of crude oils with lower APIs, higher sulfur or higher chemical contaminant levels (e.g. heavy metals or benzene) than the current slate. These higher emissions would be expected to occur from the use of diluent or lighter hydrocarbons that increase the volatility of the crude, increasing fugitive emissions from rail car unloading, tanks and refining.
- Contaminant emissions such as chromium, nickel and vanadium. Heavier crude oils may require additional energy and processing to refine. Air pollution resulting from increased boiler use, heating, steam, hydro-treating, hydrogen use and other processing must be assessed.
- Additional air emissions that could occur as a result of more corrosive new crude oils brought in by the Project contributing to an increased frequency of accident, upset and flaring events at the refinery.
- Creation of additional toxic byproducts, such as petroleum coke, including evaluation of coke dust and toxic constituents with coke dust particles.

Mitigation measures must include all possible measures addressing local community air quality, including but not limited to:

- Legally-binding requirements that diesel particulate filters and/or engines meeting the latest U.S. EPA emission standards on all diesel equipment, generators, vehicles and locomotives be used;
- Robust enforcement of engine idling limits;
- Electronic positioning systems for rail cars in the terminal;
- A permit condition that limits the sulfur levels and levels of other hazardous constituents in crude oil and sets parameters for the quality of the crude oil such as a minimum allowable API, in order to reduce the impacts of the Project; and
- All measures appropriate to address increased refinery emissions resulting from the Project.

Hazards and Hazardous Materials

Crude oil is a hazardous material that can be highly flammable and create a serious hazard to workers and the public. The EIR must assess and present appropriate mitigation strategies and project alternatives for the full range of increased hazards that could result from the project, including:

---

[1] For more discussion on the potential for this project to bring in dirtier crudes, see NRDC's July 1, 2013 comments on the Notice of Intent to Adopt a Mitigated Negative Declaration and the accompanying reports by the Goodman Group and Dr. Phyllis Fox.

- Rail car derailments, accidents, fires and spills could occur at any point along the rail line or in the terminal. The following issues must be addressed:
    - Are all rail lines that would be utilized in top repair and able to handle the very heavy tanker trains without risk of failure or derailment?
    - Have all communities, businesses and residents near the rail lines that would be utilized been notified of the Project?
    - In the event of an accident, are adequate emergency response personnel available to respond, and do they have sufficient response and containment equipment? Are they sufficiently trained for an effective and safe response?
    - In the event of a spill, particularly with unconventional heavy crudes mixed with diluents, are sufficient measures in place to prevent contamination of Suisun Bay and the fragile San Francisco Bay Delta?
- In the event of leaking tank or an accident related to handling and storage of the crude oil, are adequate emergency response personnel available to respond, and does Valero have sufficient response and containment equipment? Are Valero staff sufficiently trained for an effective and safe response?
- In the case of potentially more corrosive crude oils being transported to the refinery, are sufficient maintenance and metallurgy upgrade plans in place to handle a new crude oil? Are adequate emergency response personnel available to respond, and do they have sufficient response and containment equipment? Are they sufficiently trained for an effective and safe response?

Transportation and Public Safety

Additional rail traffic caused by this Project has the potential to disrupt traffic and impact public safety. The EIR must include a traffic study, and fully address the following:

- Mitigation measures to prevent traffic from backing up on the nearby freeway from the exit ramp;
- A grade separation to address traffic and safety hazards; and
- Mitigation measures to address impacts to emergency response access and response times to ensure that the additional rail crossings would not hinder ambulances and other emergency vehicles from reaching Benicia residents.

Noise and Quality of Life Impacts

Noise from trains is a common complaint often heard from communities near railyards or busy rail crossings. The Project has additional quality of life impacts, such as increased odors and dust that must be considered. The EIR must analyze and mitigate the following impacts:

- The Project is likely to increase rail activity, particularly at night. Noise impacts from the horns on trains, construction activity and other industrial activity must be fully addressed and mitigated.
- Some types of unconventional crudes, such as dilbits are associated with greater levels of strong odors due to their composition including a variety of sulfur containing

compounds, such as mercaptans, at higher levels. These odor impacts must be fully evaluated and mitigated.

- The potential for increased coke production must be evaluated, including how it would be stored and to what extent that storage could cause dust nuisance and toxic air contaminant exposures to the community. Any significant dust and air contaminant exposures from coke storage must be mitigated.

This Project has the potential for serious and irreversible harm to the greater San Francisco Bay Area caused by the import of exceptionally toxic substances. We support the City of Benicia's effort to perform a thorough Environmental Impact Review evaluating all of these impacts and all appropriate mitigation options. We hereby reference the detailed and expert comments submitted by the Natural Resources Defense Council on July 1, 2013; and strongly urge your consideration of our concerns.

Sincerely,

Diane Bailey, Senior Scientist
dbailey@nrdc.org
415-875-6127

Elizabeth Forsyth, Attorney
eforsyth@nrdc.org
415-975-6112

Amy Million - RE: Scoping Period comments, Valero Crude by Rail: Notice of Completion & Environmental Document Transmittal

RECEIVED
AUG 19 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: <rogrmail@gmail.com>
To: "'Amy Million'" <Amy.Million@ci.benicia.ca.us>
Date: 8/19/2013 9:30 AM
Subject: RE: Scoping Period comments, Valero Crude by Rail: Notice of Completion & Environmental Document Transmittal
CC: "'Brad Kilger'" <BKilger@ci.benicia.ca.us>, "Belinda Smith" <bsmitgo@hot...

Ms. Million, planners and commissioners:

Again for the record as part of scoping for Valero's proposed Crude by Rail project, I want to expand on one item in my previous email. Under 1), I have asked that Scoping include Fiscal issues and impacts. I am particularly concerned that the impacts on city services and other costs be included in the study, including

- Financial impact on staffing in the Community Development Department and other city offices during the permitting process and construction
- financial implications of a possible emergency response and cleanup after an emergency spill, fire, explosion or other disaster, occurring on Valero property or on rail lines leading into Benicia
- financial impacts on current and future businesses in the Benicia Industrial Park (including the possibility of setbacks in recruiting should traffic, odors and safety be seen as unfavorable by potential incoming businesses, and also including impacts on city tax revenues plus from Valero, and minus from other potential BIPA losses)
- financial impacts on Benicia as a whole, should this project alter Benicia's public image as a Sustainable Community per our General Plan (including the possibility of setbacks in real estate, tourism and new green business, green research and development, again including city revenue projections)
- financial impacts on healthcare for refinery workers, industrial park owners and employees and Benicia residents, given the likelihood of increased pollutant releases during offloading and processing of heavy crudes, and given the new volume of pet coke wastes standing and in transit.

It seems to me that these financial impacts should be calculated over a period of at least the next 50 years.

Roger Straw
766 West J Street, Benicia, CA 94510
707.373.6826

From: rogrmail@gmail.com [rogrmail@gmail.com]
Sent: Monday, August 19, 2013 8:55 AM
To: 'Amy Million'
Cc: 'Brad Kilger'; Belinda Smith (bsmitgo@hotmail.com); Don Dean (donaldjdean@sbcglobal.net); George Oakes (oakes@earthlink.net); Rod Sherry (rsherry@csa-engineers.com); Stephen Young (escazuyoungs@gmail.com); Susan Cohen Grossman (susancg@pacbell.net); Suzanne Sprague (Suzanne@solanolawgroup.com)
Subject: Scoping Period comments, Valero Crude by Rail: Notice of Completion & Environmental Document Transmittal

Amy Million, Principal Planner
Community Development Department

City of Benicia
250 East L Street
Benicia, CA 94510
RE: Scoping Period comments, Valero Crude by Rail
Dear Ms. Million:
With regard to the City's Notice of Completion & Environmental Document Transmittal, SCH # 2013052074, I want to raise a few immediate concerns for the public record, as follows:
1) I find that the section **"Project Issues Discussed in Document"** is incomplete. Surely this project will have impacts that should be reviewed under the categories:

- Coastal Zone
- Economic/Jobs
- Fiscal
- Septic Systems

Please revise the Notice with these additional factors included in scoping for the project.
2) I also find that the section **"Reviewing Agencies Checklist"** is incomplete. Please revise to include notification of the following listed agencies, and 4 additional agencies (**BOLD CAPS**) that are not listed.

- Dept of Boating & Waterways
- CalFire
- Coastal Commission
- Delta Protection Commission
- Dept of Education
- Energy Commission
- Dept of Health Services
- Integrated Waste Management Board
- Office of Emergency Services
- S.F. Bay Conservation & Development Commission
- San Joaquin River Conservancy
- SWRCB Water Quality
- SWRCB Water Rights
- Dept of Water Resources
- **SOLANO LAND TRUST** (since UP tracks apparently go through some of their land) and
- **SUISUN RESOURCE CONSERVATION DISTRICT** (which represents private landowners in the Suisun Marsh on a variety of issues at Federal, State, and local levels)
- **BAY AREA AIR QUALITY MANAGEMENT DISTRICT**
- **BAY CONSERVATION AND DEVELOPMENT COMMISSION**

Thank you for your good work in facilitating this important public process.
Roger Straw
766 West J Street, Benicia, CA 94510
707.373.6826

Roger D. Straw

766 West J Street • Benicia, CA 94510
(707) 373-6826 • rogrmail@gmail.com

RECEIVED
AUG 21 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

August 20, 2013

Amy Million, Principal Planner
Community Development Department
City of Benicia
250 East L Street
Benicia, CA 94510

Dear Ms. Million:

I have spent countless hours recently studying documents related to the Valero Crude by Rail project. I am becoming more familiar with CEQA and in particular, Scoping Periods. Please accept my comments below in response to the City's August 9, 2013 **Notice of Preparation of an Environmental Impact Report and Notice of Scoping Meeting: Valero Crude by Rail Project.** Please enter my comments as part of the formal record for the Scoping Period, and respond as part of that process and the subsequent EIR.

First, I want to incorporate by reference all of my comments, those of the Natural Resources Defense Council, Dr. Phyllis Fox, The Goodman Group, and Benicia residents Marilyn Bardet, Kathy Kerridge, Mary Frances Kelley Poh, Constance Beutel, Steve Goetz, Ed Ruszel, Jack Ruszel, Bob Berman and others who wrote *or* spoke in opposition to the Initial Study/Mitigated Negative Declaration, including opposing comments submitted prior to, during and after the Planning Commission hearing on July 11, 2013.

***Scoping Period* concerns and questions for planners, Valero and Commissioners regarding the project's potentially significant effects:**

1. *Transportation/Traffic:* Please describe the regulatory framework guiding interstate and intrastate transport of fossil fuels – in particular, diluted bituminous crude derived from tar sands and crude from hydraulic fracturing of shale deposits – and detail the conditions of authority and enforcement of those regulations that would be pertinent to the operation of the Valero Crude by Rail Project.

2. *Hazards and Hazardous Materials* and *Transportation/Traffic:* Please list and describe in detail all guidelines and any and all local, state and federal laws pertinent to regulation of rail transport of hazardous materials, including any special

regulations for transport of crude oil that would be applicable to the operations of the Valero Project. Specify any regulations that would be applicable in the case that Union Pacific tracks traveled in close proximity to schools, hospitals, cultural centers, civic centers, commercial and industrial centers and residential neighborhoods, and also in the vicinity of power plants, gas lines, lakes, dams, rivers, marshlands, bridges and water transport facilities.

3. *Hazards and Hazardous Materials* and *Transportation/Traffic:* Please describe to what extent Counties, Cities and other regulatory agencies are currently notified of the transport of potentially explosive fuels. Describe any plans for advance notification to be given to California cities, counties and regulatory agencies that are "up-rail" of Benicia given the anticipated significant increase in these shipments due to the Valero Crude by Rail project. Describe opportunities for these cities and counties to comment on the project in advance of its approval.

4. *Hazards and Hazardous Materials* and *Transportation/Traffic:* Please describe all federal requirements concerning tanker cars that may be used for transport of blended bitumen and heavy crude oil. Detail what exactly distinguishes an aging tanker car from state-of-the-art tanker cars, and describe the range of cars Valero and Union Pacific are planning to utilize. Describe specific safety precautions Valero is taking with the rail tanker cars to ensure that none of the crude transported could spill (e.g. double hulls, thicker gauge metal, additional engineers or trained personnel on board, additional track & equipment inspections, etc.) Please answer these related questions: What "DOT class" of rail cars will be required of Valero? What are the regulations governing required manufacturer's specifications for cylindrical tanker cars that may carry 1) diluted Alberta tar-sands bitumen, and 2) crude oil blends extracted from fractured shale deposits? What are the standards regarding design, manufacture, aging, testing for safety of these tanker cars? Do these requirements differ from those governing sweet crude delivered by rail?

5. *Hazards and Hazardous Materials* and *Transportation/Traffic:* Recent developments in methodologies for extracting bitumen from tar sands and extracting crude by hydraulic fracturing of shale involve blending the extracted bitumen or crude with other often toxic and highly acidic chemicals before transport. Please describe evolving safety standards for rail tanker cars that would prevent leaks, spills and worse disasters given the new blends. Describe Valero's plans and those of Union Pacific (or other rail companies) with regard to transport vehicles intended for use in transporting these toxic blends.

6. *Air Quality and Hazards and Hazardous Materials:* Please describe Valero's plan for normal procedures when offloading heavy crude at the refinery, including hose, valve connectors and clamp specifications. Include details regarding the allowable amount of fugitive emissions when connecting and disconnecting hoses; how much time will be necessary for how many refinery employees to connect and disconnect each car; the allowable amount of spill during an individual tanker car's connect/disconnect procedure; what records exist to document expectable levels of such spills during connect/disconnect; what is the likely fugitive emission level from vapors at the top of a tanker car while being offloaded; and again, what records exist to document expectable levels of such vapors.

7. *Air Quality and Hazards and Hazardous Materials:* Please describe in detail Valero's plan for disposal of pet coke, including estimates of increases in toxicity and in quantity of the pet coke following processing of the new diluted blends of crude, containers that will be used and methods for filling those containers, the location of the containers and the time they will be allowed to sit before transport, the method of transport and the destination for disposal. Describe the potential for leakage of pet coke dust into the air, including studies from other locations such as Detroit, and industry learnings from those problem locations, and mitigations and plans to prevent such hazards in and around Benicia.

8. *Air Quality, Hazards and Hazardous Materials, Transportation/Traffic, Fiscal:* Recent reports indicate that a newly revised project is undergoing a recirculated draft environmental review to develop a new crude oil import, storage and transfer facility in Pittsburg, CA, including a crude by rail component. See http://www.contracostatimes.com/contracostatimes/ci_23870322/oil-storage-and-transfer-facility-proposed-pittsburg-waterfront and http://www.ci.pittsburg.ca.us/index.aspx?page=700. The Pittsburg facility as proposed would import 240,000 barrels/day, over three times Valero's proposed crude by rail import. The EIR for Valero's proposed project should calculate *Indirect Impacts* and *Cumulative Impacts* for the Bay Area based on the combined totals of these two projects, and set both in context of an ever-expanding role for crude by rail in the several Bay Area refineries. Note also that approval of the Pittsburg project would certainly affect fiscal projections concerning the potential for success of the Valero project, and should be noted in a financial analysis. Valero could conceivably even choose to import crude from Pittsburg rather than by direct overland routes from the Midwest. This could alter plans considerably, and should be laid out as an alternative during the EIR.

9. *Hazards and Hazardous Materials* and *Transportation/Traffic:* Please locate and summarize findings in any official federal registry of all rail accidents, including the

extent of the cost of the accidents, including cleanup. If there is no federal registry, please cite the best source for such information, and again, summarize findings. Findings should include but not be limited to the following: How many at-grade train accidents have there been in California? Of those accidents, how many included loss of life, explosions, fires? What is the best estimate of the probable frequency of such accidents per 1000 at-grade crossings?

10. *Hazards and Hazardous Materials* and *Transportation/Traffic:* Please detail any regulations (in the United States or elsewhere) restricting the transport of fossil fuel on at-grade railroad crossings.

11. *Transportation/Traffic:* Describe the extent to which Union Pacific (or any other operator) may obstruct cars and trucks at-grade crossings. Cite the enforcement entity for regulation and enforcement of at-grade crossings. Make available the record for adequacy in responding to complaints and issuing fines in California and nationwide.

12. *Transportation/Traffic:* Describe how far rail cars will be permitted to extend outside of the proposed Valero off-loading facility and how many rail cars may be stockpiled at any one time, and for what duration.

13. *Hydrology and Water Quality, Biological Resources and Transportation/Traffic:* The Suisun Marsh, just east of Benicia and directly adjacent to Valero, is the largest brackish wetlands in western United States and a habitat for endangered species. Tracks going through the Suisun Marsh need constant maintenance because of the soil conditions. Please describe how these maintenance factors pertain to the condition and safety of the rails under increased usage by Valero's 100 cars/day carrying heavy crude? Describe in detail:
    a. How much does a tanker car full of diluted bitumen (and other forms of crude oil) weigh?
    b. What gauge steel is required to safely carry these weights?
    c. Are the rails currently adequate? What cost might be incurred to upgrade and maintain such a rail line? What agency will bear this cost?
    d. What authority monitors the safety and condition of these rail lines, and how often, and where can reports be reviewed?
    e. Are heavy tanker cars carrying crude expected to cause more wear on rails and therefore require higher rail maintenance costs?
    f. What mitigation measures are required to ensure survival of endangered species and air, water and land quality in the Suisun Marsh?

14. *Hydralogy and Water Quality, Biological Resources, Hazards and Hazardous Materials, Transportation/Traffic, and Geology and Soils:* Describe in detail an interagency advance plan for a crude oil train accident.
    a. *Suisun Marsh:* In the event of an accident occurring in the Suisun Marsh, when emergency responders from Valero, Benicia and Solano County are called upon, which agency would have lead authority for cleanup over a federally regulated entity such as an interstate railroad? What would be the appropriate authority to lead cleanup efforts extending into the Marsh? Because the accident involves interstate transportation, at what time would the federal government step in and take the lead? What agency or agencies would pay for the cleanup and restoration? What new methodologies will be needed to effectively clean up diluted bitumen? Are such methodologies known and in place in Solano County? (See 2010 Kalamazoo River spill - $1 billion spent, not yet cleaned up www.epa.gov/enbridgespill/.) To what extent are private Duck Clubs protected or compensated for losses in the event of an accident?
    b. *Communities like Benicia all along the rail route:* The same concerns as in a. pertain. In the event of a rail accident in Benicia, or within a city along the route in California or beyond, when emergency responders are called upon, which agency would have lead authority for cleanup over a federally regulated entity such as an interstate railroad? What would be the appropriate authority to lead cleanup efforts near the railroad on public properties and/or private commercial, industrial and residential properties? Because the accident involves interstate transportation, at what time would the federal government step in and take the lead? What agency or agencies would pay for the cleanup and restoration? What new methodologies will be needed to effectively clean up diluted bitumen? Are such methodologies known and in place in Solano County? (See 2010 Kalamazoo River spill - $1 billion spent, not yet cleaned up http://www.epa.gov/enbridgespill/.)

Thanks for your attention to these important considerations.

Roger D. Straw
766 West J Street
Benicia, CA 94510

Amy Million - Comments about Valero Rail Plans

RECEIVED
AUG 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: Grant Cooke <grantcooke11@gmail.com>
To: <amillion@ci.benicia.ca.us>
Date: 8/13/2013 11:39 AM
Subject: Comments about Valero Rail Plans
CC: Roger Straw <rogrmail@gmail.com>, Elizabeth Patterson <elopato@elizabet...

Amy,
I'm glad to see that the city is calling for a full EIR on the Valero Crude by Rail proposal. This is a critical issue that will impact our community for years to come and it should be carefully and thoughtfully examined. There have been too many accidents and incidents involving oil refineries recently in the Bay Area, and cities need to be extremely vigilant.
Regards,
Grant

Grant Cooke
Principal
Sustainable Energy Associates, LLC
925-989-7117
Skype id: grant.cooke19
gcooke@sustainableenergyassc.com
www.sustainableenergyassc.com

Global Energy Innovation: Why America Must Lead by Woodrow Clark and Grant Cooke is now on sale at Amazon.

Amy Million - Valero crude by rail project

RECEIVED
AUG 26 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: Dennis Lewis <lewylewy@pacbell.net>
To: "amillion@ci.benicia.ca.us" <amillion@ci.benicia.ca.us>
Date: 8/26/2013 10:32 AM
Subject: Valero crude by rail project

As a native Benician, I believe the crude by rail project should be given the go-ahead. I lived here when the Arsenal closed and saw the imact of losing revenue. Humble Oil, at the time, came in and rescued our dying city, or town as it was then. I have worked out there for contractors and have seen first hand how they operate, which looking at their track record, is pretty incredible. I support any endeaver they wish to embark upon, knowing that they will it in a safe manner. They have been a good neighbor and they deserve out support. Thank you for allowing me to have my say, sincerely, Dennis Lewis

From: Plewis <pjlewis363@gmail.com>
To: "amillion@ci.benicia.ca.us" <amillion@ci.benicia.ca.us>
Date: 9/10/2013 7:45 PM
Subject: Comment for the public record, Valero Crude by Rail Project

Dear Ms Million,
I would ask that the following issues be considered in the full EIR being prepared for the Valero by rail project.
What will be the impact on greenhouse gas emissions when taking into account all that are produced from the obtaining the crude, transporting it, and refining it? As climate change is a global issue, it makes no sense just to evaluate what GHGs are emitted here in Benicia, as was done in the first report.
Can the sulphur content and other components in the crude that could produce a noxious odor be measured? On average, how many days is the prevailing wind blowing towards Benicia from the refinery? As a mitigating measure, could Valero be prevented from refining sour crude on those days?
Regarding transportation issues, how much does each fully loaded tanker car weigh? How much distance and how long would it take to stop a 50 tanker long train going at the top speed permitted in the vicinity of Benicia? How long is a 50 tanker train? What is the explosive force for each tanker car in the event of a crash and the fuel igniting? How large an area would be flattened in the event all 50 cars ignited?
Thank you for your consideration of these issues.
Rick Slizeski
Benicia

Sent from my iPad

RECEIVED
SEP 11 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

TO: City of Pittsburg, Sep. 11th 2013
Development Services-Planning Division
Attention: Kristin Pollot
65 Civic Avenue, Pittsburg CA 94565

RE: Recirculated DEIR, EIR, NEPA and Environmental Justice Studies for WesPac Pittsburg Energy Infrastructure Project West 10th Street

Please include the following statements, questions and exhibits in the administrative record OF ANY AND ALL LOCAL, STATE AND FEDERAL AGENCY INVOLVED IN REGULATION OR SITING OF THIS PROJECT.

For the purpose of clarity all comments and questions herein offered are to be considered as NEW COMMENTS AND QUESTIONS by the Recirculated DEIR and answered in writing in accordance with the California Environmental Quality Act (CEQA). These comments and questions are based on new evidence submitted by WesPac, and as such they are new to this proceeding. Failure to answer in writing as requires by law will be denial of my rights to participate in this proceeding***. Use of discriminatory State and Federal laws is a denial of my right to due process under the law as granted to all Citizens of the United Sates of America by our Constitution.***

Index

Executive Summary:
The Residents of Pittsburg in the Impact Zone **2**
Facility Constructed as a PG@E Power Plant **2**
Sighting and Construction Concerns **2**
The project is in a flood zone from both storm run off and Tidal Surge **2**
Hydrocarbon tank failures common **3**
Fires and Explosions are the Biggest Immediate Threat to Live and Property **3**
Secondary Barrier Must Contain Shock Wave and Extreme Heat **3**
Need for Onsite Safety Equipment to Protect Live and Property **4**
Need for State of the Art Monitoring **4**
Need For Protection Agents Terrorist Attack **4**
Need For Protection of Wildlife, Scenic, Recreational Habitats and Antioch Dunes National Wildlife Refuge **5**
Need for Project not Supported by the Evidence **5**
The California Energy Commission (CEC) Report in Violation of CEQA **5**
History of Discrimination of Pittsburg Residents by Public Agencies **5**
Wetland Lease is in Violation of the "Public Trust Doctrine" **11**
Project Dose not Conform to the Mandate of State Legislature **11**
Less Discriminatory Alternatives **12**

Cumulative Impact **12**
Statistical Analysis; Science or Pseudo-Science? **13**
Conclusion **14**
Questions **14**
References **16**

Executive Summary: The Residents of Pittsburg in the Impact Zone

The WesPac Pittsburg Energy Infrastructure hydrocarbon storage tank farm project is literally a stones throw away from a predominantly low-income, minority community consisting of approximately 120+ homes, two churches, one school and two community parks; Marina Park and Riverview Park. It is common in the summer time to see windows and doors of residences wide open for cooling due to the lack of air conditioning of homes. Residents retreat to the Riverview Park during the summer to cool off in the Delta breeze. Water sport and nature enthusiast use the park as access to the delta. Families bring their children to the park**. The homeless use the park for shelter.** . Subsistence fisherman use Riverview Park for access to the delta for fishing. The fish they are catching are known to be contaminated with industrial toxins and mercury. Residents report high levels of cancer and asthma. **WesPac Original Draft EIR estimates the increase in cancer at 14 in a million which is in excess of the thresholds of significance** identified in the Bay Area Air Quality Management District California Environmental Quality Act (CEQA). This is in addition to the 2005 EPA estimate of 50 in a million cancer rate for Pittsburg; brings the total cancer rate to an **estimated 64 in a million.** WesPac Project will result in an increase in cancer rates to all that use this park. **It is clear Pittsburg low-income minority community bears a disproportionate share of the cumulative burden of environmental exposure.** Furthermore these facts would indicate that Riverview Park is an important sensitive receptor site adversely impacted by the project. **Riverview Park needs to be included in the Recirculated Draft EIR as a sensitive receptor.**

Executive Summary: Facility Constructed as PG@E Power Plant with Fuel Storage for Plant

Bunker fuel #2 was imported to PG@E for the power plant needs and latter as back-up supplies for PG@E. The power plaint was built and permits as such. It was never permitted as a primary retail or wholesale storage faculty for rail, ship or pipeline exports. The use of this facility as proposed is a NEW USE.

Executive Summary: Sighting and Construction Concerns

The hydrocarbon tank farm was built over 50 years ago by PG&E on very poorly compacted marsh mud and sand; highly susceptible to **liquefaction, flooding and settling.** Many earthquake faults are nearby with an estimated **98.006% probability of a 5.0 quake, 61.613% probability of a 6.6 quake, and a 7.5 quake predicted as max in next 50 years.** Existing tanks are made of what is now known to be the wrong metals and used outdated welding techniques. The tanks have been abandoned with little or no up keep. Some tank tops have collapsed and other are severely rusted. This leaves these

tanks very susceptible to major failure due to brittle metal fractures. Computer modeling and on site inspection of tanks failures have confirmed that current tank specifications and secondary containment strategies are not sufficient. It is reasonably foreseeable that the hydrocarbon storage tank farm could experience a 7.5 earthquake; hydrodynamic loads on tanks during an earthquake will be 25 percent higher than current code specification. This combined with a near total loss of hydrocarbon tank foundation due to liquefaction and no reinforced hydrocarbon tank support down to bedrock will result in 25 percent of tank farm contents flooding neighborhood homes, a major Northern Californian electrical substation, a train yard full of industrial tank cars, and the Delta.

Executive Summary: The project is in a flood zone from both storm run off and Tidal Surge There is a reasonably foreseeable probability that the entire sit alone with the rail car could be submerged, tanks and rail cars afloat and leaking due to storm and tidal surge. (The "Ark Storm Scenario," prepared by the U.S. Geological Survey and released at the Ark Storm Summit in Sacramento on Jan. 13-14, combines prehistoric geologic flood history in California with modern flood mapping and climate-change projections to produce a hypothetical**, but plausible**, scenario aimed at preparing the emergency response. We think this event happen once every 100 or 200 years or so, which puts it in the same category as our big San Andreas earthquake/tsunami for this type of hazard http://pubs.usgs.gov/of/2010/1312

Executive Summary: Hydrocarbon tank failures common
June 5th 2006 Mississippi USA.
Dec 11th 2005. Burchfield oils storage, Hertfordshire
Sep 3rd 2005 Louisiana USA
Oct 25th 2004 Belgium
June 4th 2003 Brisbane, Australia
July 20th 2002 Nigeria
May 2002 Poland
August 21st 2001 five tanks go up Kansas USA
July 17th 2001 Delaware USA
2000 Ohio USA
1999 Michigan USA
USEPA 1990 to 2000 312 tank farm accidents USA
1997 Iowa USA
Oct 16th 1995 Pennsylvania USA
Aug 10th 1990. Three river Texas 30 are burned as small crude oil tank goes up USA
Dec 21st 1985 Naples, Italy
Losses due to earthquake
1964 Alaska; 1960 Chile; 1960 two in Japan: 1964 Niigata; 2003 Tokachi1980 rupture of one 100000bbl crude oil storage tank did extensive damage to four block area, damage 8.5 million.

Executive Summary: Fires and Explosions are the Biggest Immediate Threat to Live and Property during a Hydrocarbon Spill

The hydrocarbon storage facility is very vulnerable to **fire and explosions** due to the extremely flammable nature of the hydrocarbons inside. As devastating and toxic as the hydrocarbons are to the environment and the human body, the biggest immediate threat to human live and property are fires and explosions. Within 15 minuets of a hydrocarbon spill an extremely explosive condition can result as the released heated hydrocarbons vaporizes and mixes with the oxygen in the air. This condition is referred to by the U.S. military as an air/ fuel bomb, and is a highly effective weapon. **Industry stands require hydrocarbon spills be completely foamed in 15 minutes to prevent this catastrophic explosion from happening.** Each rail car must be filled and stored in its own blast bunker, similar to how Concord Naval Weapons Station loaded rail cars. Rail right of way through Pittsburg protected on both sides with blast burms. A clear zone constructed .25 of a mile wide on each side. Remember Roseville train explosions of 1973? http://www.insensitivemunitions.org/history/railroad-train-fires-and-munition-explosions/

Executive Summary: Secondary Barrier Must Contain Shock Wave and Extreme Heat; NOT JUST SPILLED HYDROCARBONS as the applicant and others would have you believe. In this video you can see a relatively small amount of fuel is first dispersed into the air creating an air/ fuel mixture, then detonated with the result of total destruction of 2 story structure from the shock wave and the release of a massive fire ball. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&cad=rja&ved=0CD0QtwIwAw&url=http%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3Dzf7m7hN5Szc&ei=wEkrUp6IEOXF2wW0o4GgDw&usg=AFQjCNEykviJ9JHCR0rj8qK8NJYBq8gtKA

Executive Summary: Need for Onsite Safety Equipment to Protect Live and Property

It is reasonably foreseeable that in place safety equipment and trained personal will be needed: backup power supply capable of running the entire facility even if facility is completely under water. A self contained on site foaming rings around each tank top, foaming into double wall constructed tanks, **secondary blast containment structure** around each hydrocarbon tank equipped with self contained foaming ring and capable of stopping any lateral blast of complete storage tank assembly into another storage tank or the community. A third outer containment barrier with yet another self contained foaming ring and automated water/foam monitors manned by a dedicated 24 hour firefighting crew. All vapors from all scores must be collected and not allowed to be released into the environment where it might get detonated**. If you have a vapor release point into the environment you have oxygen introduction point into the system**. All has to be able to withstand extreme temperatures, total loss of foundation stability do to liquidation, 7.5 earth quake (25% stronger than current code) and complete flooding of the facility (10 feet or more) from storm runoff and tidal action. Nitrogen replacement of atmosphere into ships, tank, pipes, double halls and rail car as crude is removed. This will significantly lessen but not stop the chance of a highly explosive condition forming of oxygen and hydrocarbon vapor. In addition to the 24 hour firefighting grew, 24 hour

skimmer and spilled hydrocarbon recover crew, the facility needs to maintain a minimum 5 man operation crew 24 hours a day. The facility must be equipped with state of the art computer controls, sensors, redundant back up pumps, pipes and tanks. Their must be enough redundant pumps, pipes and tanks to transfer the entire hydrocarbon storage if needed in an emergency. Blast shelters and walls need to be built at near by schools, churches and community accessible places. Blast shelters to be equipped to handle multiple severely burned and injured patients. School personal and community members trained on how to treat severely burned children and adults. It is reasonably foreseeable Firefighters response will not be in time to prevent multiple blocks of Pittsburg burning to the ground in the event of fire if the aforementioned safeties are not in place.

Executive Summary: Need for State of the Art Monitoring
The tanks must be constantly monitored for water buildup at bottom of tank. Water build up can lead to a very dangerous and uncontrollable condition known as a boil over. Tank bottoms must be monitored constantly for any deformation that could collect water at bottom of tank. Tank foundation monitored for any ground subsidence that might compromise the integrity of the tanks. Tanks monitored for excessive pressures, vacuum, temperatures and over fill.

Executive Summary: Need For Protection Agents Terrorist Attack
This extreme flammability, easy access to facility by already existing public access, and nearby major electrical substation, rail cars full of flammable and toxic materials, military ammunition trains; possibly with nuclear war heads (neither confirmed or denied by the U.S.) makes this project reasonably foreseeable as an ideal target for terrorist attack. Hydrocarbon and rail facilities are routinely targeted for terrorist attack world wide. This project will have NO defense agents such attacks. **Loss of a very near by major electrical substation could leave Northern California blacked out for weeks, costing the Nation's economy billons.** (**Congressional report Contra Costa County is potential target terrorist attack**
http://www.co.contra-costa.ca.us/archives/42/Terrorism%20SFC%207.7.05.pdf **)**

There is such a high and real present danger to the citizens of Pittsburg to a terrorist attack that specifics of the Congressional study have been classified. This fact standing on its own is enough to warrant the stopping of this project. If government agencies allow this project to go forward it will be sending only one message. Persons who can afford an air line ticket are more valuable than the citizens of Pittsburg.

To this day government agencies have done **absolutely nothing** to protect the citizens of Pittsburg. There are rail cars after rail cars of some of the most dangerous materials known to man just yards away from homes and schools. It is literally possible to pull over to the side of the road, get out of your car and walk right up to these rail cars. No fences, no blast berms, no security force. These rail car stay next to schools even though just a few miles west there is a rail facility that was built and run by the U.S. government which was specifically built to handle and secure dangerous rail car materials: Concord Navel

Weapon Station. This facility is now in the process of being dismantled so rich developers can get even richer at the expense of Pittsburg residents' safety.

Executive Summary: Need For Protection of Wildlife, Scenic, Recreational Habitats and Antioch Dunes National Wildlife Refuge

West Pac tank farm is 3000ft upwind of Browns Island Regional Shoreline; 14000ft up wind of Dow Wetland land Persevere and Sherman Island Water fowl Management Area, and 24000ft up wind of **Antioch Dunes National Wildlife Refuge**. All have endangered plants and animals. All will be adversely affected by air pollution and hydrocarbon spill damage during flood tide. Their scenic value obscured by ships and pollution haze. All could be permanently lost just buy one minor hydrocarbon spill. These areas will need permanent hydrocarbon barriers install and maintained, tons of hydrocarbon dispersant, miles of movable containment booms, dozens of hydrocarbon skimmers on site and manned 24 hr a day.

Executive Summary: Need for Project not Supported by Evidence

The need for this terminal has not been verified or supported by the evidence. The California Energy Commission (CEC) reports sited by the Recirculated Draft EIR does not take into account refineries in the S.F. bay are well aware of projected decrease of hydrocarbon delivery to refineries by pipe line. Refineries are in the process of at least doubling their ship handing capacity. All refinery ship terminals provide a shorter shipping route than the Pittsburg terminal. **Using refinery terminals directly will result in millions of tons of reduction of air pollution compared to using the WesPac facility.** Air pollution that is produced will be spread out over a larger area with lower concentration in any one location. There is also a less likelihood of tanker mishaps in bay and delta, and less likelihood of invasive species contaminating the bay and delta.

Executive Summary: The California Energy Commission (CEC) Report in Violation of CEQA

The CEC report was produced without pubic notifications and input, furthering the self interests of the oil industry. The CEC has a record for discouraging pubic input (calfree.com). **The CEC has no authority in sighting oil facilities.** Yet the Recirculated Draft EIR quotes the CEC as unquestionable authoritative proof of need. It is obvious the decision to build has already been made by the CEC. The process at this point is nothing more than a smokescreen to disguise this fact.

Executive Summary: History of Discrimination of Pittsburg Residents by Public Agencies

The Recirculated Draft EIR still does not address why the applicant stated in the Original Draft EIR air pollination and ship traffic is of major concern when it is located in the middle of the playground of rich yacht owners and homeowners but is ok when concentrated in the midst of homes, schools, churches and playgrounds of low-income, minority community. Is it because the applicant is convinced that agencies are more likely to approve the project if they believe the project will benefit the wealthy over low-income communities? Humanity deserves an answer to this question.

A cursory look at S.F. bay area agency actions might support such a conclusion. The BAAQMD, CARB and the state of California continue to support a discriminatory practice of letting applicants buy pollution credits from outside the adversely affected community and concentrating pollution within already polluted low- income, minority communities, even when the affected community is already above state and federal pollution levels.
BART and highway extension through Pittsburg did not include the completion of Range Road overpass even though the City, police, fire department, school district and emergency responders all testified that the overpass was needed to better protect and serve the community. Agencies response was that Pittsburg was not deserving of an overpass and splitting the community permanently was not their problem. When we look at what those same agencies did for Lafayette and Walnut Creek we see for Lafayette they built 6 under passes (between Acalanes Rd to Pleasant Hill Rd on Highway 24) and for Walnut Creek two major over passes (between Pleasant Hill Rd to Ygnacio Valley) to serve only a few wealthy homeowners, homes that had other means of access to the nearby community.

A thriving, finically lucrative and community supporting fishing industry in Pittsburg was destroyed by public agencies allowing the Delta water to be diverted away and polluted by industry. This destruction of Pittsburg fishing economy was for the so purpose of making rich property owners, developers and industry stock holders richer.

Pittsburg Unified School District had to close a school and sign a voluntary letter of compliance to answer concerns of racial discrimination.

Keller Canyon land fill was located in Pittsburg so that wealthy equestrians would not lose their riding range even though their location would have been more centrally located, producing less truck traffic and pollution

The CEC, BAAQMD, CARB and the state of California allowed power plants to use outdated emissions controls and concentrate pollution in Pittsburg by use of pollution credits from outside the affected area. CEC did not require an EJ analysis as there are **"not enough minorities in Pittsburg to study." The CEC went as far as to hold seminars for other state agency to teach them how to handle low income minority comminutes, thus institutionalizing discrimination against EJ comminutes in California.**

Local and state agency allow GWF to build several small dirty Petroleum Coke burning power plants instead of one large one to get around strict pollution standards

PUC only gave PG&E a warning when it was found out PG&E went ahead with power line upgrades without public input, thus denying Pittsburg the opportunity to have high power lines underground. High voltage power lines are now strung all over Pittsburg, detracting from the landscape and bringing down property values.

Pittsburg Unified School District Files EJ complaint agents the City of Pittsburg, BAAQMD, CEC and CARB because of these agencies continued attracts on the health and welfare of Pittsburg Students and **the major adverse effects on the learning environment, due to health problems from air pollution**.

Los Medanos Community College was built with false smoke stacks and fake industrial doors so student would become accustomed to the environment in with they are expected to live.

Original Draft EIR **attempts to use past discrimination to justify continued discrimination:**
The original Draft EIR suggests continued discrimination is OK since public agencies have already destroyed Pittsburg recreational and scenic value as a tourist destination by killing off sport fishing, filling Pittsburg's hills with trash and by walling off the delta from public view and use with industrial blight. They have made sure that Pittsburg residents will not prosper by providing poor educational opportunities and closing off access to near by heath care. They have blighted the City with high voltage lines, cut the City in halve with BART and allowed the air to be polluted above State and Federal standards. Original Draft EIR goes on to suggest that if public and private agencies have been successful in dummying down a community's expectations that this dummied down expectation is what should be used to judge a project; not what is right: That every man, women and child desires the right to live in a as clean and as beautiful an environment as anyone else. **Civil Rights title VI, Cal Gov. Code 11135,**
Presidential Executive Order 12898

The **Recirculated Draft EIR** once again tries to use discriminatory Federal law to justify continued discrimination of the residents of Pittsburg. "As railroad operations are preempted from local and state environmental regulations by federal law (under the Interstate Commerce Commission Termination Act), the movements of locomotives to and from the Rail Transload Facility and within areas of potential impact for the project are included in this EIR for evaluation and discussion purposes only. The City of Pittsburg and other state and local responsible agencies are preempted from imposing mitigation measures, conditions or regulations to reduce or mitigate potential impacts of BNSF train movements"

Imagine if:

- Ralph Abernathy (1926–1990) clergyman, activist, Southern Christian Leadership Conference (SCLC) official
- Susan B. Anthony (1820–1906) Women's suffrage leader, speaker, inspiration
- Ella Baker (1903–1986) SCLC activist, initiated Student Nonviolent Coordinating Committee (SNCC)
- James Baldwin (1924–1987) essayist, novelist, public speaker, SNCC activist
- Daisy Bates (1914–1999)

- Dana Beal (1947–) pro-hemp activist, organizer, speaker, initiator
- Jeremy Bentham (1748-1832) British philosopher, writer, and teacher on civil rights, inspiration
- James Bevel (1936–2008) SCLC's main strategist, organizer, and Action leader
- Claude Black (1916–2009)
- Antoinette Brown Blackwell (1825-1921) - founded American Woman Suffrage Association with Lucy Stone in 1869
- Julian Bond (1940–) activist, politician, scholar, lawyer, NAACP chairman
- Lenny Bruce free speech advocate, comedian, satirist
- Lucy Burns (1879–1966) women's suffrage/voting rights leader
- Stokely Carmichael (1941–1998) SNCC and Black Panther activist
- Carrie Chapman Catt (1859–1947) suffrage leader, president National American Woman Suffrage Association, founder League of Women Voters and International Alliance of Women
- Cesar Chavez (1927–1993) Chicano activist, organizer, trade unionist
- Claudette Colvin (1939–) Montgomery Bus Boycott pioneer, independent activist
- Marvel Cooke (1903–2000), journalist, writer, trade unionist[1]
- Humberto "Bert" Corona (1918–2001) labor and civil rights leader
- Dorothy Cotton (1930–) SCLC activist, organizer, and leader
- Norris Wright Cuney (1846–1898), Texas politician
- Eugene Debs (1855–1926) organizer, campaigner for the poor, women, dissenters, prisoners
- Frederick Douglass (1818–1895) abolitionist, women's rights, writer, organizer
- W. E. B. Du Bois (1868–1963) writer, scholar, founder of NAACP
- Charles Evers (1922–) Civil Rights Movement activist
- Medgar Evers (1925–1963) NAACP official
- James Farmer (1920–1999) Congress of Racial Equality (CORE) leader and activist
- Louis Farrakhan (1933–) Minister, National Representative of the Nation of Islam
- James Forman (1928–2005) SNCC official and activist
- Marie Foster (1917–2003) activist, local leader in Selma Voting Rights Movement
- Betty Friedan (1921–2006) writer, activist, feminist
- Mohandas Gandhi (1869–1948) activist, writer, philosopher, inspiration
- William Lloyd Garrison (1805–1879) writer, organizer, feminist, initiator
- Dick Gregory civil rights movement, free speech advocate, comedian
- Olympe de Gouges (1748–1793) women's rights pioneer, writer, beheaded after French Revolution
- Prathia Hall (1940–2002) SNCC activist, civil rights movement speaker

- Fannie Lou Hamer (1917–1977) activist in Mississippi movements
- Harry Hay (1912–2002) early leader in American LGBT rights movement, founder Mattachine Society
- Lola Hendricks (1932–) activist, local leader in Birmingham Movement
- Jack Herer (1939–2010) pro-hemp activist, speaker, organizer, author
- Gordon Hirabayashi (1918–2012) Japanese-American civil rights hero
- Myles Horton (1905–1990) teacher of nonviolence, pioneer activist, Highlander Folk School
- T.R.M. Howard (1908–1976) founder of Mississippi's Regional Council of Negro Leadership
- Julia Ward Howe (1818–1910) writer, organizer, suffragette
- Dolores Huerta (1930–) labor and civil rights activist
- John Peters Humphrey (1905–1995) author of Universal Declaration of Human Rights
- Jesse Jackson (1941–) clergyman, activist, politician
- Nellie Stone Johnson (1905–2002) labor and civil rights activist
- Abby Kelley (1811–1887) abolitionist and suffragette
- Coretta Scott King (1927–2006) SCLC leader, activist
- Martin Luther King, Jr. (1929–1968) SCLC co-founder/president, activist, author, speaker, inspiration
- James Lawson (1928–) teacher of nonviolence, activist
- Bernard Lafayette (1940–) SCLC and SNCC activist and organizer
- John Lewis (1940–) Nashville Student Movement, SNCC activist, organizer, speaker, politician
- Joseph Lowery (1921–) SCLC leader and co-founder, activist
- Clara Luper (1923–2011) sit-in movement leader, activist
- James Madison (1751–1836) introduced and lobbied for the U.S. Bill of Rights
- Nelson Mandela (1918–) South African statesman, leading figure in anti-apartheid movement
- George Mason (1725–1792) wrote Virginia Declaration of Rights, influenced U.S. Bill of Rights
- Rigoberta Menchú (1959) - Guatemalan indigenous rights leader, co-founder Nobel
- James Meredith (1933–) independent student leader and self–starting activist
- Mamie Till Bradley Mobley held open casket funeral for son, Emmett Till; speaker, activist
- Charles Morgan, Jr. (1930–2009) attorney, established principle of "one man, one vote"
- Harvey Milk (1930–1978) politician, gay rights activist
- Bob Moses (1935–) leader, activist, and organizer
- Diane Nash (1938–) SNCC and SCLC activist and organizer
- Edgar Nixon (1899–1987) Montgomery Bus Boycott organizer, civil rights activist

- James Orange (1942–2008) SCLC activist and organizer, trade unionist
- Emmeline Pankhurst (1858-1928) one of the founders and the leader of the British Suffragette Movement
- Rosa Parks (1913–2005) NAACP official, activist, Montgomery Bus Boycott inspiration
- Alice Paul (1885–1977) major women's suffrage/women's rights leader, strategist, and organizer
- Thomas Paine (1737-1809) English-American activist, author, theorist, wrote *Rights*
- Elizabeth Peratrovich (1911–1958) Alaska activist for native people
- A. Philip Randolph (1889–1979) socialist, labor leader
- Amelia Boynton Robinson (1911–) voting rights activist
- Jo Ann Robinson (1912–1992) Montgomery Bus Boycott activist.
- Eleanor Roosevelt (1884–1962) women's rights, human rights activist in United Nations
- Bayard Rustin (1912–1987) civil rights activist
- Al Sharpton (1954–) clergyman, activist, media
- Charles Sherrod civil rights activist, SNCC leader
- Judy Shepard (1952–) gay rights activist, public speaker
- Kate Sheppard (1847–1934) New Zealand suffragist in first country to have universal suffrage
- Fred Shuttlesworth (1922–2011) clergyman, activist, SCLC co-founder, initiated Birmingham Movement
- Elizabeth Cady Stanton (1815–1902) women's suffrage/women's rights leader
- Gloria Steinem (1934–) writer, activist, feminist
- Lucy Stone (1818–1893) women's suffrage/voting rights leader
- Thich Quang Duc (1897–1963) Vietnamese monk, freedom of religion self-martyr
- Desmond Tutu (1931–) South African anti-apartheid organizer, advocate, inspiration
- Karl Heinrich Ulrichs (1825-1895) German writer, organizer, and the pioneer of the modern gay rights movement.
- C.T. Vivian (1924–) American student civil rights leader, SNCC activist
- Wyatt Tee Walker activist with NAACP, CORE, and SCLC
- Ida B. Wells (1862–1931) journalist, women's suffrage/voting rights activist
- Walter Francis White (1895–1955) NAACP executive secretary
- Elie Wiesel (1928–Present) Jewish rights leader
- Roy Wilkins (1901–1981) NAACP executive secretary/executive director
- Frances Willard (1839–1898) women's rights, suffrage/voting rights leader
- Hosea Williams (1926–2000) civil rights activist, SCLC organizer
- Robert F. Williams (1925–1996) organizer
- Victoria Woodhull (1838–1927) suffragette organizer, women's rights leader

- Malcolm X (1925–1965) author, activist
- Andrew Young (1932–) clergyman, SCLC activist and executive director
- Whitney M. Young, Jr. (1921–1971) Exec. Director National Urban League, advisor to U.S. Presidents
- William Wilberforce (1759-1833) leader of English abolition movement
- **Alexander Fred MacDonald (1920-2006) union leader, civil rights activist, my father**

Imagine if all these people said "Oh… let's go home ladies and gentlemen the law says it's ok for them to discriminate."

And again in the **Recirculated Draft EIR** as in the **Original Draft EIR** they make this ridiculous clam that somehow this project will reduce the number of ship in the SF bay; knowing tanker ships have to transfer some of their load to other tanker ships in order to move into the shallow upper bay.

Wait: this just in!

Northern Waterfront Economic Development Initiative - Authored by Supervisor Federal Glover **http://www.cccounty.us/DocumentCenter/View/26503** **Note: Shipping Channel Deepening Project Study Area – 35 feet increased to 45 feet (See map on page 6 in cc county project link) PITTSBURG CA**

"Gateway to Pacific Rim and Western U.S." (for Dirty Tar Sands Crude and Petroleum Coke.) Note: Existing Koch Carbon marine shipping facility in Pittsburg for Petroleum Coke (i.e., PetCoke) Export – derived from Bay Area Refineries that have increasingly received PetCoke-producing low-quality Canadian Tar Sands heavy crude oil by railroad, i.e., Valero, etcetera.
("Bottom-of-the-Barrel" garbage in, PetCoke garbage out.)
April 23, 2013 Board of Supervisors Approve Northern Waterfront development Initiative Work Plan –
What is the Northern Waterfront?

- **Approximately 50-miles of shoreline stretching from Hercules to the Antioch Bridgehead area – San Pablo Bay to the Sacramento and San Joaquin Rivers**
- **Approximately 15% General Plan designation for Heavy Industrial (HI) use**
- **Covers both cities and unincorporated areas**
- **Hosts several major petroleum/chemical manufacturing facilities, other manufacturing industries, class 1 railroads, docks, and ports**
- **Gateway to Pacific Rim and Western U.S. – Why Northern Waterfront?**
- **Rail-served by the UPRR and BNSF**
- **Deep-water wharfs for exports/imports, as well as, transbay shipments**

Primary Contact: Rich Seithel (925) 674-7869 **Rich.Seithel@dcd.cccounty.us**

Ok I see, with Federal Glover leading the charge and the CCC Supervisors and CEC right behind him it must be a slam dunk for approval of deep water shipping channels throughout the upper Bay going to all refineries and new projects (tax payers money used to maintain them of course). **But how in June of 2012 when the original draft EIR came out did the authors know the Contra Costa County Supervisors would Approve Northern Waterfront development Initiative Work Plan, April 23 2013? Is this why a Recirculated DEIR; so the dates of these action would be in the proper order of independent agency action?**

Executive Summary: Wetland Lease is in Violation of the "Public Trust Doctrine"
Senate Bill No. 551 CHAPTER 422 SEC. 3. (a) The trust lands shall be held by the trustee in trust for the benefit of all the people of the state for purposes consistent with the public trust doctrine,
(3) "Public trust doctrine" means the common law doctrine, as enunciated by the court in National Audubon Society v. Superior Court (1983) 33 Cal.3d 419, and other relevant judicial decisions, specifying the state's authority as sovereign to exercise a continuous supervision and control over the navigable waters of the state, the lands underlying those waters, and nonnavigable tributaries to navigable waters, including the maritime or water dependent commerce, navigation, and fisheries, and the preservation of lands in their natural state for scientific study, open space, wildlife habitat, and water-oriented recreation
It is clear that the WesPac facility is not for the benefit of all the people. Will have a detrimental effect on fisheries, wildlife habitats and water- oriented recreation and is in violation of public trust doctrine. Terms of Trust require lands to stay open to and for public use.
The City is legally bond by the use condition of the trust to deny lease of wetlands.

Executive Summary: Project Dose not Conform to the Mandate of State Legislature
Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992

29701. The Legislature finds and declares that the Sacramento-San Joaquin Delta is a natural resource of statewide, national, and international significance, containing irreplaceable resources, and it is the policy of the state to recognize, preserve, and protect those resources of the delta for the use and enjoyment of current and future generations.
29702. The Legislature further finds and declares that the basic goals of the state for the Delta are the following:
(a) Achieve the two coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.
(b) Protect, maintain, and, where possible, enhance and restore the overall quality of the Delta environment, including, but not limited to, agriculture, wildlife habitat, and recreational activities.
29705. The Legislature further finds and declares that the delta's wildlife and wildlife habitats, including waterways, vegetated unleveed channel islands, wetlands, and riparian forests and vegetation corridors, are highly valuable, providing critical wintering habitat for waterfowl and other migratory birds using the Pacific Flyway, as well as certain plant species, various rare and endangered wildlife species of birds, mammals, and fish, and numerous

amphibians, reptiles, and invertebrates, that these wildlife species and their habitat are valuable, unique, and irreplaceable resources of critical statewide significance, and that it is the policy of the state to preserve and protect these resources and their diversity for the enjoyment of current and future generations.
29706. The Legislature further finds and declares that the resource values of the delta have deteriorated, and that further deterioration threatens the maintenance and sustainability of the delta's ecology, fish and wildlife populations, recreational opportunities, and economic productivity.

29708. The Legislature further finds and declares that the cities, towns, and settlements within the delta are of significant historical, cultural, and economic value and that their continued protection is important to the economic and cultural vitality of the region.

Executive Summary: Less Discriminatory Alternatives
Less Discriminatory Project Alternatives, Best protection of bay endangered species 1 :
Have Bay Area refineries build a pipe line out to sea so that ships can unload out side of the bay, l**ess air pollution, less ship traffic and less chance of invasive species contaminating the bay and delta**. No rail export of raw or partially refined crude. The existing pipe line from refineries to the Central Valley used to transport raw product to a rail faculty away from residential housing. For those of you that are now hopping up and down proclaiming this to be preposterous, ludicrous, outlandish, unthinkable, undoable and dose not conform to the **Master Plan already pushed through the CEC**; here is a link to a map of The Golf Mexico showing some of the:
25,000 miles of pipe line in the Golf. And you say you do not have the expertise to build and run just one? What dose this say about your ability to build and run a complete shipping/rail and storage facility? http://stateofthecoast.noaa.gov/energy/gulfenergy.html

Less Discriminatory Project Alternatives 2:
Have bay refineries at least double their ship handing capacity and add on site storage. All refinery ship terminals provide a shorter shipping route than the Pittsburg terminal. **Using refinery terminals directly will result in millions of tons of reduction of air pollution compared to using the Wes Pac facility.** Air pollution that is produced will be spread out over a larger area with lower concentration in any one location. The existing pipe line from refineries to the Central valley used to transport raw product to a rail faculty away from residential housing. There is also a less likelihood of tanker mishaps in bay and delta, and less likelihood of invasive species contaminating the bay and delta. No rail export of raw or partially refined crude.

Less Discriminatory Project Alternatives 3:
Continue the current practice of holding ships in the bay until needed by refineries. No rail export of raw or partially refined crude. The existing pipe line from refineries to the

Central valley used to transport raw product to a rail faculty away from residential housing.

Less Discriminatory Project Alternatives 4:
Find a suitable site west of Bay Point to Martinez. Most of this land is zoned industrial with very few residents**.** No rail export of raw or partially refined crude.The existing pipe line from refineries to the Central valley used to transport raw product to a rail faculty away from residential housing.

Executive Summary: Cumulative Impact
It is reasonably foreseeable project will lead to higher PM10 and PM2.5 concentrations, air pollution, greenhouse gases, explosions, exposure to carcinogenic compounds and poisonous chemicals, **higher illness and asthma rates** and deaths within Pittsburg. **Higher illness rates among students and family members have been shown to be a major detriment to student learning**. It is reasonably foreseeable there will be an increase in non-indigenous species and deterioration of the delta habitat, reducing the economic prosperity of the delta. This project will have no significant impact on reducing air pollution in the SF bay as stated in Original Draft EIR. It is reasonably foreseeable Project may become a target for terrorist attack. (**Congressional report Contra Costa County is potential target terrorist attack**
http://www.co.contra-costa.ca.us/archives/42/Terrorism%20SFC%207.7.05.pdf)

It is reasonably foreseeable there is a 98.006% chance of tank failure within the next 50 years just due to earthquake alone. This does not include other causes of failure such as poor design and containment strategies, lightning strike, metal cracking or rusting, water in tanks, flooding, wrong construction materials used, poor welds, lack of inspection and repair, subsidence, tornados, high winds, terrorists, boil over and explosions from overheating hydrocarbons, operator or human error is very likely.

It is reasonably foreseeable a nearby facility failure could easily cause major tank failures. These include but are not limited to the power plant, under ground pipe lines **(remember San Bruno? http://en.wikipedia.org/wiki/ 2010_San_Bruno_pipeline_explosion),** a major PG&E substation and Pittsburg Power,s trans-bay terminal (both are very high energy ignition point), a rail yard full of explosive liquids, train derailment, or terrorist attack. The barbeques in the backyards of some of the homes are close enough to set off tank fumes.

It is reasonably foreseeable a problem at any one of these sites would quickly spread to all the others. Everything within .5 mile could be destroyed, a major electrical blackout of the Bay Area, rails, pipe lines and tank cars destroyed with major release of toxins, local industry unable to receive or ship supplies, millions of barrels of crude oil in the Delta and bay and substantial loss of life.

With the successful destruction of Pittsburg's very last recreational and scenic habitat it is reasonably foreseeable the demise of the marina, yacht club and down town redevelopment. It will be slow but enviable. Boaters and wild life enthusiast

will find that their wonderland on the delta has been replaced with messy oily stained ships. Their nostrils filled with a smelly noxious hydrogen sulfide and sulfur Dioxide gas that turns their stomach, burn their eyes and throat. The sky turned brown and the scenic view obscured with ships, particulate matter and smog. Wild live gone, stinky algae blooms and fish kill more prevalent from the increase in nutrients in the water from ships stirring up the sediments. Their view obscured by a brown haze reaching far into the Central Valley. Persons who never experienced breathing problems before will find their lungs getting tighter and breathing getting labored. For those who already have breathing problem more emergency room visits more missed days from work and school. The community will experience a higher death rate from cancer and *chemically induced asthma*. (Yet we sham others for gassing their own people). Those who can will leave and not come back to Pittsburg. Pittsburg downtown will become boarded up as before, the housing become predominantly low income and section 8: a place for the" poor" as it was once envisioned by some to always remain.

Executive Summary: Statistical Analysis; Science or Pseudo-Science?
The age old dispute (science or Pseudo-Science?) on statistical analysis has irrevocably been settled with the advent of the Fukushima Daiichi nuclear disaster**.** Statistical analysis for what is most likely to happen has once again been shown to be fundamentally flawed! The question is not what is most likely to happen but what can happen! **Everything in this report has already happened and is reasonably foreseeable will happen once again.** It is not a question of if but where, when and to whom. Residents should not be made to put their health and the lives of their families on the line so the applicant can save a few buck.

Executive Summary: Conclusion

Video of a very, very small crude oil tank boilover going up, 30 burned, Texas USA March 02 2011

http://video.msnbc.msn.com/documentaries/41907756/#41907756

These firefighters were well trained in fighting such fires but were not able to control it. With the aforementioned safety equipment and blast walls this fire could have been easy controlled by just one person with the push of just one button**. The concept of using innovation to solve today's problems is referred to as progress, moving forward, not living in the past or just common good since; It use to be called "the American way". Let's put America back to work doing what The United States of America was second to none in doing and made you proud to be an American: building it right.**

Questions:

1 Why no heath studies of Pittsburg residents living in the down town? Pittsburg, especially the area around the project, is a low-income, minority community. Pittsburg

residents are burdened with an unfair amount of pollution while having the least access to health care. Pittsburg air pollution is above State and Federal standards. Pittsburg residents' health is deserving of protection under the Federal Environmental Justice Memorandum of Understanding and Presidential Executive Order 12898 (Environmental Justice).

2 Why not include near by parks, churches and schools in this study? The selection of sensitive receptors .5 miles around the project does not accurately represent the possible impact zone for this project. BAAQMD records should show complaints of very foul odors and eye and throat irritation caused by former operator Mirant's transfer of fuel several years ago; odors from tank can still be smelled at times to this day. Complaints came from residents at least one mile down-wind and very wide spread. A community meeting was held by Mirant to apologize to the community for being such a bad neighbor. Air model studies should be performed to detail total area that may be affected by the project. A minimum of 10 miles down wind should be studied.

3 Why not include the following sites in your study?
Senior housing complex, Railroad Ave and 8th Street
Marina Vista Elementary School, Railroad Ave and 8th Street
St Peter Martyr School, West 4th Street
Riverview Park, River Park Dr.
Stewart Memorial Christian Methodist Episcopal Church, Linda Vista Way and Front
First Baptist Church, Odessa Dr.
St. Peter Martyr Catholic Church, Black Diamond St. and 8th St.
Greater McGluthen Memorial Temple Church, 550 Black Diamond St.
Parkside Elementary School, within 1000ft of KLM alt 1 connection.
Pittsburg High School, School St.
El Pueblo Federal Housing Project, El Pueblo
All section 8 housing within 5 miles of project

4 What are all possible compounds that may be in crude, their percentages and known health effects on children and the elderly? Which of these compounds cause eye, throat and skin irritation; asthma, bad smells and/or vomiting?

5 Why not documented, monitor and determine long term effects on residents' health?

6 Why not give free health services, including but not limited to cancer and asthma screening and treatment in the exposure zone?

7 Can anyone build electric or hydrogen powered ships and trains?

8 Will ships going to Pittsburg need to moor in the SF bay to "lighter" (transfer some of their load to other ships to reduce their draft) before entering the upper bay and Delta?

9 Why not build a pipe line out to sea to off load from? Ocean-going ships are a major source of non-indigenous species of clam, plants, crabs and parasites in the Delta. This invasion has damaged the quality and economic vitality of the Delta habitat.

10 What will you stop shoreline and levee erosion from ships?

11 how will you stop the stirring up of sentiments from the ships water displacement and props?

12 What emergency staff and supplies will be on site incase of accentdent?

13 Can WesPac get air pollution credits from sources that currently effect near by residents?

14 In the event of an accident what agency will be notified and what will be their response? How fast and in what number will help come?

15 How much money will applicant put toward getting, maintaining and training fire fighters per year?

16 The concept of" shelter in place" implies that there is something the homeowner can do to save themselves incase of a catastrophe. Will residents be given home fire fighting equipment, gas masks, first aid supplies and fire resistant suits?

17 Which agency has been notified for their input on Environmental Justice issues for this project?

18 Which agency does the City of Pittsburg expect to do an Environment Justice study?

19 Why not a study on a reasonably foreseeable worst-case scenario: sabotage to the facility, including the possibility 5000,000BBL tank content vaporizing into an explosive air/fuel mix and detonated? With LPG, ammonia, and chlorine storage railroad cars being engulfed in shock wave and flames at their storage site approximately ¼ mile south of the facility What effect would such a worst-case scenario have on the nearby residents and power substation just northwest of project? The electric power substation is a major supplier of power in California. It is vital to both the economic success of California and National Security that this substation remains safe from any possible threat.

20 how much insurance coverage dose applicant have?

21 Will applicant be required to put up a bond covering the total expense of insurance coverage for the next 30 years or more?

22 How close to existing water ways are tanks?

23 CCC fire department is being downsized and is already under manned. How much would it cost to have onsite fire fighting equipment and personal to completely foam site and ***within the industry standard of 15 minuets?***

24 Will Riverview Park be closed or made smaller?

25 What is the cancer rate and pollution for Brown Island?

26What is the cancer rate and pollution for the Pittsburg yacht Club?

27 How many persons in Pittsburg have asthma? How many die from asthma?

28 What are you going to do to protect the scenic value of the Delta?

29Will the facility be closed down on spare the air day?

30Will the facility be closed down when wind speeds drop below 10 miles an hour?

31 What steps will be taken to trap air pollution so that it dose not pollute the environment?

32 Why should children be allowed to get asthma so WesPac can make a profit?

References:

PUSD's OCR Complaint 4/17/00
http://www.calfree.com/OCRDelta.html

EPA 94565 web site
http://www.epa.gov/myenv/myenview2.html?minx=-122.11853&miny=37.94041&maxx=-121.73744&maxy=38.07837&ve=11,38.00946,-121.92805&pSearch=94565, CA

Congressional report Contra Costa County is potential target terrorist attack
http://www.co.contra-costa.ca.us/archives/42/Terrorism%20SFC%207.7.05.pdf

safety
***www.intergraph.com/assets/pdf/.../HydrocarbonEngineeringJune2011.pdf*- Block all www.intergraph.com results**
File Format: PDF/Adobe Acrobat
most oil storage tank damage is attributable to age deterioration, corrosion or (in some locations) ... these tanks stored such materials as crude oil, gasoline, fuel oil and ... tanks. In the us in 1978, a tank failure at a complex in Texas City, texas...

Failure Analysis of a ... - ASM Materials Information - ASM International
***products.asminternational.org/fach/data/fullDisplay.do?...* - Cached- Block all products.asminternational.org results**

Abstract: A 100000 barrel crude oil storage tank rupture caused extensive property damage in Dec. 1980, in Moose Jaw, Saskatchewan, Canada. Failure was ...

REVIEW OF FAILURES, CAUSES & CONSEQUENCES IN THE ...
www.lightningsafety.com/nlsi_lls/Causes-of-Failures-in-Bulk-Storage.pdf
File Format: PDF/Adobe Acrobat - Quick View
by W Atherton - Related articles
The cataclysmic events, which occurred at the Buncefield Oils Storage Depot in. Hertfordshire ... The failure of above ground atmospheric storage tanks, of which a variety of types are ... June 2003, where a floating roof crude tank was struck by ...

Tank Failure Modes and Their
www.risk-support.co.uk/vmt-tank_failure.pdf
File Format: PDF/Adobe Acrobat - Quick View
by VM Trbojevic - Cited by 2 - Related articles
atmospheric (Crude Oil) designs. An analysis of the consequences of an assumed axisymmetric mode of failure of a liquid storage tank is presented in an effort ..

REVIEW OF FAILURES, CAUSES & CONSEQUENCES IN THE ...
www.lightningsafety.com/nlsi_lls/Causes-of-Failures-in-Bulk-Storage.pdf
File Format: PDF/Adobe Acrobat - Quick View
by W Atherton - Related articles
The cataclysmic events, which occurred at the Buncefield Oils Storage Depot in. Hertfordshire ... The failure of above ground atmospheric storage tanks, of which a variety of types are ... June 2003, where a floating roof crude tank was struck by ...

Catastrophic Tank Failures: Highlights of Past Failures along with ...
***www.epa.gov/oem/docs/oil/fss/fss02/cornellpaper.pdf*- Block all www.epa.gov results**
File Format: PDF/Adobe Acrobat
A few of the more prominent failures have been listed below. On November 31, 2001, a storage tank holding almost 100000 gallons of crude oil ignited, throwing ..

Geospatial Settlement Monitoring of Above Oil Storage Tank
***jeteas.scholarlinkresearch.org/articles/SUBSIDENCE%20MONITORING.pdf*- Block all jeteas.scholarlinkresearch.org results**
File Format: PDF/Adobe Acrobat - Quick View
by R Ehigiator–Irughe - 2010
There are ten crude oil tanks each 21m high and diameter 76.2m (Ehigiator,. 2005). Others are two emulsion tanks, and continuous hydration tanks. Storage ...

Fawley Crude Oil Storage Tank - TWI
www.twi.co.uk/content/oilgas_casedown25.html
Two storage tanks failed during hydrotest after receiving weld repairs. Assessment of the material ... Fawley crude oil storage tank failure. Storage tank failure ...

On line documents
http://www.mediafire.com/?o5oiyj4jiganh

Sincerely,
James B. MacDonald
274 Pebble Beach Loop
Pittsburg, Ca. 94565
jbmd56@yahoo.com

Amy Million - Comments for the Scoping of Valero's EIR

From: Lynne Nittler <lnittler@sbcglobal.net>
To: "amillion@ci.benicia.ca.us" <amillion@ci.benicia.ca.us>
Date: 9/13/2013 4:30 PM
Subject: Comments for the Scoping of Valero's EIR

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

September 12, 2013
Amy Million, Principal Planner
amillion@ci.benicia.ca.us
Benicia Community Development Department
Comments for the Scoping of Valero's EIR

Dear Amy Million,
I have just begun to educate myself on the increased rail transportation of crude oil to various refineries in the Bay Area, most recently the application of Valero Benicia for an increase of two trains of 100-tanker car loads per day! Not many articles appear in the local papers, so I have to hunt for them. Having followed the dramatic increase in rail accident oil spills as more Tar Sands oil is moved by rail, and having noted also that such heavy crude cannot be adequately cleaned up, I am not at all pleased to have more trains rumbling through my home town of Davis, California.

It appears that the underlying intent is most likely to bring Albert Tar Sands crude to Benicia for processing, dirty oil that is best left in the ground. It destroys forest lands that help mitigate the effects of global warming we are already experiencing. Instead, we strip the land, apply toxics to force the bitumen from the ground and discard the waste water in toxic ponds that pollute water downstream. Then we take on the risks of shipping that dirty bitumen across Canada and the US through my home town to the bay area where the refining of the high sulfur content pollutes the air there! All this to create fuels that once burned contribute still more greenhouse gases to add to our global warming overload. Not one segment of this story meets the test of helping create a healthy and habitable planet where our children can thrive.

I strongly urge you to notify all communities that may possibly be affected by the rail transport with its potential for oil spill accidents, sulfur dioxide air pollution and the increased greenhouse gas emissions of bringing more tar sand crude to Benicia.

I have alerted the Davis City Council and the Yolo County Supervisors to this critical issue and will continue to send them articles as I find them, as this is clearly a matter that should concern us.

Thank you for taking my comments into consideration.
Lynne Nittler and Richard McAdam
2441 Bucklebury Road
Davis, CA 95616
530-756-8110

Amy Million - "Valero Crude by Rail Project, to Amy Million, Principal Planner, Community Development Department, City of Benicia,

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: Milton Kalish <milton@miltonkalish.com>
To: <amillion@ci.benicia.ca.us>
Date: 9/12/2013 6:13 PM
Subject: "Valero Crude by Rail Project, to Amy Million, Principal Planner, Community Development Department, City of Benicia,

corrected copy

To whom it may concern
I am Milton Kalish of Davis California, writing as a citizen of Davis and as co-coordinator of Yolando Climate Action. The Vallejo Good Neighbor Steering Committee has invited me to speak at tonight's meeting concerning railroad shipments of crude oil through Davis to Benicia. I am writing because I am unable to attend the meeting due to a family emergency.

We in Davis are just becoming aware that crude oil is being shipped by through our city, and of the associated risks to public safety and health, especially in light of the disastrous loss of life and property in Lac-Megantic, Quebec on July 6. We are taking this very seriously.

We urge the city of Benicia to put public safety and health as the top priorities in any decisions involving shipment of crude oil.

Please feel free to contact me for further information, or if you wish to discuss this matter further.

Respectfully submitted,
Milton Kalish, LCSW

--

Privileged and Confidential Communication: This message is not encrypted and may not be confidential. This message and any attached files contain information intended for the exclusive use of the recipient to whom it is addressed and may contain information that is proprietary, privileged, confidential or exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby notified that any viewing, copying, disclosure or distribution of this information may be subject to legal restriction or sanction. Please notify the sender, by electronic mail or telephone, of any unintended recipients and delete the original message without making any copies.

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

September 12, 2013

Mary Frances Kelly Poh

643 Windsor Drive
Benicia, CA 94510
Phone: 707-745-5461
Mfpoh@pacbell.net

Amy Million, Principal Planner
Community Development Department
City of Benicia,
250 East L Street
Benicia, CA 94510

Dear Ms. Million

Scoping Comments for Valero Crude by Rail

Valero Crude by Rail is probably the most important project to come to the City of Benicia in decades. Both the City of Benicia and the public need sufficient time to prepare and review the necessary documents. Therefore I request that the comment period for the DEIR be 60.

I have previously written regarding the need for an EIR and request those questions and concerns be addressed in the DEIR.

Specifically the plan must address emergency planning all the rail lines that the tank cars will travel. Additionally emergency plans can only be vague if the people preparing the plans don't know specifically what the train cars contain. I understand Valero is going to blend the crude in their facility so that it essentially is the same as what they refine there now, But the tank cars will not contain the crude mixture that Valero now refines. All crude oil is not alike. Some contain more sulfur and often 2-4 times the amount of "sweet north slope crude" contains. Also included needs to be training plans so that all first responders know how to respond and protect the citizens all along the train route. There needs to be developed something similar to Bay Keeper which responds to oil spills in the Bay waters to respond to spills on the land.

I also wrote about the need to accurately document the presence of two federally listed endangered species, specifically Soft Bird's Beak and the Suisun Song Sparrow. Both must be searched for at the appropriate times and if found mitigations must be developed to protect both of these species. The easiest time to find the Soft Bird's Beak is April and May when it is in bloom. There are other species which also must be considered as the train passes through the Suisun Marsh which is a shallow tidal estuary on the Pacific Flyway in which migratory birds from Alaska travel as far as Patagonia and back again. There are migratory bird treaties which will come into play here. A spill in this area could prove difficult to clean up and have devastating consequences in the marsh, delta and the Carquinez Strait. A spill into Sulfur Springs Creek, which runs parallel to the train tracks on the Valero property, and empties into the Suisun Delta, could be very problematic and difficult to clean up.

This project is more than just putting in a rail spur in the refinery in isolation. There are a number of other local and statewide organizations which need to be invited to comment on issues to be addressed in the DEIR. They

include The Solano Land Trust, Suisun Delta Resource Conservation District, California Native Plant Society, Solano County Fire Chief's Association, and all the cities along the train's route here in California. This project is part of larger changes which are occurring in Bay Area refineries. This project must be examined for its cumulative impacts. Mitigations must be identified and explained so that the public can understand the project and participate in the solutions.

Sincerely,

Mary Frances Kelly Poh

Mary Frances Kelly Poh

Amy Million - Re: Additional comment for the record, Valero Crude By Rail

From: Mary Frances Kelly Poh <mfpoh@pacbell.net>
To: "rogrmail@gmail.com" <rogrmail@gmail.com>, 'Amy Million' <Amy.Million@ci...
Date: 9/12/2013 1:40 PM
Subject: Re: Additional comment for the record, Valero Crude By Rail
CC: 'Brad Kilger' <BKilger@ci.benicia.ca.us>, Belinda Smith <bsmitgo@hotmail...

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Oh, what a great thought! And Valero does have the minds and the ability to pull this forward thinking off. Even me, who drives an all electric car, knows that value and necessity of petroleum. I have to drive either on concrete or asphalt or go regressive drive on dirt.

Mary Frances

From: "rogrmail@gmail.com" <rogrmail@gmail.com>
To: 'Amy Million' <Amy.Million@ci.benicia.ca.us>
Cc: 'Brad Kilger' <BKilger@ci.benicia.ca.us>; Belinda Smith <bsmitgo@hotmail.com>; Don Dean <donaldjdean@sbcglobal.net>; George Oakes <oakes@earthlink.net>; Rod Sherry <rsherry@csa-engineers.com>; Stephen Young <escazuyoungs@gmail.com>; Susan Cohen Grossman <susancg@pacbell.net>; Suzanne Sprague <Suzanne@solanolawgroup.com>
Sent: Thursday, September 12, 2013 9:12 AM
Subject: Additional comment for the record, Valero Crude By Rail

For the record, Valero Crude By Rail:
Like so many others who have expressed concerns and questions regarding Valero's proposed Crude By Rail project, I resent the suggestion that I simply want to run Valero out of town. We all are dependent on fossil fuels at this moment in history. Valero knows, as do we all, that there are cleaner ways to produce energy, and that fossil fuels will eventually give way to other forms of manufacturing power. What is at issue in our community is the pace of transition, the security of our City's economic base, and the health of the planet. Major issues, indeed! As for me, I'd prefer that Valero NOT buy into what might be called a "Last Gasp" strategy of refining the earth's dirtiest sources of oil for a short term profit and a small extension on the time of transition to cleaner fuels. Imagine the day when even the tar-sands and shale crudes are gone. Valero knows there will come a time when the refinery will need to re-tool its efforts completely. No, I don't imagine that our good neighbor refinery will shut down and leave, although I guess that would be a possibility. Rather, I see a day when, under a continuing ownership or a new owner, our refinery moves into electrical generation by wind/solar/water production or by an as yet undetermined clean and safe methodology. Now having imagined that, just imagine it sooner rather than later, with Valero LEADING the oil industry into a more responsible and sustainable future.

Roger Straw
766 West J Street, Benicia, CA 94510
707.373.6826

09-12-13

City Benicia Planning Commission Meeting

Questions for meeting:

1. Is Environmental Science Associates the lead in this E.I.R. How do they and the city verify ~~verify~~ information submitted?

2. Is the environmental effects of strip mining for crude "in" Canada or fracking for crude "in" north Decota related to ~~this~~ this E.I.R or within the purview of the planning commission?

3. For this meeting please ask speakers to detail their left of expertise on the related issue. Education, work experience ect. Not "I stayed at a Holiday Inn last night so I am a scientist."

RECEIVED
SEP 12 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Clark Driggers
58 Buena Vista
Benicia Ca
745-1225

50 yr resident

Amy Million - Additional comment for the record, Valero Crude By Rail

RECEIVED
SEP 12 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: <rogrmail@gmail.com>
To: "'Amy Million'" <Amy.Million@ci.benicia.ca.us>
Date: 9/12/2013 9:12 AM
Subject: Additional comment for the record, Valero Crude By Rail
CC: "'Brad Kilger'" <BKilger@ci.benicia.ca.us>, "Belinda Smith" <bsmitgo@hot...

For the record, Valero Crude By Rail:

Like so many others who have expressed concerns and questions regarding Valero's proposed Crude By Rail project, I resent the suggestion that I simply want to run Valero out of town. We all are dependent on fossil fuels at this moment in history. Valero knows, as do we all, that there are cleaner ways to produce energy, and that fossil fuels will eventually give way to other forms of manufacturing power. What is at issue in our community is the pace of transition, the security of our City's economic base, and the health of the planet. Major issues, indeed!

As for me, I'd prefer that Valero NOT buy into what might be called a "Last Gasp" strategy of refining the earth's dirtiest sources of oil for a short term profit and a small extension on the time of transition to cleaner fuels.

Imagine the day when even the tar-sands and shale crudes are gone. Valero knows there will come a time when the refinery will need to re-tool its efforts completely. No, I don't imagine that our good neighbor refinery will shut down and leave, although I guess that would be a possibility. Rather, I see a day when, under a continuing ownership or a new owner, our refinery moves into electrical generation by wind/solar/water production or by an as yet undetermined clean and safe methodology. Now having imagined that, just imagine it sooner rather than later, with Valero LEADING the oil industry into a more responsible and sustainable future.

Roger Straw
766 West J Street, Benicia, CA 94S10
707.373.6826

Amy Million - Public Comment - Valero Crude By Rail

RECEIVED
SEP 12 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: <rogrmail@gmail.com>
To: "'Amy Million'" <Amy.Million@ci.benicia.ca.us>
Date: 9/12/2013 9:07 AM
Subject: Public Comment - Valero Crude By Rail
CC: "'Brad Kilger'" <BKilger@ci.benicia.ca.us>, "Belinda Smith" <bsmitgo@hot...

Amy – please include my letter below in the record for Scoping for the proposed Valero Crude By Rail project, and distribute to all parties concerned. My letter was published in this morning's Benicia Herald, and offers a clarification on the distinction between shipments of "tar sands crude" (bitumen) and "diluted bitumen" (dilbit). I am asking Valero and the consultant to clarify Valero's previous statements and I suggest mitigations that would prevent shipment of diluted bitumen anytime in the future if this project goes forward. Thank you.

Roger Straw
766 West J Street, Benicia, CA 94510
707.373.6826

From: rogrmail@gmail.com [rogrmail@gmail.com]
Sent: Tuesday, September 10, 2013 12:23 PM
To: 'Benicia Herald'
Subject: Letter to the Editor

Editor:

Thank you for your September 10 article, "Questions on crude-by-rail to get airing Thursday." The issues covered in the article, in Steve Young's op ed, and at Thursday's meeting of the Planning Commission are deeply significant here in Benicia and beyond.

While the Herald's article covered the facts pretty well, I am concerned about a contrast drawn between Valero's statements and those who have voiced concerns about tar-sands crude. Ms. Weilenmann writes, "Company and refinery officials have repeatedly stated that the Benicia plant isn't equipped to process the heavier Canadian tar sands crude, and what would be brought in by train is the same quality of crude that is brought in from overseas countries and Alaska by oil tanker ships." Then she contrasts the refinery's statement with this: "...many residents, including members of the Good Neighbor Steering Committee have said at Planning Commission and other meetings that they suspect the less-expensive but heavier and more polluting crude is what would arrive by rail."

Concerned Benicia citizens' claims (and those of experts from the National Resources Defense Council) need to be clarified to be understood. Valero has indeed stated that they would not be shipping Canadian tar sands crude. Of course not. Tar sands crude (bitumen) is too thick and gooey to be shipped by pipeline or rail car. But Valero has not stated publicly that they would refrain from shipping the "heavier and more polluting" crude that is a ***blend*** of tar sands bitumen and other lighter volatile chemicals. This blend is referred to as diluted bitumen, or dilbit, and it is by far the dirtiest, most polluting source of fossil fuel in existence today. The stripping of the earth and despoiling of forests and rivers at the source is catastrophic for the health of the earth, as well as for human and other inhabitants. Movement of this blended crude by rail is extremely dangerous in every town, passing through community centers and rumbling past nearby schools, residential neighborhoods and commercial and manufacturing centers. Then, when it finally creaks through our protected Suisun Marsh, it would arrive in our fair village for a refining process that is dirtier than that of other crudes, producing more

greenhouse and volatile gases and resulting in a huge increase in a nasty refinery byproduct, petroleum coke (or petcoke), which is usually sold overseas and burned as a fuel that is itself dirtier than coal. A spill or an accident anywhere along the way could cost a billion dollars or more to clean up.

The list of reasons for NOT allowing diluted tar sands crude into Benicia can go on for pages, but I will leave it there.

Valero should be required to clarify, as part of the Environmental Impact Report and before this project is approved, whether they plan to import DILUTED BITUMEN, originating as tar sands crude in North America. And given that plans change, I would personally ask that a method of enforcing this plan far into the future be built into the project as a mitigating measure, and under penalty of law.

Roger Straw
766 West J Street, Benicia, CA 94510
707.373.6826

Kathy Kerridge
771 West I Street
Benicia, CA 94510
kkerridge@sbcglobal.net

RECEIVED
SEP 12 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy Million, Principal Planner
Community Development Department
250 East L Street
Benicia, CA 94510

Scoping Comments for Valero Crude by Rail

First, I would request that the comment period for the EIR be 60 days rather than 30 or 45 days. This gives ample time for the public to study and comment on the draft EIR. I would also ask that the comments period not be in December. That would reduce public input.

I would like to incorporate all of the comments I made in my prior letter regarding the need for an EIR into a request that these concerns and questions to be addressed in an EIR. That letter follows. I also believe that the comments by NRDC, the Goodman Group and Dr. Fox be thoroughly analyzed and the concerns addressed.

This project must be evaluated as part of a broad range of projects involving oil importation that are planned in the Bay Area. It cannot be viewed in isolation. The project should not be evaluated in the narrow way that was done in the negative declaration. Off site as well as on site impacts must be addressed. This project is not just about construction of a rail road. It is about what that construction will lead to. It is about how what is refined may change and about the public health consequences of that change. This must all be considered in the EIR. I would like the following specific issues addressed:

1. What will be the future economic impact on the Industrial Park? Would a large rail project have a negative impact on the attraction of new businesses and retention of current businesses? How would an increase in traffic congestion impact business attraction and retention? What are the safety issues of increased traffic back up on to the freeways? If Valero refines diluted bitumen oil with its higher emissions, its stronger odors, its greater risk of accident, with increased production of coke and its increased and dangerous particulate matter will other businesses want to locate in our industrial park? Will we lose businesses in the industrial park if this happens? What will be the consequences over the next 10 years, 30 years, 50 years? What will the economic impact of that potential loss be? What will be the impact of increased dependence on one business for our tax base if other businesses leave?

2. In light of the recent train disaster in Canada I want much more information about how these trains will be staffed, what kind of rail cars are they, and are they the safest possible? Are the rail cars double hulled? Would there be an increased risk of accident if higher sulfur oil, which is more corrosive, was carried in these rail cars? What kind of plans will be in effect to prevent a runaway train? What are the safety plans in effect now, not ones to be developed in the future? What would happen if there was a derailment in the industrial park near an oil tank? What are the mitigations for the inevitable dripping that will take place in a transfer of oil from the tank cars to the refinery?

3. How would a derailment be handled in any of the areas the train passes through? Will first responders know what is in the rail cars? Will they know how to treat a spill of diluted bitumen, if that is

ever transported? What are the plans to clean up an oil spill or a spill of tar sands oil if that ends up being imported? Will there be a bond in place to ensure clean up? The cost of the tar sands spill cleanup in the Kalamazoo River is approaching one **billion dollars.** Who will pay for a spill here? If the crude is reclassified as something besides oil, since it is so thick, who will pay for this cleanup since the industry is trying to exempt this from laws requiring cleanup? How will trains be impacted by the flooding that occurs in the marsh now? How will the rise in sea level impact the trains going through the marsh? What mitigation would there be? Could mitigation be no refining of this dangerous crude? What are the public health dangers of a spill of unconventional crude? Would local population be at risk from the release of the toxic chemicals used to dilute tar sands crude? What are the risks to the native wildlife and the bay if there was a derailment and spill in the marsh?

4. What exactly will be brought in by these rail cars? How will the public know what is brought in? How will the public know if the type of oil being brought in changes? How will a change in the source of oil impact our community?

5. The totality of this project must be addressed in the EIR, not just the small rail construction part. What will be the impact if the type of crude changes to tar sands, which produced more odor, more emissions, is more corrosive, and produces more pet coke?

6. Our general plan puts sustainability first. It specifically states on p. 22 "what is done at the project or local level can affect all levels of the environment, including the local community, neighboring regions, the country, and the world." This means to me that we must take a large view of this project. If tar sands are imported doesn't that directly go against providing for a more sustainable future? There are tremendous greenhouse gas emissions from the tar sands. We live in a community susceptible to sea level rise. What are the effects on this low lying community if the refining of oil that creates more greenhouse gases causes quicker sea level rise? Can a mitigation of this project be no diluted bitumen, no tar sands allowed?

7. How does the potential importation of tar sands crude impact AB 32 and the low carbon fuel standards? How can we strive for lower emissions if we encourage the development of the dirtiest fuels? How would any additional off site as well as onsite emissions be mitigated? What will the greenhouse gas emission be when considering off site as well as on site impacts? What will be the mitigation if tar sands with their extremely high emissions are refined?

8. If tar sands Dilbits are imported how will we know? What will happen when the VIP is fully implemented? How will the implementation of the VIP affect the type of crude oil that is imported and refined? How will the completion of the Hydrogen Plant affect the type of oil that is processed? How will a change in the crude oil impact emissions? This should consider not just average emissions, but emissions from the heaviest, sour crude that could be refined? How will a change to heavy, sour crude affect public health, cancer rates, asthma and other lung diseases? How will a change affect plant safety and the possibility of more accidents? Will the crude mix change over time? Will Valero tell us if it changes its sources after the project is approved? Would we have any say in it at that time? Would an EIR have to be then or does it need to be done now to address this threat?

9. Air quality needs to be evaluated not only during the project construction, but in light of possible change in emissions with a change in crude supply. Without knowing exactly what Valero will be refining it is impossible to tell how emissions will be impacted. What kind of air monitoring will tell us if there is a change in emissions? There is no fence line monitoring in place now. If there is an accident

how will we know what we are being exposed to? How will we know if we need to shelter in place or evacuate? What are the mitigations for increased emissions caused by a change in the crude being refined?

10. What is the cumulative impact of this project along with other projects in the Bay Area, such as the West Pac Energy Infrastructure Project in Pittsburg, and projects in Martinez and at the other refineries? If all of the refineries in the Bay Area change how they get their oil and the composition of the crude changes what will the public health impacts be? What are all the other projects that are being considered by other refineries? How will the cumulative impacts of all of these projects be mitigated?

11. What are the public health issues associated with refining diluted bitumen? What are the public health impacts from more pet coke production? What are the impacts besides increased cancer risk? How will this projects possible long term change of crude oil affect asthma rates, and other lung conditions? What are the long term impacts of inhalation of small particular matter? How would this change if diluted bitumen is brought in? The refining of tar sands crude increased the production of pet coke which contains lead and nickel, both of which are hazardous to human health? How will the impacts from this be mitigated? What will prevent small particles from blowing off of these pet coke piles into the bay and into Benicia? What are the mitigations? What are the cumulative impacts if more of the refineries in the Bay Area refine tar sands Dilbits? What will the cumulative effects be on the San Francisco Bay if there is more pet coke production and more pollution from particulate matter?

Sincerely,

Kathy Kerridge

Kathy Kerridge
771 West I Street
Benicia, CA 94510

July 1, 2013

Dear Planning Commissioners, Mayor Patterson, City Council and Brad Kilger,

I am writing to urge you to reject the MND on the Valero Crude- by –Rail Project and to require a full Environmental Impact Report

CEQA requires that there be an evaluation of all foreseeable cumulative contributions to negative impacts including air quality, public health, local and regional sensitive ecology (land and water), traffic/transportation, and global warming. The initial study and negative declaration does none of that. As the study explains "all environmental evaluation must take into account the whole action involved including offsite as well as onsite, cumulative as well as project level, indirect as well as direct, and construction as well as operational impacts." The possible impacts of an oil spill in the Suisun Marsh, or any other waterway in California is not mentioned. The cumulative effect of not just increased rail for Valero but for all the other refineries in the area is not mentioned. Yet this is foreseeable. Maybe 25 cars will have little impact, 100 more, but what if we start having 500 rail cars a day coming through a sensitive wetland that flows to the Bay?

The biological mitigation only looked at on site mitigations that would be implemented at the project site. There was no discussion of offsite mitigations, despite the fact that these rail cars will be going through sensitive habitats off site as well. Have other agencies been notified about this such as the Suisun Resource Conservation District and the Department of Fish and Wildlife?

The derailment of a train carrying the herbicide, metam sodium, in Dunsmuir in 1991 shows what an environmental disaster can happen when a rail car derails. This derailment killed everything for 38 miles of the Upper Sacramento River. This same area was the site of a derailment on 6-13-2013. The Dunsmuir spill can provide valuable lessons. In Dunsmuir the train operators had no idea what they were dealing with and raised no warning that there was a toxic spill. The same thing happened in the Kalamazoo, Michigan pipeline burst where not only did the local people have no idea what was in the pipeline, but the company ignored their own warning signals, increased the pumping of oil and never gave a thought to contacting the local authorities. This pipeline was carrying diluted bitumen from the Canadian Tar Sands. This cleanup is in its third year and is still incomplete. It has cost $809 million dollars so far. Are our safety plans adequate? Has an emergency response plan been prepared for a crude oil spill being imported by rail in sensitive areas? Do we even know what will be in these rail cars? These are off site concerns that must be responded to. The initial study acknowledges that there are hazards of shipping by rail, but concludes that those are offset by the hazards of shipping by boat. That is not an adequate analysis. The analysis should be what are the hazards of shipping by rail and how can they be mitigated.

Will this expansion lead to bringing in crude oil from the tar sands of Canada? Valero has stated and the initial study says that the crude brought in will be similar to what they are already processing. Will that always be so? Are they bringing in oil that is from the tar sands that has been blended prior to being shipped? Oil from the tar sands are a toxic stew when transported. They don't react in a spill in the way

that traditional crude does. If Valero is not importing tar sands diluted bitumen blend now, will it do so in the future?

The initial project claims that there will be no need to modify the refinery to be able to process the new North American crude variety since VIP upgrades have been accomplished. Would Valero have to modify the refinery to accept dilute bitumen crude blends? Would the processing of diluted bitumen increase certain kinds of emissions and what would they be? The community would want additional notification if this happened.

The Alberta Tar Sands is an environmental disaster. Not only is it extremely energy intensive in the way the oil is produced; it is also destroying vast tracts of forest and using immense quantities of fresh water. The oil that is produced has to be heated and mixed with some very toxic chemicals in order to be shipped. When it spills these chemicals evaporate and a toxic cloud is released. The resultant heavy tar does not float to the top of water to be scooped up, but rather sinks to the bottom. It is more corrosive than lighter crude. This corrosive crude is so dangerous that British Columbia will not allow a pipeline to be built through their province to the ocean. The greenhouse gas emissions from the production of these oils are much greater than normal oil production. Will this project lead to this being brought in? What would the greenhouse gas emissions be like if that were considered? These are potential cumulative, off site impacts that must be considered.

Under section 18 "Mandatory Finding of Significance" of the initial report all finding were less than significant either with or without mitigation. The only reason for this is the failure of the initial report to look beyond the narrow scope of the project, which was treated only as a construction project. There is no analysis of offsite problems with rail transport of hazardous materials, no in depth analysis of what would happen with an offsite derailment or spill in sensitive environments and no analysis of the broader impact of increased GGH emissions that would happen if there was the importation of diluted bitumen from the Canadian Tar Sands.

For all of these reasons a complete Environmental Impact Report should be required.

Sincerely,

Kathy Kerridge

Sept. 15, 2013

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Dear Amy Million,

As a concerned citizen of Benicia, I am writing to you and the Benicia Planning Commission in regard to the "Crude by Rail Project" submitted by The Valero Refinery. The last two BPC meetings about this proposal have provided quite an education about this complex subject, leading me to further explore the issues involved.

I am grateful that the Planning Commission chose to order an independent EIR to consider the ramifications, both direct and indirect, this project poses. Based on what has been shared, through the extensive research presented, I have come to the conclusion that significant health and safety issues need to be addressed to protect our environment, our citizens, and our neighboring communities. At this point, I am not in favor of allowing the refinery to carry out this project of transporting crude via the railroad. I do not view this as a "green alternative," and also do not see it as a benefit to the city. The supposed new jobs that Valero has said would come from this change would not necessarily be given to Benicia residents, and I feel even if they were, it would be a poor substitute for what it might cost the city down the road due to potential health, safety and traffic problems. Since the details of health and safety were well substantiated at the meeting, I won't repeat them here.

Air space is shared, and the accumulative effect of several refineries seeking crude could have potentially damaging effects, even if no unexpected accident occurs. The latter is an obvious concern but much has already been said about those possibilities. We have been forewarned by the tragic results from recent crude oil disasters elsewhere in the US.

The major traffic increase along the corridors Union Pacific trains run also feels problematic, since only UP has control over the timing of when those trains come through. Since they will cross several states, our end location isn't the only one to consider. Many towns will experience the same kind of traffic flow disruptions we will experience if the plan goes through, yet they won't have the opportunity to address the project in the way that we can, since we live at the tail end of the line, where the refinery is located. Whatever decision we make, they will have to live with it, without their needs being considered ahead of time.

Based on last night's revelations that new track is being laid, followed by a personal conversation with Valero Representative, Chris Howe, in which he would not confirm what kind of construction was going on at the Valero site, I decided to take a little field trip to the refinery today. I was accompanied by Benicia resident, Karen Schlumpp. We were held up for several minutes while we waited for a long tank train to pass through at Park Street around 12:20 p.m., during what I assume was the traditional lunch break time for those who work in the Industrial Park.

Although Chris Howe denied any unusual construction going on at the Valero site that would relate to the proposed project, I saw lots of fresh, new railroad track had been laid on their land with large piles of supplies stacked up for more tracks to be laid within their property lines. I was able to speak with a UP train workman who told us that new track lines were going in as well as major repairs on older lines that had been vacant for many years, (since the 1960's, he said). This sounds like a major change for UP to be making in preparation for the Valero project being passed. It's costing UP several million dollars to do this upgrade and they stand to receive handsomely from their efforts. This indicates that more is being done than the two lines that were shown during last night's simplistic presentation. There appeared to other tracks being updated perhaps for holding areas for tanks?

I also found out that the heavier track being laid is considered to be necessary for the heavier loads that are being anticipated to be coming through. It will take three locomotives for each train to carry the large tanks of crude per train run, (two in front and one in back), which is two more locomotives than was specified in the report we received at the July BPC meeting from which the original air quality report was estimated.

It appears that construction is currently being implemented by UP, yet I sense it is being triggered by a contract between UP and Valero in preparation for this influx of anticipated heavy deliveries the tracks will have to support. From what I understand, the UP doesn't need the city's approval to make railroad track changes, yet I can't help but feel these changes are contractual between Valero and the railroad even before the project has been approved by our city. The new lines I saw, (there may be others being reconstructed in the park, as well), were on various portions of Valero's land. I feel it would be worth the BPC's time to go to the site and check it out. Having this done ahead of time before the city approves the project, feels presumptuous. I also felt Chris Howe was not being honest about the construction being done when questioned directly about it.

The profit/gain is obvious for both UP and Valero. But would we actually see a substantial drop in costs at the pump? I doubt that. For business reasons, oil companies are naturally drawn to the least expensive options for themselves, which is understandable. UP stands to gain an estimated $400,000 per day to run these shipments on their tracks. This adds up to even more than Valero will receive by purchasing the cheap grade, toxic crude, (estimated to be about $7 to $10 a barrel).

Although I haven't been told anything of this nature, I would imagine Valero has or will offer the Good Neighbor Steering Committee a goodly sum to see this project through. Valero has been a generous supporter to our town. In addition to their gifts, they provide a significant tax revenue to the city. To some extent, I understand and certainly appreciate what they have offered to the community during my 33 years of residency here. Yet even in acknowledgement and gratitude for the gifts received, I ask you to weigh these against the potential effects this requested change would have on our town and the outlying areas, some of which would be more affected than we are due to wind currents. Please pay careful attention to ALL aspects of this proposal, including setting reliable stipulations for independent monitoring requirements to assure safe air quality on a regular basis. Also, if this passes, please make sure Valero has the ability, financially and physically, to quickly and safely respond to any unexpected disasters that may occur from the highly toxic quality of this new form of dirty oil. When I heard last night that have been 20 derailments since 2002 in the Industrial Park, I was alarmed. These loads Valero will be bringing in, two trains arriving daily, with each train car carrying 70,000 gallons of crude, if the figures are remembered correctly, would be a lot heavier and more dangerously toxic than what has formerly been carried on the railroad line. Some of the projected holding areas are in very sensitive locations for the environment and the town. I also noticed some of these areas are getting fresh track as well. I hope each of you will investigate this further and not just rely on the information provided by Valero.

I was stunned and disappointed that Chris Howe, the Valero Representative, did not respond to any of our questions from the July meeting. Valero had stated they needed more time to go over the comments to prepare a statement, yet did not follow through on addressing any of our concerns. I don't know if this bothered any of you, but I felt discounted by them not choosing to reply. When asked about that, Chris replied, "that's what the EIR is for." It seemed to me that the only creative problem solving suggestions for the issues we're grappling with came from the audience.

Thank you for your attention to these matters. We are counting on you and the other 18 environmental agencies you've contacted to make sure that a thorough EIR is done to protect our city and the environs that surround us.

Sincerely,

Judith S. Sullivan

Amy Million, Principal Planner
Community Development Department
250 East L Street
Benicia, CA 94510

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From
Ed Ruszel
2980 Bayshore Rd.

September 13, 2013

Subject: Notice of Preparation of an EIR for the Valero Crude by Rail Project

I respectfully submit comments to be considered and included in the preparation of the EIR for the above-mentioned project.

Alternatives to the Project;

A thorough discussion of the "No Project" option must be included. Valero's facility is designed around Ship transport for the bulk of their crude deliveries. The Rail facilities existing in the Industrial park were designed for the US Armies needs in the '40s and are inadequate and conflict with modern auto and truck traffic. There are other Crude by rail facilities existing and being planned on the west coast that could serve transfer crude to ships to be delivered to the refinery.

The rail unloading facility could be located on the lower waterfront, connect to existing piping to Valero's Crude Tank Farm. This would avoid the substantial traffic impacts to Bayshore Rd and Park Rd.

Subjects to be included in an EIR

Air Quality:
A description of Emissions from rail activities outside of Valero's property needs to be included. This needs to include specific information on the types, number and operations of locomotives thought the industrial park.

Hazards and Hazardous Materials:
The shipping industry has in place a dedicated emergency response contractor, Marine Spill Response Corporation, MSRC. The EIR should evaluate the capacity of UPRR in the event of a spill and compare it to Ship transport safety.

Transportation and Traffic:
The EIR must include an extensive discussion of the rail facilities outside Valero's property.
Current rail movement to and through Valero's property needs to be included.
Rail traffic for Amports car movement needs to be included as a spokesperson from UPRR stated that automobile car shipments are up "30%".
Extensive work by UPRR is currently being performed to separate rail traffic between the Amports rail yard and the Bayshore Rd tracks.
Additional rail infrastructure improvements, currently being performed by UPRR, need to be discussed. See Attachment A.
Improvements to UPRR's facilities, outside Valero's property, that needs to be made to support the CBR Project, need to be identified.
Updated site plans for the project need to be included. Will the "Wye Connector" be included as originally proposed? See attachment B.
A complete review of Federal, State and local authority governing Rail Roads need to be included.

Possible Mitigation to be considered:

Provide a grade level separation of the railroad tracks and Park Rd.

Construct alterative rail connection from the Industrial Way RR siding area to the UPRR East bound main line. (UP has tracks to within .20 miles of the main line near Teal Ct and Industrial way.)

Include the "Wye Connector" on Valero property that is configured to allow train movement to the Industrial Way RR sidings without having to shunt train across Park Rd.

Widen the eastbound 680 off ramp at Bayshore Rd. to two lanes with a right turn lane.

Warning signs should be erected on e bound 680 to alert traffic to delays at Park and Bayshore Rd.

The gate on the northwest side RR tracks leading to the Industrial Way siding should be changed to a remote operated gate similar to the gate near Park Rd.

The 3 private RR crossings on Bayshore Rd need to be specifically addressed in the Emergency Response plan and an alternative means of egress should be provided.

The crude rail traffic should be limited to 50 cards per day, which is the maximum capacity of Valero's on site rail facilities.

Attachment A 1/2

Union Pacific Railroad Track Upgrade & Maintenance Project in Benicia Port Area: June to October 2013

Beginning June 8 and working through the summer, Union Pacific Railroad will perform maintenance work to enhance existing rail infrastructure in Benicia. The project requires temporary closure of public and private crossings, as well as public roadways in the port area specifically.

Project Area:

Union Pacific's maintenance project will occur within the City of Benicia near the port. Public roadways and crossings impacted include Industrial Way, Park Road, Oregon Street, East Channel Road and Bayshore Road. Roadway and crossing closures are being planned to minimize impacts to businesses and the public, but motorists and area residents should be aware that temporary closures will occur.

Project Benefits:

The maintenance project consists of replacing five miles of old rails and railroad ties, removing rail embedded in the intersection at Park Road and Industrial Way, replacement of existing crossing surfaces and repaving. When complete, the project will result in:

- Improved railroad crossings including concrete pads and new asphalt.
- An enhanced Park Road/Industrial Way intersection to improve traffic flow.
- Improved freight train fluidity.

A 2/2

Roadway Traffic Plans:

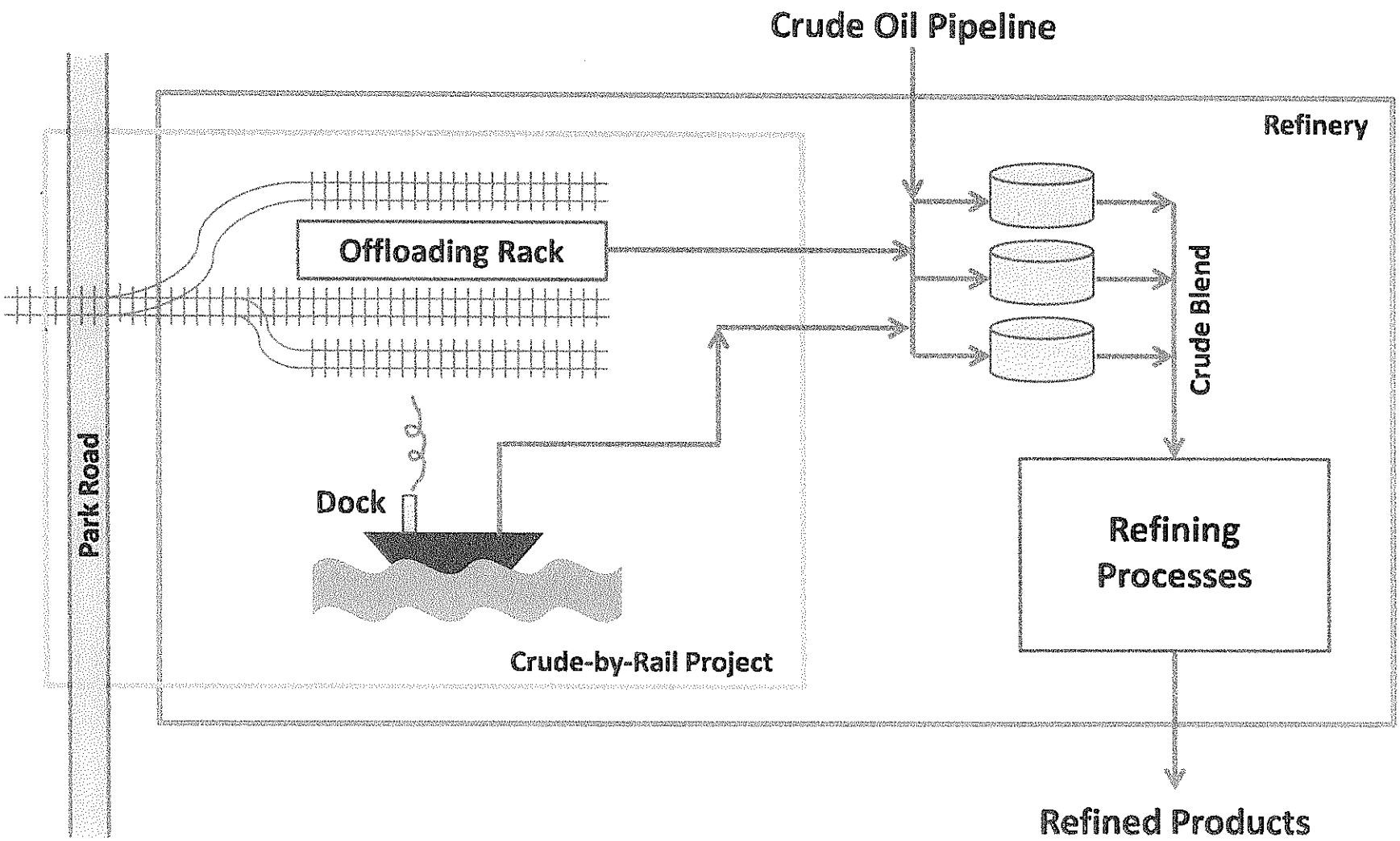
Before any roadway crossings or roadways are temporarily closed, Union Pacific coordinates with the local roadway authority in order to prepare comprehensive traffic reroute plans that will minimize vehicle delays. In advance of the project, signs will be placed throughout the project area so the traveling public is aware of the pending crossing and road closures. Detour signs will also be staged in order to easily identify alternate routes.

Union Pacific Railroad Project Contacts:

Erik Kreutzberg, Project Manager 916-789-6155, eakreutz@up.com

Liisa Stark, Public Affairs 916-792-9160, llstark@up.com

Attachment D 1/1



Valero Benicia Refinery
Crude-by-Rail Project Description

September 12, 2013

To: Kristin Pollot, kpollot@pittsburg.ca.us, City of Pittsburg CA Planning Division

From: Charles Davidson. 2108 Drake Lane, Hercules CA 94547

RE: WesPac PITTSBURG ENERGY INFRASTRUCTURE PROJECT

Dear Kristin,

I do not live in Pittsburg, but I live in Hercules near Phillips 66, a refinery connected to and very much dependent upon the scope and capabilities of the Pittsburg WesPac Energy Infrastructure Project, aka the WesPac Pittsburg Petroleum Depot Project.

Addressed below are my concerns pertaining to:

POTENTIAL ENVIRONMENTAL IMPACTS NOT ADDRESSED IN THE PITTSBURG WesPac DEIR :

I. PHYSICALLY-INTERRELATED REFINERY PROJECTS FOR THE EVALUATION OF CUMULATIVE REGIONAL EFFECTS,

II. CUMULATIVE REGIONAL GREENHOUSE GAS AND NOXIOUS POLLUTION EFFECTS, AND

III. A CRITICALLY SIGNIFICANT INCREASE IN TOTAL BAY AREA REFINING CAPABILITY ENABLED BY THE WesPac PETROLEUM STORAGE DEPOT.

Please consider my recommendation to amend the following omissions stated in sections I to III.

Regards,

Charles Davidson
(510) 837-8441

CONCLUSION: The WesPac PITTSBURG ENERGY INFRASTRUCTURE PROJECT, aka THE PITTSBURG PETROLEUM STORAGE DEPOT, WILL CRITICALLY ENABLE A SIGNIFICANT INCREASE IN TOTAL BAY AREA REFINING CAPABILITY AND OFF-SITE GREENHOUSE GAS PRODUCTION - LIKELY OFF-SITE EMISSIONS NOT DOCUMENTED IN THE DRAFT EIR.

Off-site emissions due to additional regional refining capability are dependent upon the WesPac Oil Storage Depot and are not directly addressed in the DEIR, but can be inferred by the size and scope of the overall oil storage and associated marine/railroad/pipeline enhancement project.

The Pittsburg WesPac DEIR omits mention of the potential deleterious impacts on regional air quality, that the aforementioned Bay Area's destination refineries for WesPac crude will accrue when the WesPac Project is completed.

The WesPac oil terminal and storage tank project should not be seen in isolation in terms of off-site air emissions that it will enable and that need a full regional emissions assessment. The WesPac DEIR neglects to mention the recent and proposed changes in refinery technology and throughput that will impact WesPac's off-site emissions assessment. The WesPac DEIR, therefore, omits mention of the potential impacts that the destination refineries will engender for crude transiting the terminal, namely a significant increase in volume of refined products, in addition to refining a likely increased percentage of high-sulfur heavy crude oil, such as Canadian Tar Sands crude.

These quantity and quality factors related to the WesPac-transited crude will require far larger volumes of regional refinery hydrogen production and more heat production, and consequently, the refineries will also produce more greenhouse gasses and other airborn pollutants in the Bay Area and beyond, when considering the increased volume of manufactured end-products. Therefore, it is inaccurate and misleading to mention only the WesPac project's on-site air emissions analysis into emissions declarations, while ignoring secondary off-site emissions for purposes of invoking the presumption that the project will have no significant regional impact.

The Pittsburg WesPac DEIR should be amended to include off-site GHGs, from the terminal's various destination refineries and also from their end-products, which will be engendered both by the terminal-enabled increase in yearly Bay Area refinery input quantity and the probable lower quality of the crude passing through the facility, in order to produce a more complete cumulative evaluation of regional effects. Furthermore, for the WesPac DEIR to be in compliance and to have a more complete cumulative evaluation of regional air pollution effects, all recent and proposed major, relevant upgrades to WesPac crude destination

refineries, which were omitted in the draft EIR, must be considered in detail.

BACKGROUND AND DISCUSSION

I. PHYSICALLY INTERRELATED REFINERY PROJECTS FOR CUMULATIVE REGIONAL EFFECTS EVALUATION ARE REQUIRED FOR WesPac's DEIR, BUT WERE OMITTED.

The main components of the project consist of the modernization and reactivation of the existing fuel storage and distribution systems at the facility, including: (1) the marine terminal; (2) the onshore storage terminal, including both the East and South Tank Farms; and (3) the pipeline connection to the existing San Pablo Bay Pipeline and a proposed new pipeline connection to the existing KLM Pipeline. An existing 1-mile-long railroad siding leading into and around the GenOn Pittsburg Generating Station would allow for the facility to receive crude oil by rail cars, instead of—or in addition to—waterborne vessels.

The WesPac Pittsburg Energy Infrastructure Project (i.e., Petroleum Tank Storage Depot) DEIR, however, does not disclose pertinent information relating to the anticipated source and quality of the crude feedstock moving through the WesPac facility, for stored crude oil, that the destination refineries need for the crude slate that they plan on processing. The WesPac Tank Project must be seen within a larger context to the Bay Area refineries, that it is connected to, that each have undergone recent (or have planned) renovations allowing for the processing of lower quality feedstock, such as Canadian Tar Sands.

The Pittsburg WesPac Draft EIR, failed to mention, as required, several other "POTENTIAL PROJECTS FOR CUMULATIVE POLLUTION EFFECTS EVALUATION", at local Bay Area refineries, that are critically enabled by the WesPac project.

See: Orinda Ass'n v. Board of Supervisors (1986) 182 CA3d 1145, 1171 ("A public agency is not permitted to subdivide a single project into smaller individual subprojects in order to avoid the responsibility of considering the environmental impact of the project as a whole.").

The named, likely destination Bay Area refineries for crude transiting the Pittsburg WesPack Oil Storage facility are Chevron (Richmond) , Shell

(Martinez), Phillips 66 (Rodeo) , Tesoro (Martinez) and Valero (Benecia). According to the WesPac DEIR:

Table 2-6: Refineries that May Receive-Crude-Oil-from and/or Deliver- Crude-Oil-to the Terminal Oil Refinery

Address

Shell Martinez Refinery
3485 Pacheco Boulevard Martinez, California 94553

Conoco Phillips Refinery
1380 San Pablo Avenue Rodeo, California 94572

Tesoro Golden Eagle Refinery
150 Solano Way Martinez, California 94553

Valero Benicia Refinery
3400 East 2nd Street Benicia, California 94510

The Pittsburg WesPac Draft EIR, failed to mention, as required, these "POTENTIAL PROJECTS FOR CUMULATIVE EFFECTS EVALUATION", which are collectively listed below and which are either proposed or recently completed, namely:

WesPac Pittsburg Petroleum Tank Project: Proposed

ConocoPhillips proposed the Clean Fuels Expansion Project (CFEP): Completed
[The Clean Fuels Expansion Project (CFEP) added new facilities and modified existing facilities to produce additional low-sulfur clean fuels. The Refinery would use the Heavy Gas Oil (HGO) that is normally produced at the Refinery and is currently sold into the HGO market, to produce cleaner-burning gasoline and ultra-low-sulfur diesel (ULSD) fuels targeted for the California market or fuel oil for the global market.]

PHILLIPS 66 PROPANE RECOVERY PROJECT: Currently Proposed
(Propane and butane currently used as refinery gasses (RFGs) for heat, electricity and hydrogen production will subsequently be sold as de-sulfured commercial end-products and the RFG would then be replaced by currently inexpensive natural gas)

Chevron Richmond Revised [Hydrogen] Renewal Project and (proposed) Hydrogen pipeline to Martinez Shell Refinery.

City of Benicia: Valero Crude by Rail Project:

Plus: Marine Terminal Leases for Shell Martinez Refinery NuStar Selby Marine Terminal and Tesoro Amorco.

The collective and significant increase in refining volume of the five local Bay Area Refinery Projects that are not on the Pittsburg WesPac site, but will be connected to WesPac, will generate additional refinery and end-product Greenhouse Gasses and other pollutants in significant volumes. This enhanced Bay Area and consumer end-point GHG production will be significantly facilitated when the WesPac Project is completed. **Off-site emissions due to additional regional refining capability dependent upon the WesPac Oil Storage Depot and are not directly addressed in the DEIR, but can be inferred by the size and scope of the overall oil storage and associated marine/railroad/pipeline enhancement project.** According to the WesPac DEIR:

"The total annual throughput for the entire Terminal would be approximately 70,200,000 BBLs of crude oil and/or partially refined crude oil per year."

Moreover, the indirect nature of these off-site emissions, from both additional Bay Area refinery emissions and the emissions of the refined end-products, cannot be ignored as "it is inaccurate and misleading to mention only the WesPac project's air emissions analysis into on-site emissions, while ignoring secondary off-site emissions for purposes of invoking the presumption the project will have no significant regional impact." Kings County Farm Bureau v. City of Hanford (1990) 221 Cal. App. 3d 692, 717. Thus the DEIR requires a sufficient analysis and discussion of these emission sources.

II. CUMULATIVE REGIONAL GREEN HOUSE GAS AND NOXIOUS POLLUTION EFFECTS REQUIRE EVALUATION:

The Pittsburg WesPac DEIR omits mention of the potential deleterious impacts on regional air quality, that the aforementioned Bay Area destination refinery's for WesPac crude will accrue when the WesPac

Project is completed. These deleterious effects are due to both the increased crude oil delivery capacity facilitated by the proposed Pittsburg WesPac Oil Storage Depot and the increased crude oil refinery throughput, that was not mentioned in the WesPac DEIR, but which is predicated upon the need for a regional depot facility such as WesPac. The WesPac-related and pipeline interrelated refineries are namely: Chevron (Richmond) , Shell (Martinez), Phillips 66 (Rodeo), Tesoro (Martinez) and Valero's (Benecia),

The regional refineries that will be connected to WesPac each have their own aforementioned projects that lock in coking, a process that require dense crude, such as the cheapest diluted bitumen from Canadian tar sands and high-sulfur heavy California shale oil. Coking removes carbon from the remaining refinery feed, leaving a product that can be burned in the place of coal for electrical plants or for making steel. All Bay Area refineries have increased or plan on increasing hydrogen production, pipeline transport and consumption in order to accomplish desulfurization and hydrocracking, thereby increasing greenhouse gas production inherent in currently used methods of industrial hydrogen production. The coking for heavy process requires greater heat than is required for refining lighter crudes, and therefore, more production of GHGs and other airborn pollutants. Koch Carbon owns a petroleum coke (i.e., petcoke) storage/shipping plant in Pittsburg, right on the water at 707 E. 3rd St.. Several Bay Area refineries use this bulk storage plant to send their petcoke to Asia from there.

Phillips 66 CEO Greg Garland "told analysts that the company was looking at railcars capable of transporting Canadian heavy crude to the West Coast." The Valero project would provide the ability to process lower grades of raw crude and provide flexibility to substitute raw crudes. In addition, the project would optimize operations for efficient production of low-sulfur fuels, requiring more hydrogen production and consumption.

The EIR process for this WesPac Project presents a critical opportunity to engage in a genuine and thorough review of the full environmental impacts of WesPac's proposed Project, specifically in the context of both the increased crude delivery capacity, the overall switch to lower crude quality by Bay Area refineries connected to WesPac and the increased need for regional refinery hydrogen production.

The proposed WesPac Project makes fundamental transportation (marine

terminal and rail roads spurs), storage and associated equipment changes designed specifically to enable the long-term crude quality switch in refineries connected to WesPac. These Bay Area refinery changes are potentially irreversible, and although they are indirect to the WesPac Depot itself, the depot project will have regional environmental impacts that demand public and agency attention, and a full review from an air quality management perspective.

III. WesPac PETROLEUM STORAGE DEPOT WILL CRITICALLY ENABLE A SIGNIFICANT INCREASE IN CUMULATIVE BAY AREA REFINING CAPABILITY:

The WesPac project should not be seen in isolation in terms of off-site emissions that it will enable and that need a full regional emissions assessment. The DEIR omits mention of the potential impacts that several of the destination refineries' now produce a significantly increased volume of refined products and it fails to explicitly detail how exactly the Project will meet stated projected Bay Area refinery export objectives, using their expected surplus above domestic market needs nor does it the account for GHGs produced by those exports.

Importantly, current and proposed regional refinery projects substitute inexpensive natural gas in place of each of the refineries' former usage of heavy gas oil (HGO), propane or butane (all collected during the refining process) as the refinery fuel gas of choice, for heat, electricity and hydrogen production. Switching to natural gas in order to operate the refinery allows for significantly more refined value-added products to be produced for sale by each of the refineries connected to WesPac. In turn, this refinery gas switch to an external input of natural gas will require that each of the refineries supplied by the WesPac Depot be provided with proportionately more crude petroleum input (ie, feedstock in order to accomplish their increased production goals). For example, Phillips' recently completed CFEP, that converted to using cheap HGO for refinery operations rather than for sale, that yielded 35% more highly valued gasoline and 21.5% more diesel fuel per day compared to before the CFEP was completed. Phillips' currently proposed Propane Recovery Project will capture the propane and butane for sale, instead of using it as another refinery fuel gas (RFG) and replacing them with inexpensive natural gas.

The interconnectedness of the Pittsburg WesPac Project with the various Bay Area refineries is perhaps most apparent in light of the WesPac DEIR that calls for the existing San Pablo Bay Pipeline, a 42-mile-long pipeline

extending from the Chevron Refinery in the City of Richmond, to be extended to the Pittsburg WesPac Depot by reactivating an unused, adjacent 13.2-mile-long currently idle section of the pipeline.

The reactivated pipeline would be used to transport crude oil between the WesPac Terminal to nearby San Francisco Bay Area refineries, terminals, and other existing active common-carrier pipelines. In turn, the Richmond Chevron hydrogen pipeline DEIR is proposed to go back north to the Phillips 66 refinery in Rodeo and will end at the Shell refinery in Martinez.

The total annual throughput for the entire WesPac Terminal would be approximately 70,200,000 BBLs of crude oil and/or partially refined crude oil per year, corresponding to a proportionate increase in total, overall Bay Area Refining capacity, which is increasingly dependent upon a corresponding massive increase in the natural gas usage by the WesPac-connected Bay Area refinery operations.

http://www.ci.pittsburg.ca.us/Modules/ShowDocument.aspx?documentid=5675

City of Pittsburg 1.0 Introduction and Project Goals and Objectives

The proposed petroleum Terminal is located at 696 West 10th Street in the City of Pittsburg (City) in Contra Costa County (County),California, approximately 32 miles northeast of Oakland and along the shores of Suisun Bay. The Terminal would consist of approximately 125 acres of land situated within the current NRG property/facility. The land and facilities for the project, including storage tanks and the dock, are expected to be purchased from NRG by WesPac.

1.2 PROPOSED PROJECT SUMMARY

The proposed project would modernize and reactivate an existing oil storage and transportation facility, to be known as the WesPac Energy-Pittsburg Terminal (Terminal). The Terminal includes existing oil storage tanks that would be updated to accommodate the storage of crude oil and partially refined crude oil on-site. The Terminal would be designed to receive shipments of oil from trains, pipelines, and marine vessels; store these oil shipments for varying periods of time; and transfer stored oils out to local refineries via new and existing pipelines connected to the site. The Terminal would also have the capability to load marine vessels for shipment to other destinations. For the delivery of crude oil and

partially refined crude oil by train, the project would include the construction of a new Rail Transload Operations Facility (Rail Transload Facility) within a nearby BNSF Railway Company (BNSF) rail yard. As stated above, all products received at the Terminal would be transported to the Terminal by rail, pipeline, ship, or barge. The proposed project includes no product transportation via truck.

1.2.1 Locomotive Operations

All movements of trains bringing rail tank cars to and from the Rail Transload Facility would be performed by BNSF, on BNSF property, and on trains operated by BNSF employees. The City of Pittsburg and other State and local responsible agencies are preempted from imposing mitigation measures, conditions, or regulations to reduce or mitigate potential impacts of BNSF train movements.

Amy Million - Scoping Comment on Valero CBR Project

From: Donald Dean <donaldjdean@sbcglobal.net>
To: Amy Million <Amy.Million@ci.benicia.ca.us>
Date: 9/13/2013 1:22 PM
Subject: Scoping Comment on Valero CBR Project

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy,

Additional scoping question on Valero CBR Project-

It's clear that air quality and possible new or increased emissions are an issue with the CBR project. My understanding is that the BAAQMD will be addressing air quality issues as part of a revised permit for the project. The DEIR should explain the BAAQMD process and how it interrelates to the City's permit process. What issues is the BAAQMD addressing as a function of its permit? What is the timing of the BAAQMD permit? Any information or determinations generated by the BAAQMD for the Valero project should be included in the DEIR.

Thanks,

Donald Dean
257 West I Street
Benicia

Amy Million - Benicia Valero Crude-by-Rail Project

From: Charles Davidson <charlesdavidson@me.com>
To: "Amy.Million@ci.benicia.ca.us" <Amy.Million@ci.benicia.ca.us>
Date: 9/13/2013 4:22 PM
Subject: Benicia Valero Crude-by-Rail Project
CC: Charles Davidson <charlesdavidson@me.com>

RECEIVED
SEP 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

To: Amy.Million@ci.benicia.ca.us

From: Charles Davidson
2108 Drake Lane. Hercules CA. 94547
(510) 837-8441 <charlesdavidson@me.com>

Re: Benicia Valero Crude-by-Rail Project

Dear Benecia Planning Dept.

The proposed Benicia Valero Crude-by-Rail Project was presupposed by the now completed Valero Improvement Project (VIP) that allowed for the increased volume of refining of low-quality high-sulfur heavy crude oil as refinery feedstock. No mention was made in the VIP EIR of a now VIP-necessitated massive increase in rail traffic to the refinery that will impinge upon the quality of life and safety of Valero refinery neighbors and UP railroad neighbors. The necessity of massive rail traffic to Benecia Valero for Canadian Tar Sands and domestic shale oil was known at that time, but not disclosed in the VIP EIR. For the reason of previous non-disclosure in the VIP EIR of neighbor, safety and environmental impacts of a massive increase in projected rail traffic of canadian and domestic high sulfur heavy crudes, permission for the Valero Crude-by-Rail project should be denied.

Regards,

Charles Davidson

APPENDIX G

Initial Study Comment Period Written Comments

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 286-6053
FAX (510) 286-5559
TTY 711

Flex your power!
Be energy efficient!

RECEIVED
JUN 27 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

June 27, 2013

SOL680059
SOL-680-R2.58
SCH#2013052074

Ms. Amy Million
City of Benicia
250 East L Street
Benicia CA 94510

Dear Ms. Million:

Valero Crude by Rail / Mitigated Negative Declaration

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the project referenced above.

Traffic Operations
Please consider in your mitigation measures ways to reduce the impacts your project may have on Interstate (I-) 680. We are particularly concerned about how your project will impact I-680 / Bayshore Road intersection. The Level of service (LOS) on I-680 Northbound off ramp goes from a LOS D to a LOS F. Please find ways to mitigate this impact your project has on this off ramp to maintain or improve the LOS.

Should you have any questions regarding this letter, please contact Keith Wayne of my staff by telephone at (510) 286-5737, or by email at keith_wayne@dot.ca.gov.

Sincerely,

ERIK ALM, AICP
District Branch Chief
Local Development – Intergovernmental Review

c: Scott Morgan, State Clearinghouse

RECEIVED
JUN 27 2013
CITY MANAGER'S OFFICE
CITY OF BENICIA

AMPORTS

APS West Coast, Inc.
P.O. Box 315
1997 Elm Road
Benicia, CA 94510
Tel: (707) 745-2394
Fax: (707) 746-1485

June 27, 2013

Brad Kilger
City Manager and Benicia Planning Commission
City of Benicia
250 East L Street
Benicia, CA 94510

Re: Letter of Clarification (Valero Crude by Rail Project)

Dear Mr. Kilger,

There appears to be a fair amount of misinformation regarding the Valero crude by rail project and its potential impact on AMPORTS and the Port of Benicia.
For clarification, Valero operates their own marine terminal. A reduction in vessels delivering crude to their terminal will have no economic or operational impact on AMPORTS or our port operations

.

The record should also show, AMPORTS operates Valero's petcoke silos and provides the associated marine terminal services at AMPORTS pier. This operation should be unaffected by the crude by rail project as well.

If you have any questions regarding the impact of this project on AMPORTS or the Port of Benicia, please do not hesitate to give us a call.

Best Regards,

Randy Scott
General Manager
Amports - Benicia

WRITTEN COMMENT #

July 1, 2013

Via Fax to
City of Benicia Community Development Department
Attn: Amy Million
250 East L Street
Benicia, CA 94510
Fax: (707) 747-1637

Re: Notice of Intent to Adopt a Mitigated Negative Declaration for the Valero Crude by Rail Project

Dear Ms. Million:

On behalf of the Natural Resources Defense Council (NRDC), which has over 1.4 million members and activists, 250,000 of whom are Californians and approximately 100 of whom reside in Benicia, we submit the following comments on the Notice of Intent to Adopt a Mitigated Negative Declaration for the Valero Crude by Rail Project. The Notice of Intent for the project was issued on May 28, 2013, and indicated that the public comment period closes on July 1, 2013. Valero applied for a land use permit from the City of Benicia in December of 2012 to allow Valero to receive crude oil by train in quantities up to 70,000 barrels per day, in 100 rail cars per day.

Although the May 31, 2013 Initial Study/Mitigated Negative Declaration [IS/MND] on the Valero Crude by Rail Project assumed the project would cause no significant unmitigated effects on the environment, the IS/MND failed to consider all potential impacts. Our evaluation of the Project, as well as that of two independent experts retained by NRDC to evaluate the project, indicates that it will likely result in significant environmental impacts that have been neither discussed in the Initial Study nor mitigated under the IS/MND. Our comments below focus on air quality, public health, public safety, noise, general hazards and ecological risks.[1]

Because this Project could result in significant impacts to the environment, an Environmental Impact Report [EIR] must be prepared and circulated for public comment before the City may lawfully approve the project. Any significant impacts revealed by the EIR should be thoroughly analyzed and fully mitigated.

I. Air Quality and Public Health Impacts

The two key premises of the IS/MND's air quality analysis—that the new "North American-sourced crudes" received by the refinery as a result of the project will have a sulfur

[1] Selected sources cited have been provided to the City of Benicia in hard copy. All sources cited in NRDC's comments and in the expert reports will be provided in CD to follow.

content and density similar to the refinery's current slate, and that as a result, air emissions will not significantly change—is both unsupported and demonstrably wrong. The range of sulfur contents and densities projected for the new crude slate is wide, and air impacts could vary substantially within that range. Even more importantly, air emissions from crude refining depend on a host of characteristics other than sulfur content and density, and likely changes in those other characteristics are not disclosed or discussed by the IS/MND at all. Nor are other potentially significant air impacts, as further discussed below. The IS/MND thus fails to recognize the full suite of potential air quality and public health impacts of this project or provide any meaningful mitigation for those impacts.

No mitigation is included for the operational phase of this project. The operation of this project has very serious implications for air quality and public health that are not discussed in the IS/MND because the IS/MND fails to consider the appropriate scenarios of crude oils that may be transported by rail.

Valero's application states that "[t]he crude oil to be transported by rail cars is expected to be of similar quality compared to existing crude oil imported by marine vessel" and that the Project would not result in changes in refinery emissions. The May 31, 2013 IS/MND also assumes that there would be no significant change in crude oil slate due to the Project and no change in refinery emissions. But neither Valero's application nor the IS/MND provide data, let alone any analysis, sufficient to support these assumptions.

We have included as attachments to our comment letter, two expert reports that evaluate whether this Project would impact the crude oil slate or refinery emissions. The first report, by The Goodman Group, discusses changes to the refinery's crude slate that would likely occur due to the Crude by Rail Project. The report concludes that, although much of the relevant information needed to evaluate the proposed Project's exact effect on crude oil slate was not made publically available by either Valero or the City of Benicia, the Project is likely to significantly affect crude quality. In particular, the project is likely in the long-term to facilitate the refinery's use of Canadian tar sand crudes blended with diluent or "DilBits."

The second report, by Dr. Phyllis Fox, concludes that Canadian tar sand crudes blended with diluent have the potential to significantly change the profile of and increase air emissions compared to current crude slates. These changes may be, and indeed are likely to be, significant. The transport and refining of dilbits could significantly increase emissions of a wider range of pollutants including but not limited to volatile organic compounds (VOCs); hazardous air pollutants, including benzene and lead; and highly odiferous sulfur compounds. This additional pollution would degrade ambient air quality, adversely affect the health of workers and residents around the subject facilities, and create public nuisance odors. Further, the high acid levels in these crudes would accelerate corrosion of refinery components, contributing to equipment failure and increased accidental releases.

Unfortunately, contrary to CEQA's goals of public disclosure and evaluation, the IS/MND does not disclose enough specific information about the chemical composition of the crudes that would be imported and the crudes that would be displaced to fully assess crude quality changes and resulting air quality and other impacts. The number and nature of the

deficiencies are so substantial that the IS/MND should be withdrawn. The City should prepare an EIR with a complete Project description and a thorough environmental impact analysis.

The minor mitigations included for the construction component of the project amount to little more than dust control. The construction phase of the project should require all trucks, construction equipment and any other equipment utilizing a diesel engine to meet the latest and cleanest U.S. EPA emission standards or be retrofitted with exhaust controls to achieve similar emission reductions.

A. Increased Air Emissions Due to Heavier, Lower Quality Crude Oil

The IS/MND fails to disclose or quantify the increases in emissions that could and likely would result from modifications to the crude slate at the Valero refinery that could and likely would result from the Crude by Rail Project. As noted in the concurrently submitted expert report of The Goodman Group, publicly disclosed information supports a finding that the rail project could foreseeably lead to replacing as much as 40% or more of the refinery's current crude slate (70,000 barrels per day) with tar sands crudes. This would make the refinery's overall crude slate heavier, increase emissions, and result in significant environmental impacts.

The CEQA baseline that must be considered for this project is the current slate of crude oil. Current refinery conditions and current air emissions must be analyzed. The use of the proper CEQA baseline is critical to accurately evaluate impacts. The Refinery operates under a permit issued by the Bay Area Air Quality Management District (BAAQMD). This permit establishes maximum amounts of regulated pollutants that can be emitted. However, even if emissions increases from the Crude by Rail Project fell within the limits of existing permits and plans, those increases may still be significant for purposes of CEQA. A long line of Court of Appeal decisions and a California Supreme Court decision hold that impacts of a proposed project are to be compared to the actual environmental conditions existing at the time of CEQA analysis, rather than to allowable conditions defined by a plan or regulatory framework, such as the BAAQMD permit. The California Supreme Court specifically concluded, regarding the ConocoPhillips refinery in Los Angeles, that the pre-existing permits did not establish the baseline for CEQA analysis. *Communities for a Better Environment v. South Coast Air Quality Management District (2010) 48 Cal.4th 310.*

Thus, even if the emission increases identified below, when fully analyzed, fell within existing permit limits, or potential future emissions analyzed with respect to other projects,[2] this would not exclude them from CEQA review for the Crude by Rail Project. The increases in emissions that will occur from importing "North American-sourced crudes" must be quantified and evaluated under CEQA as of current conditions. (And even if those increased emissions had

[2] Although the IS/MND neglected to discuss the Valero Improvement Project (VIP) that began in 2002 and remains in progress, that Project envisioned process changes designed to facilitate the import and processing of much higher sulfur and heavier crudes than the current slate. Documents related to the VIP are relevant to our comments because those VIP documents articulate Valero's clear intent to process much dirtier crudes, and provide some insight into the additional energy usage required and potential increased air emissions.

been considered earlier, they would now have to be evaluated now within the regulatory and other framework on the ground now.)

In fact the potential air emissions increases related to this project would be significant, would exceed BAAQMD CEQA significance thresholds and potentially would contribute to adverse health impacts, malodors, and major accidental releases, as well as degradation of ambient air quality. The IS/MND fails to evaluate these potential emission increases and their environmental consequences, yet we find that they are significant and unmitigated, requiring the preparation of an EIR.

1) Changes in Crude Slate and Chemical Composition

The air quality impacts of refining North American-sourced crudes such as tar sands depends on the chemical and physical composition of the refinery slate with tar sands crude compared to the current slate. The current slate includes very little tar sands, from 0.5% to 2% of the Refinery total crude slate over the period 2010 to 2012. The Crude by Rail Project could increase the heavy, sour tar sands crude by up to 70,000 BPD, or up to 42% of the permitted refinery throughput. This represents a significant increase in a crude with a dramatically different chemical composition, which will change the emissions profile and cause significant increases in emissions of some pollutants compared to the emissions from the Refinery's current crude slate.[3]

The U.S. Geological Survey ("USGS"), for example, reported that "natural bitumen," the source of all Canadian tar sands-derived oils, contains 102 times more copper, 21 times more vanadium, 11 times more sulfur, six times more nitrogen, 11 times more nickel, and 5 times more lead than conventional heavy crude oil, such as those currently refined from Ecuador, Columbia, and Brazil.[4] These pollutants contribute to smog, soot, acid rain, and odors that affect residents nearby.

---

[3] Straatiev and other, 2010, Table 1; Brian Hitchon and R.H. Filby, Geochemical Studies - 1 Trace Elements in Alberta Crude Oils, http://www.ags.gov.ab.ca/publications/OFR/PDF/OFR_1983_02.PDF; F.S. Jacobs and R.H. Filby, Trace Element Composition of Athabasca Tar Sands and Extracted Bitumens, Atomic and Nuclear Methods in Fossil Energy Research, 1982, pp 49-59, *available at* http://link.springer.com/book/10.1007/978-1-4684-4133-8/page/1;James G. Speight, The Desulfurization of Heavy Oils and Residua, Marcel Dekker, Inc., 1981, Tables 1-1, 2-2, 2-3, 2-4 and p. 13 and James G. Speight, Synthetic Fuels Handbook: Properties, Process, and Performance, McGraw-Hill, 2008, Tables A.2, A.3, and A.4; Pat Swafford, Evaluating Canadian Crudes in US Gulf Coast Refineries, Crude Oil Quality Association Meeting, February 11, 2010, Available at: http://www.coqa-inc.org/20100211_Swafford_Crude_Evaluations.pdf.

[4] R.F. Meyer, E.D. Attanasi, and P.A. Freeman, Heavy Oil and Natural Bitumen Resources in Geological Basins of the World, U.S. Geological Survey Open-File Report 2007-1084, 2007, p. 14, Table 1, Available at http://pubs.usgs.gov/of/2007/1084/OF2007-1084v1.pdf.

Additionally, many of these chemicals pose a direct health hazard from air emissions. These metals, for example, mostly end up in the coke. Greater amounts of coke are produced by the tar sands crudes than the current crude slate. The California Air Resources Board has classified lead as a pollutant with no safe threshold level of exposure below which there are no adverse health effects. Thus, just the increase in lead from switching up to 42% of the slate to tar sands crude is a significant impact that was not disclosed in the IS/MND. Accordingly, crude quality is critical to a thorough evaluation of the impacts of a crude switch, such as proposed here.

A good crude assay is essential for comprehensive crude oil evaluation.[5] The type of data required to evaluate emissions would require, at a minimum, the following information:

- Trace elements (As, B, Cd, Cl, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, U, V, Zn)
- Nitrogen (total & basic)
- Sulfur (total, mercaptans, H_2S)
- Residue properties (saturates, aromatics, resins)
- Acidity
- Aromatics content
- Asphaltenes (pentane, hexane and heptane insolubles)
- Hydrogen content
- Carbon residue (Ramsbottom, Conradson)
- Distillation yields
- Properties by cut
- Hydrocarbon analysis by gas chromatography

Valero is likely to have access to the crude assay or "fingerprint" of the oil, but it was not made available to the public, foreclosing any meaningful public review. The IS/MND does not contain any crude assays for the current refinery slate, the crude that would be imported by rail, or the crude that is currently imported by ship but would be replaced. The IS/MND also does not contain an analysis of the impact of changes in crude quality on air emissions, asserting that there would be no change. The Initial Study should have evaluated the impacts of refining tar sands crudes on air emissions and other residuals or included conditions of certification specifically prohibiting their import, as publicly available information indicates that Valero is considering tar sands crudes and they would arrive at the Refinery with the largest discount relative to other crudes.

---

[5] CCQTA, Canadian Crude Oil Quality Past, Present and Future Direction, February 7, 2012, pp. 8 ("Need more than sulfur and gravity to determine the "acceptability and valuation" of crude oil in a refinery. The crude oil's hydrocarbon footprint and contaminants determine the value of crudes.."), Available at: http://www.choa.ab.ca/index.php/ci_id/9210/la_id/1/, provided as Appendix I to TGG Comments.

Although specific information is lacking, significant impacts can reasonably be expected from including tar sands crudes in the crude slate. The IS/MND claims that new "North American-sourced crudes" will not significantly change the range of sulfur content and density of the crude slate; however, it is possible and probable for the range of API and sulfur reported in the IS/MND to remain similar, yet with relatively small shifts in the average levels of sulfur and density and with major shifts in other properties, for emissions to increase. Essentially, the premise of the IS/MND that the composition of the crude slate will not change and thus will not impact air emissions, is inherently false.

For example, sulfur content of crude oils represents a complex collection of individual chemical compounds such as hydrogen sulfide, mercaptans, thiophene, benzothiophene, methyl sulfonic acid, dimethyl sulfone, thiacyclohexane, etc. Each crude has a different suite of individual sulfur chemicals. The impacts of "sulfur" depend upon the specific sulfur chemicals and their relative concentrations, not on the range of total sulfur expressed as a percent of the crude oil by weight. Although a range in the total sulfur content of rail-imported crude and the current crude slate may appear similar, even a small increase in total sulfur content can have profound impacts, and the composition of sulfur species also matters. A minor increase in sulfur content was reported by the Federal Chemical Safety Board (CSB) as a major contributing factor in the recent (August 2012) catastrophic fire at the Chevron Richmond Refinery in California.

Similarly, while the lighter sulfur compounds such as mercaptans and disulfides found in light sweet crudes may not significantly increase the overall weight percent sulfur in the crude slate, as claimed in the IS/MND, they do lead to impacts, such as aggressive sulfidation corrosion, which can lead to accidental releases.[6] As another example, the specific sulfur compounds will determine which compounds will be emitted from storage tanks and fugitive component, some of which could result in significant odor impacts, e.g., mercaptans. Thus, regardless of what crude might be brought in by rail, there are potential significant environmental impacts that are due to characteristics of that oil besides total sulfur and API gravity.

The specific chemicals in crude oil also determine which ones will be volatile and lost through equipment leaks and outgassed from tanks, which ones will be difficult to remove in hydrotreaters and other refining processes (thus determining how much hydrogen and energy must be expended to remove them), which ones will cause malodors, and which ones might aggravate corrosion, leading to accidental releases. The IS/MND failed to consider these finer details that have important implications for air quality and public health, and thus, failed to satisfy the disclosure requirements of CEQA and failed to analyze relevant impacts.

2) Heavier Crudes Require More Processing

Canadian tar sands bitumen is distinguished from conventional petroleum by the small concentration of low molecular weight hydrocarbons and the abundance of high molecular

---

[6] See, for example, Jim McLaughlin, Changing Your Crude Slate, Becht New, May 24, 2013, Available at: http://becht.com/news/becht-news/.

weight polymeric material.[7] Crudes derived from Canadian tar sands bitumen—DilBits, Synthetic crude oils (SCOs) and the combination of the two (SynBits)—are heavier, i.e., have larger, more complex molecules such as asphaltenes,[8] some with molecular weights above 15,000.[9] They generally have higher amounts of coke-forming precursors; larger amounts of contaminants (sulfur, nitrogen nickel, vanadium) that require more intense processing to remove; and are deficient in hydrogen, compared to other heavy crudes.

Thus, to convert them into the same refined products requires more utilities -- electricity, water, heat, and hydrogen. This requires that more fuel be burned in most every fired source at the refinery and that more water be circulated in heat exchangers and cooling towers. Further, this requires more fuel to be burned in any supporting off-site facilities, such as power plants that may supply electricity or Steam-Methane Reforming Plants that may supply hydrogen. Under CEQA, these indirect increases in emissions caused by a project must be included in the impact analysis. The increases in fuel consumption also releases increased amounts of NO_x, SO_2, VOCs, CO, PM10, PM2.5, and HAPs as well as greenhouse gas emissions (GHG). The IS/MND fails to analyze these impacts of crude composition on the resulting emissions from generating increased amount of these utilities.

a. Higher Concentrations of Asphaltenes and Resins

The severity (e.g., temperature, amount of catalyst, hydrogen) of hydrotreating crude oil in a refinery depends on the type of compound a contaminant is bound up in. Lower molecular weight compounds are easier to remove. The difficulty of removal increases in this order: paraffins, naphthenes, and aromatics.[10] Most of the contaminants of concern in tar sands crudes are bound up in high molecular weight aromatic compounds such as asphaltenes that are difficult to remove, meaning more heat, hydrogen, and catalyst are required to convert them to lower molecular weight blend stocks. Some tar sands-derived vacuum gas oils (VGOs), for example, contain no paraffins of any kind. All of the molecules are aromatics, naphthenes, or sulfur species that require large amounts of hydrogen to hydrotreat, compared to other heavy crudes.[11]

---

[7] O.P. Strausz, The Chemistry of the Alberta Oil Sand Bitumen, Available at: http://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/22_3_MONTREAL_06-77_0171.pdf.
[8] Asphaltenes are nonvolatile fractions of petroleum that contain the highest proportions of heteroatoms, i.e., sulfur, nitrogen, oxygen. The asphaltene fraction is that portion of material that is precipitated when a large excess of a low-boiling liquid hydrocarbon such as pentane is added. They are dark brown to black amorphous solids that do not melt prior to decomposition and are soluble in benzene and aromatic naphthas.
[9] O.P. Strausz, The Chemistry of the Alberta Oil Sand Bitumen, Available at: http://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/22_3_MONTREAL_06-77_0171.pdf.
[10] James H. Gary, Glenn E. Handwerk, and Mark J. Kaiser, Petroleum Refining: Technology and Economics, 5th Ed., CRC Press, 2007, p. 200 and A.M. Aitani, Processes to Enhance Refinery-Hydrogen Production, Int. J. Hydrogen Energy, v. 21, no. 4, pp. 267-271, 1996.
[11] See, for example, the discussion of hydrotreating and hydrocracking of Athabasca tar sands cuts in. Gary R. Brierley, Visnja A. Gembicki, and Tim M. Cowan, Changing Refinery Configurations for Heavy and Synthetic Crude Processing, 2006, pp. 11-17. Available at:

Asphaltenes and resins generally occur in tar sands bitumens in much higher amounts than in other heavy crudes. They are the nonvolatile fractions of petroleum and contain the highest proportions of sulfur, nitrogen, and oxygen.[12] They have a marked effect on refining and result in the deposition of high amounts of coke during thermal processing in the coker. They also form layers of coke in hydrotreating reactors, requiring increased heat input, leading to localized or even general overheating and thus even more coke deposition. This seriously affects catalyst activity resulting in a marked decrease in the rate of desulfurization. They also require more intense processing in the coker required to break them down into lighter products. These factors require increases in steam and heat input, both of which generate combustion emissions -- NO_x, SO_x, CO, VOCs, PM10, and PM2.5.

Further, if the crude includes a synthetic crude, SCO, for example, the material has been previously hydrotreated. Thus, the remaining contaminants (e.g., sulfur, nitrogen), while present in small amounts, are much more difficult to remove (due to their chemical form, buried in complex aromatics), requiring higher temperatures, more catalyst, and more hydrogen.[13]

The higher amounts of asphaltenes and resins generate more heavy feedstocks that require more severe processing than lighter feedstocks. The coker, for example, makes more coker distillate and gas oil that must be hydrotreated, compared to conventional heavy crudes. Similarly, the Crude Unit makes more atmospheric and vacuum gas oils that must be hydrotreated.[14] This increases emissions from these units, including fugitive VOC emissions from equipment leaks and combustion emissions from burning more fuel.

b. Hydrogen Deficient

Tar sands crudes are hydrogen deficient compared to heavy and conventional crude oils and thus require substantial hydrogen addition during refining, beyond that required to remove contaminants (sulfur, nitrogen, metals). This again means more combustion emissions from burning more fuel.

---

https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7BA07DE342-E9B1-402A-83F7-36B18DC3DD05%7D&documentTitle=5639138.

[12] James G. Speight, The Desulfurization of Heavy Oils and Residua, Marcel Dekker, Inc., 1981, Tables 1-1, 2-2, 2-3, 2-4 and p. 13 and James G. Speight, Synthetic Fuels Handbook: Properties, Process, and Performance, McGraw-Hill, 2008, Tables A.2, A.3, and A.4.

[13] See, for example, Brierley et al. 2006, p. 8 ("The sulfur and nitrogen species left in the kerosene and diesel cuts are the most refractory, difficult-to-treat species that could not be removed in the upgrader's relatively high-pressure hydrotreaters."); Turini et al. 2011 p. 4.

[14] Turini et al. Processing Heavy Crudes in Existing Refineries, prepared for AIChE Spring Meeting, Chicago, IL 2011, p. 9.; available at: http://www.aiche-fpd.org/listing/112.pdf

c. Higher Concentrations of Catalyst Contaminants

Tar sands bitumens contain about 1.5 times more sulfur, nitrogen, oxygen, nickel and vanadium than typical heavy crudes.[15] Thus, much more hydrogen per barrel of feed and higher temperatures would be required to remove the larger amounts of these chemicals. These impurities are removed by reacting hydrogen with the crude fractions over a fixed catalyst bed at elevated temperature. The oil feed is mixed with substantial quantities of hydrogen either before or after it is preheated, generally to 500 F to 800 F.[16]

Canadian tar sands crudes generally have higher nitrogen content, 3,000 to >6,000 ppm[17] and specifically higher organic nitrogen content, particularly in the naphtha range, than other heavy crudes.[18] This nitrogen is mostly bound up in complex aromatic compounds that require a lot of hydrogen to remove. This affects emissions in five ways.

First, additional hydrotreating is required to remove them, which increases hydrogen and energy input. Second, they deactivate the cracking catalysts, which requires more energy and hence more emissions to achieve the same end result. Third, they increase the nitrogen content of the fuel gas fired in combustion sources, which increases NO_x emissions from all fired sources that use refinery fuel gas. Fourth, nitrogen in tar sands crudes is present in higher molecular weight compounds than in other heavy crudes and thus requires more hydrogen and energy to remove. Fifth, some of this nitrogen will be converted to ammonia and other chemically bound nitrogen compounds, such as pyridines and pyrroles. These become part of the fuel gas and could increase NO_x from fired sources. They further may be routed to the flares, where they would increase NO_x emissions.

These types of chemical differences between the current crude slate and the new crude slate facilitated by the Crude by Rail Project were not addressed at all in the IS/MND. Some of these increased utility impacts were revealed in the VIP FEIR as of 2002. For example, the VIP FEIR indicated that the then-proposed changes in the crude slate would cause: (1) an increase in electricity demand of 23 MW; (2) an increase in natural gas consumption of 9.6 MMscf/day; (3) an increase in the firing rate of heaters and boilers of 400 MMBtu/hr; (4) an increase in the hydrogen capacity of 30 MMscf/day; and an increase in coker capacity of 5,000 BPD. Mitigations were proposed in the VIP FEIR for these significant increases in utility demands. However, this decades-old analysis has not been re-evaluated to determine if the current

---

[15] R.F. Meyer, E.D. Attanasi, and P.A. Freeman, Heavy Oil and Natural Bitumen Resources in Geological Basins of the World, U.S. Geological Survey Open-File Report 2007-1084, 2007, p. 14, Table 1, Available at http://pubs.usgs.gov/of/2007/1084/OF2007-1084v1.pdf.

[16] James H. Gary, Glenn E. Handwerk, and Mark J. Kaiser, Petroleum Refining: Technology and Economics, 5th Ed., CRC Press, 2007, p. 200 and A.M. Aitani, Processes to Enhance Refinery-Hydrogen Production, Int. J. Hydrogen Energy, v. 21, no. 4, pp. 267-271, 1996.

[17] Murray R. Gray, Tutorial on Upgrading of Oil Sands Bitumen, University of Alberta, Available at: http://www.ualberta.ca/~gray/Links%20&%20Docs/Web%20Upgrading%20Tutorial.pdf.

[18] See, for example, James G. Speight, Synthetic Fuels Handbook: Properties, Process, and Performance, McGraw-Hill, 2008, Appendix A.

proposed change in crude slate would result in further increased impacts or if the changed regulatory framework requires more aggressive mitigation.

3) *Failure to Mitigate Air Emissions of Crudes*

The VIP environmental analysis was performed over 10 years ago. Much has changed in the last 10 years, from the suite of tar sands products available in the market, to the transportation options (marine shipping may have been the focus 10 years ago, while the current development is for rail), to the timing of implementation of the VIP, to the regulatory framework. Thus, a new, full, thorough analysis is required in conjunction to the proposed Crude by Rail Project and the crude slate composition. The impacts of importing unidentified crudes by rail cannot be reasonably evaluated without considering and re-evaluating the impacts of the VIP modifications to the refinery.

a. VOC emissions of the Project are Significant and Unmitigated

The VIP FEIR, for example, assumes that the use of a higher percentage of sour crudes would mitigate increases in VOC emissions from increasing crude throughput.[19] However, the dilbits that may now be imported with this Project would result in much higher VOC emissions than the originally anticipated heavier crude oil. These VOC emissions include large amounts of hazardous air pollutants, such as benzene, toluene and xylenes that result in significant health impacts, including elevated cancer risk.

Increased VOC emissions impacts have not been sufficiently analyzed for the current project. While we have focused our comments mainly on the reasonably foreseeable possibility that the Crude by Rail project will bring in heavy bitumen tar sands crudes, the IS/MND asserts that the imported crudes could include up to 70,000 BPD of light, low density crudes, which would create increased VOC emissions. These crudes have a much higher vapor pressure than the crude slate contemplated in the VIP FEIR and would significantly increase VOC emissions from tanks, pumps, compressors, valves, and connectors throughout the Refinery compared to the scenario analyzed in the VIP FEIR. Further, the FEIR explicitly assumes that the imported heavy sour crudes would mitigate increases in VOC emissions. This assumption did not consider the fact that diluents are now widely used to blend with the crudes, which similarly have significant VOC emissions increases associated with them, discussed below.

---

[19] ESA, Valero Refining Company's Land Use Application for the Valero Improvement Project, Environmental Impact Report, Draft, October 2002 (DEIR), The Benicia Planning Commission certified the Final EIR, consisting of the DEIR and the Responses to Comments in Resolution No. 03-4. This FEIR was amended in 2007. See VIP RTC, p. IV-61. Supporting documents available at: http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC=%7B737165B4-11C5-4974-9B0B-0AE4AC535ECC%7D.

The BAAQMD CEQA significance threshold for VOCs is 15 tons/year based on conservative 1999 guidance.[20] Assuming 70,000 BPD of the crude throughput or 42% of the total, is light sweet crude, as now asserted in the Crude by Rail project, the VOC emissions would increase to more than 104 tons/year or by 31 tons/year. This exceeds the BAAQMD CEQA significance threshold by a factor of two and is a very significant unmitigated impact, triggering an EIR. Actual increases could be much higher under any of the currently understood plausible scenarios, importing light sweet crude under the Crude by Rail Project, or importing diluent-blended DilBit under the VIP project, as explored further below.

b. Cumulative impacts of simultaneous construction of the VIP Project and the Crude By Rail Project are significant and unmitigated.

The Initial Study for the Crude by Rail Project estimated that the daily average construction exhaust emissions from building the rail terminal would be 51.9 lb/day.[21] The CEQA significance threshold is 54 lb/day.[22] Taken together with NOx emissions from the VIP Project, which is still being constructed, cumulative NOx emissions are likely to exceed the significance threshold. The last portion of the VIP project, the new Hydrogen Plant, will be under construction at the same time that the new rail terminal is being constructed. The VIP FEIR did not calculate construction emissions, as this was not required at the time, which is an example of the change in regulatory framework. If the NOx emissions from constructing the Hydrogen Plant would exceed 2.1 lb/day, cumulative NOx emissions from simultaneously constructing the Hydrogen Plant and the Crude by Rail project would be cumulatively significant. The IS/MND does not analyze cumulative NOx emissions and provides no support for an implicit assumption that NOx emissions from constructing the Hydrogen Plant would be less than 2.1 lb/day (i.e., 25 times less than from constructing the rail terminal). It is reasonable to assume—at least absent contrary analysis—that the emissions from constructing the Hydrogen Plant will exceed 2.1 lb/day (i.e., not be 25 times less than for constructing the rail terminal) and that the cumulative impacts of constructing the two projects simultaneously will exceed the significance threshold.

c. Emissions must be reduced to assure that regulatory levels are not exceeded.

Ten years have passed since the environmental analysis was done for the VIP and the FEIR was certified. As the VIP FEIR was certified in 2003, and amended in 2007, the regulatory and informational framework within which the Project would be developed today has

---

[20] Newer guidelines adopted in 2010 lowered the thresholds of significant for VOCs and other pollutants to 10 tons per year. However, the newer guidance is on hold due to ongoing litigation. See: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES.aspx

[21] ESA, Valero Crude by Rail Project, Initial Study/Mitigated Negative Declaration, Use Permit Application 12PLN-00063, Prepared for City of Benicia, May 2013,Table 3-1.

[22] BAAQMD Recommended CEQA Threshold of Significance, Available at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Staff-Recommended%20and%20Existing%20CEQA%20Thresholds%20Table%2010-07-09.ashx?la=en.

changed dramatically, rendering the 2002 analysis obsolete.

Since the VIP FEIR was certified in 2003, new scientific evidence about the potential adverse impacts of air pollutants has become available, and in response, new guidance has been published and several federal and state ambient air quality standards have been revised. These include:

- The 8-hour CA ozone standard was approved by the Air Resources Board on April 28, 2005 and became effective on May 17, 2006.
- The EPA lowered the 24-hour PM2.5 standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ in 2006. EPA designated the Bay Area as nonattainment of the PM2.5 standard on October 8, 2009.
- On June 2, 2010, the U.S. EPA established a new 1-hour SO_2 standard, effective August 23, 2010.
- The EPA promulgated a new 1-hour NO_2 standard of 0.1 ppm, effective January 22, 2010.
- The EPA issued the greenhouse gas tailoring rule in May 2010, which requires controls of GHG emissions not contemplated in the VIP FEIR.
- The California Air Resources Board has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure below which there are no adverse health effects determined.
- The EPA issued a final rule for a national lead standard, rolling 3-month average, on October 15, 2008.

Emissions must be reduced to assure that these new regulatory levels are not exceeded. Lead, for example, can be present in very high concentrations in fugitive dusts from coke storage, handling, and export, especially when heavy sour crudes are being processed. There is a long history of nuisance coke dust issues at this Refinery that impact residents.[23] The VIP would increase coke production and thus fugitive coke dust emissions with elevated lead levels. The proposed Crude by Rail Project also could increase coke production, depending upon the specific "North American-sourced crude" that it imports. [24] Coke contains many contaminants including lead.[25] The California Air Resources Board has concluded there is no safe threshold level of exposure for lead; any amount poses significant health risks. Thus, the cumulative increase in coke fugitive emissions estimated in the VIP EIR and facilitated by the Crude by Rail Project are a significant public health impact.

---

[23] See, e.g., VIP DEIR, p. 4.2-14.

[24] The VIP DEIR did not disclose the actual coke increase, but did acknowledge that it would increase coke exports over the dock by 12 ships per year and by rail of 5 rail cars per day. VIP DEIR, p. 3-52. The capacity of a coke ship and coke rail cars was not disclosed.

[25] For example, see a Material Safety Data Sheet for Petroleum Coke: http://www.tsocorp.com/stellent/groups/corpcomm/documents/tsocorp_documents/msdspetrocoke.pdf

Further, the VIP DEIR assumed health impacts from coke dust exposure would be mitigated by complying with the then-current PM10 and PM2.5 regulations.[26] However, these have been significantly lowered and an ambient air quality standard for lead has been promulgated. There has been no demonstration that the increase in lead and heavy metal-laden coke dust, that could reasonably be expected to result from the Crude to Rail Project, could comply with these new standards, or that such compliance would mitigate lead health impacts, given CARB's zero threshold finding, or that other contaminants in coke dust would not pose a significant risk to public health.

B. Increased Air Emissions from Diluent

The majority of the crudes that will eventually be transported by rail will likely be a blend of bitumen and diluent due to their discounted price compared to conventional light sweet crudes. When heavy crude is shipped by pipeline, it needs to be diluted so that it will flow in the pipe, and this is similarly the case for un-heated railcars. We estimate that the Dilbit likely to be imported by this project will contain 20% to 30% diluent based on the description of the rail facility in the IS/MND.[27]

Regardless, the mixture of diluent and bitumen does not behave the same as a conventional crude, as the distribution of hydrocarbons is very different. The blended lighter diluent evaporates easily when exposed to ambient conditions, leaving behind the heavy ends, the vacuum gas oil (VGO) and residuum.[28] Thus, when a DilBit is released accidentally, it will generally create a difficult to cleanup spill as the heavier bitumen will be left behind.[29] Further, in a storage tank, the diluent also can be rapidly evaporated and emitted through tank openings.

These conventional DilBits, which are the most likely "North American-sourced crude" to be imported by rail over the long term, given the current economic outlook, are sometimes referred to as "dumbell" or "barbell" crudes as the majority of the diluent is C_5 to C_{12} and the majority of the bitumen is C_{30}+ boiling range material, with very little in the more desirable

---

[26] VIP DEIR, p. 4.8-14.

[27] Bitumen blended to pipeline specifications can be loaded on and off conventional rail tank cars like other light crudes. The amount of diluent depends on the type of rail tank car and design details of the offloading facilities. Although this information was not provided in the IS/MND, the document did discuss the use of conventional rail cars and a conventional unloading terminal. Further, the number of rail cars, 100 per day, or 700 barrels per car, suggests a lighter material, with more diluent.

[28] The residuum is the residue obtained from the oil after nondestructive distillation has removed all of the volatile materials. Residua are black, viscous materials. They may be liquid at room temperature (from the atmospheric distillation tower) or almost solid (generally vacuum residua), depending upon the nature of the crude oil.

[29] A Dilbit Primer: How It's Different from Conventional Oil, Inside Climate News. Available at: http://insideclimatenews.org/news/20120626/dilbit-primer-diluted-bitumen-conventional-oil-tar-sands-Alberta-Kalamazoo-Keystone-XL-Enbridge?page=show.

middle range.[30] Thus, they yield very little middle distillate fuels, such as diesel, heating oil, kerosene, and jet fuel and much more coke, than other heavy crudes. A typical DilBit, for example, will have 15% to 20% by weight light material, basically the added diluent, 10% to 15% middle distillate, and the balance, >75% is heavy residual material (vacuum gas oil and residue) exiting the distillation column. These characteristics show major differences between DilBits and the crudes currently refined at Benicia.[31]

The large amount of light material in DilBits is very volatile and can be emitted to the atmosphere from storage tanks and equipment leaks of fugitive components (pumps, compressors, valves, fittings) in much larger amounts than other heavy crudes that it would replace. It is unlikely that any other heavy crudes processed at the Refinery currently arrive with diluent, since EIA crude import data do not identify any crudes that are blended with diluent. Thus, the use of diluent to transport tar sands crudes is likely an important difference between the current heavy crude slates processed at the Refinery and the tar sands crudes that could replace them. This diluent will have impacts during railcar unloading as well as at many processing units within the Refinery.

The diluent is a low molecular weight organic material with a high vapor pressure that contains high levels of VOCs, sulfur compounds, and HAPs. These would be emitted during unloading and present in emissions from the crude tank(s) and fugitive components from its entry into the Refinery with the crude until it is recovered and marketed, or at least between the desalter and downstream units where some of it is recovered. The presence of diluent would increase the vapor pressure of the crude, substantially increasing VOC and HAPs emissions from tanks and fugitive component leaks compared to those from displaced heavy crudes not blended with diluent. The IS/MND and the VIP FEIR did not disclose the potential presence of diluent and made no attempt to estimate these diluent-derived emissions.

The composition of some typical diluents is reported on the website, www.crudemonitor.ca.[32] The specific diluents that would be used by the Project are unknown. However, the CrudeMonitor information indicates that several different types of diluents contain very high concentrations (based on 5-year averages) of the hazardous air pollutants

---

[30] Gary R. Brierley and others, Changing Refinery Configuration for Heavy and Synthetic Crude Processing, 2006, Available at: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7BA07DE342-E9B1-402A-83F7-36B18DC3DD05%7D&documentTitle=5639138.

[31] Stratiev and others, 2010, Table 1, compared to DilBit crude data on www.crudemonitor.ca.

[32] Condensate Blend (CRW) - http://www.crudemonitor.ca/condensate.php?acr=CRW; Fort Saskatchewan Condensate (CFT) - http://www.crudemonitor.ca/condensate.php?acr=CFT; Peace Condensate (CPR) - http://www.crudemonitor.ca/condensate.php?acr=CPR; Pembina Condensate (CPM) - http://www.crudemonitor.ca/condensate.php?acr=CPM; Rangeland Condensate (CRL) - http://www.crudemonitor.ca/condensate.php?acr=CRL; Southern Lights Diluent (SLD) - http://www.crudemonitor.ca/condensate.php?acr=SLD.

(HAPs) benzene (5,200 ppm to 9,800 ppm); toluene (10,300 ppm to 25,300 ppm); ethyl benzene (900 ppm to 2,900 ppm); and xylenes (4,600 ppm to 23,900 ppm).

The sum of these four compounds is known as "BTEX" or benzene-toluene-ethylbenzene-xylene. The BTEX in diluent ranges from 27,000 ppm to 60,900 ppm. The BTEX in DilBits, blended from these materials, ranges from 8,000 ppm, to 12,400 ppm.[33] Similarly, the BTEX in synthetic crude oils (SCOs) ranges from 6,100 ppm to 14,100 ppm.[34] These are very high concentrations that were not considered in the emission calculations in the IS/MND nor in the VIP FEIR. These high levels could result in significant worker and public health impacts.

The ATC estimated emissions of these compounds (ATC, Table 3-3) from Tank 1776 and fugitive components using the "default speciation profile" for crude oil from the EPA program, TANKS4.09d, for all constituents except benzene. For benzene, the IS/MND variously claims it substituted either 0.06 wt % or 0.6 wt % for the default value.[35] Thus, the IS/MND's assumptions as to benzene in fugitive emissions are inconsistent. The default crude oil speciation profile from the TANKS4.09d model reports benzene at 0.6 wt %.[36] Thus, the

---

[33] DilBits: Access Western Blend (AWB) -http://www.crudemonitor.ca/crude.php?acr=AWB; Borealis Heavy Blend (BHB) -http://www.crudemonitor.ca/crude.php?acr=BHB; Christina Dilbit Blend (CDB) -http://www.crudemonitor.ca/crude.php?acr=CDB; Cold Lake (CL) - http://www.crudemonitor.ca/crude.php?acr=CL; Peace River Heavy (PH) - http://www.crudemonitor.ca/crude.php?acr=PH; Seal Heavy (SH) - http://www.crudemonitor.ca/crude.php?acr=SH; Statoil Cheecham Blend (SCB) - http://www.crudemonitor.ca/crude.php?acr=SCB; Wabasca Heavy (WH) - http://www.crudemonitor.ca/crude.php?acr=WH; Western Canadian Select (WCS) - http://www.crudemonitor.ca/crude.php?acr=WCS; Albian Heavy Synthetic (AHS) (DilSynBit) - http://www.crudemonitor.ca/crude.php?acr=AHS.

[34] SCOs: CNRL Light Sweet Synthetic (CNS) - http://www.crudemonitor.ca/crude.php?acr=CNS; Husky Synthetic Blend (HSB) - http://www.crudemonitor.ca/crude.php?acr=HSB; Long Lake Light Synthetic (PSC) - http://www.crudemonitor.ca/crude.php?acr=PSC; Premium Albian Synthetic (PAS) - http://www.crudemonitor.ca/crude.php?acr=PAS; Shell Synthetic Light (SSX) - http://www.crudemonitor.ca/crude.php?acr=SSX; Suncor Synthetic A (OSA) - http://www.crudemonitor.ca/crude.php?acr=OSA; Syncrude Synthetic (SYN) - http://www.crudemonitor.ca/crude.php?acr=SYN.

[35] See Appendix A.1 of the IS/MND (The Air Permit Application or Authority To Construct, "ATC"), p. 11, pdf 17, in the note following Table 3-3, states that benzene in crude oil was assumed to be 0.6%. However, in Table 3-5, p. 12, pdf 18, it is stated that benzene in the crude oil was assumed to be 0.06%. Similarly, the supporting appendices indicate that 0.06% benzene was actually used in the fugitive emissions calculations. ATC, Attach. B-3, Fugitive Component Emissions, pdf 33. Similar data for tank emission calculations cannot be checked as it is claimed to be confidential. ATC, Attach. B-2.

[36] The profile, "Tanks_Crude_Speciation.xls" can be extracted from the TANKS409d model available at http://www.epa.gov/ttnchie1/software/tanks/ by using the "Data --> Speciation

IS/MND apparently lowered the benzene concentration in rail-imported crude oil by a factor of ten.[37] This contradicts published crude composition for the range of North American-sourced crudes that could be imported by the Project, as reviewed above and summarized in Table 1. The benzene value used in the IS/MND substantially underestimates the amount of benzene that would be present in tank and fugitive component emissions when processing either DilBits or Bakken crudes.

Table 1 compares the concentration of BTEX used to estimate BTEX emissions in the IS/MND with the BTEX concentrations in various diluents, two widely traded DilBits, including the DilBit that Valero used in its cost analysis (Fig. 2), Western Canadian Select, and Bakken crude oils. This table shows that regardless of which material is imported by the Crude by Rail Project, benzene emissions would be much higher than estimated in the IS/MND. Further, benzene emissions are higher in the most recently collected samples than in the five-year averages in Table 1. These benzene emissions would result in significant health impacts.

Profiles --> Export" menu selection and choosing crude oil. This spreadsheet confirms that the default benzene level for crude oils is 0.6wt.%.

[37] The information in IS/MND Appendix A confirms that the lower value for benzene in crude, 0.06wt.%, was used to calculate benzene emissions.

Table 1
Comparison of BTEX Levels Assumed in IS/MND with Levels in Diluents and DilBits

	Default Crude ATC Attach.B-3 (wt.%)	Diluents (5-yr Avg)[38] (wt.%)	Christina DilBit[39] (5-yr Avg) (wt.%)	Western Canadian Select[40] (5-yr Avg) (wt.%)	Bakken[41] Crude (wt.%)
Benzene	0.06	0.83-1.27	0.27	0.15	0.1-1.0
Ethylbenzene	0.4	0.11-0.33	0.06	0.06	0.33
Toluene	1.00	1.32-2.89	0.44	0.27	0.92
Xylenes	1.4	0.59-2.71	0.34	0.27	1.4

The ATC discloses that annual emissions of benzene from Tank 1776 exceed the BAAQMD chronic trigger level (6.4 lb/yr trigger level compared to a net increase of 28.3 lb/yr).[42] Further, the IS/MND and underlying ATC fail to disclose that benzene emissions from fugitive components, when calculated using the correct benzene level (at least 0.6%, rather than 0.06%), also exceed the BAAQMD screening level (6.4 lb/hr screening level compared to 20 lb/hr emitted, adjusted to 0.6% benzene).

The Initial Study conducted a screening health risk assessment. It found no significant health impact.[43] However, the benzene emissions used in this analysis apparently (the records lacks sufficient data to be certain) were underestimated by factors of 2.5 to 4.5 assuming DilBits and up to a factor of 17 for Bakken crudes. Although there is one DilBit with an unusually low benzene concentration of 0.06 wt.%, Borealis Heavy Blend, there is no evidence that this is the only DilBit that would be imported by rail.

---

[38] The reported range includes the following diluents: Condensate Blend, Saskatchewan Condensate, Peace Condensate, Pembina Condensate, Rangeland Condensate, and Southern Lights Diluent. The composition data for all of these diluents is found at http://www.crudemonitor.ca. Concentrations reported in volume % (v/v) in this source were converted to weight % by dividing by the ratio of compound density in kg/m^3 at 25 C (benzene =876.5 kg/m^3, toluene = 0.866.9 kg/m^3, ethylbenzene 866.5 kg/m^3, and the xylenes 863 kg/m^3) to crude oil density in kg/m3, as reported at www.crudemonitor.ca, 5-year average. See also Cenovus Energy Inc. Material Safety Data Sheet, Condensate (Sour) and Condensate (Sweet), Available at: http://www.cenovus.com/contractor/msds.html.
[39] Christina DilBit Blend (CDB) -.http://www.crudemonitor.ca/crude.php?acr=CDB. Concentrations reported in volume % (v/v) converted to weight % as explained in footnote 44..
[40] Western Canadian Select (WCS) -http://www.crudemonitor.ca/crude.php?acr=WCS. Concentrations reported in volume % (v/v) converted to weight % as explained in footnote 44..
[41] Cenovus Energy, Material Safety Data Sheet for Light Crude Oil, Bakken (benzene), Available at: http://www.cenovus.com/contractor/docs/CenovusMSDS_BakkenOil.pdf. Other components of BTEX from Keystone DEIS, Tables 3.13-1 (density) and 3.13-2 (BTEX). Concentrations reported in volume % (v/v) converted to weight % as explained in footnote 44.
[42] ATC, p. 17-18 & Table 4-3.
[43] IS, p. II-15.

Although crude oil contains many different chemicals that are carcinogens, benzene is the only carcinogen included in the HAP emission calculations in the IS/MND.[44] The only sources of benzene disclosed in the IS/MND is Tank 1776 and fugitives, which were underestimated due to the use of an anomalously low crude concentration. Thus, the cancer risks reported in the IS/MND in Table 3-3 can be adjusted for this error by multiplying that cancer risk by the benzene ratios reported above. With this correction, the cancer risk to the maximum exposed worker increases from the 4 in a million reported in the IS/MND to up to 20 in a million for DilBits and up to 76 in a million for Bakken crudes. For the maximum exposed residential receptor, the reported cancer risk increases from 2 in a million reported in the IS/MND to up to 10 in a million for DilBits and to 39 in a million for Bakken crudes. These cancer risk levels equal or exceed the assumed cancer significance threshold of 10 in a million. Thus, these are significant unmitigated impacts both to workers and nearby residents that were not disclosed in the IS/MND and are directly caused by the failure of the IS/MND to consider the composition of the crude that is being imported.

Information on diluents from the CrudeMontior also indicates elevated concentrations of volatile mercaptans (9.9 to 103.5 ppm), which are highly odiferous and toxic compounds that will create odor and nuisance problems at the Refinery in the vicinity of the unloading area, crude storage tanks and supporting fugitive components. Mercaptans can be detected at concentrations substantially lower than will be present in emissions from the crude tanks and fugitive emissions from the unloading rack and related components, including pumps, valves, flanges, and connectors.[45]

Thus, unloading, storing, handling and refining bitumens mixed with diluent and shale crudes such as Bakken would emit VOCs, HAPs, and malodorous sulfur compounds, not found in comparable levels in conventional crudes, depending upon the DilBit or shale crude source. There are no restrictions on the crudes, diluent source or their compositions nor any requirements to monitor emissions from tanks and leaking equipment where DilBit-blended and other light crudes would be handled. As the market has experienced shortages of diluents, any material with a suitable thinning ability could be used, which could contain still other hazardous components, with the potential for even greater air quality and health impacts than discussed here.

C. Health Impacts of Chemical Constituents in DilBits

Heavy bitumen tar sands and diluents are composed of hundreds of chemicals with known health impacts. Below is a summary of the health impacts of some of those hazardous compounds associated with refining dirtier crude oils. Many of these compounds present significant hazards to human health at varying levels of exposure.

---

[44] IS/MND, Appx. A.

[45] American Industrial Hygiene Association, Odor Thresholds for Chemicals with Established Occupational Health Standards, 1989; American Petroleum Institute, Manual on Disposal of Refinery Wastes, Volume on Atmospheric Emissions, Chapter 16 - Odors, May 1976, Table 16-1.

1. Hydrogen Sulfide is a flammable and colorless gas that smells like rotten eggs. It is a broad spectrum poison that can be lethal at high concentrations. At low concentrations, hydrogen sulfide can cause irritation to the eyes, nose and throat. Additionally, exposure may result in incoordination, memory loss, hallucinations, personality changes, loss of sense of smell, cough, and shortness of breath; people with asthma may experience difficulty breathing. In occupational settings, workers have died from exposure to high levels of hydrogen sulfide.[46]

2. Mercaptans[47] are a large class of toxic compounds that generally have a strong and unpleasant odor even at very low concentrations. They are added in small amounts to natural gas to help detect gas leaks. Because they are extremely flammable, mercaptans present fire and explosion hazards in industrial processe. Exposure to mercaptans may cause irritation of the skin, eyes, and upper respiratory tract. All mercaptans negatively affect the central nervous system. Workers accidentally exposed to high levels of mercaptans experienced muscular weakness, nausea, dizziness, stupor, and uncounsciousness (narcosis).[48]

3. Thiophene[49] is a highly flammable and hazardous component of petroleum.[50] Exposure to thiophene results in adverse effects to the skin, eyes, nose and throat.[51] Workers breathing thiophene vapors generated from normal handling of the material may experience respiratory irritation, dizziness, fatigue, unconsciousness, loss of reflexes, lack of coordination, and vertigo. Long term exposure to thiophene may damage the liver, or produce asthma-like symptoms which may continue for months or years after exposure to the chemical stops.[52]

4. Benzothiophene[53] is a solid compound with an odor similar to naphthalene (mothballs). It is found in petroleum, and used primarily in industries such as pharmaceuticals and in

---

[46] Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Hydrogen Sulfide,* U.S. Department of Health and Human Services, July 2006.
[47] Mercaptans are also commonly known as thiols, thioalcohols, or sulphydrates.
[48] Stellman, Jeanne Mager, *Encyclopaedia of Occupational Health and Safety,* vol. 4,Geneva: International Labor Office, 1998.
[49] Thiophene is also called divinylene sulphide, thiacyclopentadiene, and thiofuran
[50] National Library of Medicine Hazardous Substances Databank , 'Thiophne', http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~xlH0IB:1 (accessed June 2013)
[51] New Jersey Department of Health and Senior Services, 'Thiophene Hazardous Substance Fact Sheet', December 2000, http://nj.gov/health/eoh/rtkweb/documents/fs/1851.pdf (accessed June 2013)
[52] Santa Cruz Biotechnology, 'ThiopheneMaterial Safety Data Sheet' March 2009, http://datasheets.scbt.com/sc-251237.pdf (accessed June 2013)
[53]Benzothiophene is also known as thianaphthene, benzo(b)thiophene, 1-benzothiophene, 1-thiaindene, 2,3-benzothiophene, benzothiofuran, benzothiophen, thianaphtene, thianaphthen, thianaphthene, and thionaphthene

research.[54] A person exposed to benzothiophene may experience irritation of the eyes, skin, or respiratory tract.[55]

5. Methylsulfonic acid[56] is used in the process of refining petroleum. The general population is exposed through breathing outdoor air.[57] Methylsulfonic acid is harmful to humans and can irritate or burn the eyes, skin, and mucous membranes.[58] Inhaling methylsulfonic acid vapor is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.[59]

6. Dimethyl sulfone[60,61] is an odorless, combustible liquid and vapor. If inhaled as a dust, it may cause respiratory irritation. It may also cause irritation to the eyes.[62]

7. Thiacyclohexane[63] is a sulfur containing component of crude oil. It is highly flammable, and exists in both liquid and vapor form. Exposure to thiacyclohexane may cause skin or eye irritation. At present, the short and long-term toxicity of this compound is not fully

---

[54] Merck Index, 'Thianaphthene Structure Details', n.d., http://themerckindex.cambridgesoft.com/themerckindex/Forms/Search/ContentArea/ChemBioVizSearch.aspx?FormGroupId=200000&AppName=THEMERCKINDEX&AllowFullSearch=true&KeepRecordCountSynchronized=false&SearchCriteriaId=5&SearchCriteriaValue=95-15-8&CurrentIndex=0 (accessed June 2013)

[55] National Institue of Health Haz-Map Database, 'Benzothiophene Haz-Map Category Details', *Haz-Map*, n.d., http://hazmap.nlm.nih.gov/category-details?id=12230&table=copytblagents (accessed June 2013)

[56] Methylsulfonic acid is also called methanesulfonic acid

[57] National Library of Medicine Hazardous Substances Data Bank, 'Methanesulfonic Acid -', *Toxnet: Toxicology Data Network* http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+5004 (accessed June 2013)

[58] Occupational Safety and Health Administration 'Methanesulfonic Acid Chemical Sampling Information', n.d., http://www.osha.gov/dts/chemicalsampling/data/CH_250710.html (accessed June 2013)

[59] National Library of Medicine Hazardous Substances Data Bank, 'Methanesulfonic Acid', http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+5004 (accessed June 2013)

[60] Dimethyl sulfone is also known as methyl sulfone, methylsulfonylmethane, sulfonylbismethane, methane, sulfonylbis-, and dimethyl sulphone

[61] Dimethyl sulphone is commonly known as methylsulfonylmethane, or MSM, and used widely as a food supplement and medicine.

[62] Gaylord Chemical Corporation, 'Dimethyl Sulfone Material Safety Data Sheet', August 20, 2004, http://www.clean.cise.columbia.edu/msds/dimethylsulfoxide.pdf (accessed June 2013)

[63] Synonyms include thiapyran, tetrahydro- (4CI), thiopyran, tetrahydro- (6CI), pentamethylenesulfide, penthiophane, tetrahydro-2H thiopyran, tetrahydrothiapyran, tetrahydrothiopyran, thiacyclohexane, thiane. Search for this compound using thiane, or its CAS number 1613-51-0.

understood.[64]

8. Pentane[65] is a volatile organic compound (VOC) commonly found in natural gas and crude oil. Aside from the fact that is highly flammable—mixtures of pentane and air can be explosive—pentane has been identified as a central nervous system (CNS) depressant.[66] Exposure to pentane vapors can cause irritation to the eyes, skin, and respiratory system, as well as, nausea, vomiting, headaches, and dizziness.[67,68] Chronic or long-term exposure can result in anoxia, or a severe lack of oxygen to body organs and tissues.[69] Exposure to high levels of pentane can be deadly.[70]

9. Naphtha[71] is a highly flammable, toxic organic solvent distilled from petroleum with a wide range of industrial and commercial uses. Exposure to naphtha can cause headaches, dizziness, nausea, and vomiting.[72] Naphtha vapor is a central nervous system depressant as well as an irritant of the mucous membranes and the respiratory tract—exposure to high concentrations can cause fatigue, lightheadedness, and loss of consciousness.[73] Female workers exposed to naphtha experienced reproductive impacts in the form of disturbances in menstrual cycles, abnormal uterine bleeding, and a disturbance of the ovarian function.[74] Long-term exposure may cause damage to the liver, kidneys, blood, nervous system, and skin.[75] Naphtha contains benzene which is a known carcinogen. [76]

---

[64] Alfa Aesar, 'Tetrahydrothiopyran Material Safety Data Sheet', June 2011, http://www.msds.com/servlet/B2BDocumentDisplay?document_version_nri=5175301&manuf_nri=704&manuf_name=&supplier_nri=704&page_number=1&search_source=centraldb&CLIENT_session_key=A736334_Kitty89&CLIENT_language=2 (accessed June 2013)

[65] Also known as n-Pentane, normal-Pentane

[66] National Library of Medicine Hazardous Substances Data Bank, 'PENTANE', http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~mKkbnT:1 (accessed June 2013)

[67] NIOSH, 'CDC - NIOSH Pocket Guide to Chemical Hazards - n-Pentane', November 2010, http://www.cdc.gov/niosh/npg/npgd0486.html (accessed June 2013)

[68] NIOSH, 'n-Pentane International Chemical Safety Cards', October 1999 http://www.cdc.gov/niosh/ipcsneng/neng0534.html (accessed June 2013)

[69] National Library of Medicine Hazardous Substances Data Bank, 'Pentane', http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~mKkbnT:1 (accessed June 2013)

[70] NIOSH, 'n-Pentane International Chemical Safety Cards', October 1999 http://www.cdc.gov/niosh/ipcsneng/neng0534.html (accessed June 2013)

[71] Like pentane, naphtha may be used as a diluent in heavy crude oils.

[72] New Jersey Department of Health and Senior Services, 'Naphtha Hazardous Substance Fact Sheet', April 2007, http://nj.gov/health/eoh/rtkweb/documents/fs/0518.pdf (accessed June 2013)

[73] National Library of Medicine Hazardous Substances Data Bank, 'Naphtha', http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~PqjFcw:1 (accessed June 2013)

[74] National Library of Medicine Hazardous Substances Data Bank, 'Naphtha', http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~PqjFcw:1 (accessed June 2013)

[75] Collection Care, 'Naphtha Material Safety Data Sheet', June 27, 2011, http://www.collectioncare.org/MSDS/naphthamsds.pdf (accessed June 2013)

BTEX: The following compounds (benzene, toluene, ethylbenzene, and xylene) are some of the VOCs found in petroleum.

10. Benzene is a common component of crude oil and gasoline, and a widespread environmental pollutant resulting mainly from refinery activity.[77] People are primarily exposed to benzene through breathing contaminated air. Benzene is a known carcinogen; long term exposure can cause leukemia.[78] Inhalation of high doses of benzene may impact the central nervous system leading to drowsiness, dizziness, irregular heartbeat, nausea, headaches, and depression.[79] Female workers experiencing high exposure levels over the course of many months experienced reproductive impacts, such as a decrease in the size of their ovaries. In animal studies, breathing benzene was associated with developmental effects such as low birth weight, delayed bone formation, and bone marrow damage.[80]

11. Toluene is a volatile organic compound (VOC) used widely in industry as a raw material and as a solvent. Toluene concentrations are highest in areas of heavy traffic, near gas stations and petroleum refineries. According to California's list of chemicals known to cause cancer or reproductive toxicity, toluene is listed as a developmental toxicant.[81] Similar to many organic solvents, toluene acts as a respiratory tract irritant, particularly at high air concentrations.[82] For this reason, it can be more harmful to people with asthma. A ubiquitous air pollutant, exposure to toluene constitutes a serious health concern as it has negative impacts on the central nervous system. Exposure to toluene can cause headaches, impaired reasoning, memory loss, nausea, impaired speech, hearing, and vision, amongst other health effects.[83] Long term exposure may damage the

---

[76] New Jersey Department of Health and Senior Services, 'Naphtha Hazardous Substance Fact Sheet', April 2007, http://nj.gov/health/eoh/rtkweb/documents/fs/0518.pdf (accessed June 2013)

[77] Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Benzene,* U.S. Department of Health and Human Services, August 2007.

[78] California EPA Office of Environmental Health Hazard Assessment, 'Chemicals Known to the State to Cause Cancer or Reproductive Toxicity', 2013, http://oehha.ca.gov/prop65/prop65_list/files/P65single052413.pdf (accessed June 2013)

[79] Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Benzene,* U.S. Department of Health and Human Services, August 2007.

[80] Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Benzene,* U.S. Department of Health and Human Services, August 2007.

[81] California EPA Office of Environmental Health Hazard Assessment, 'Chemicals Known to the State to Cause Cancer or Reproductive Toxicity', 2013, http://oehha.ca.gov/prop65/prop65_list/files/P65single052413.pdf (accessed June 2013)

[82] Agency for Toxic Substances and Disease Registry, *Toluene Toxicity*: *Case Studies in Environmental Medicine*, U.S. Department of Health and Human Services, Division of Toxicology and Environmental Medicine, February 2001, http://www.atsdr.cdc.gov/csem/toluene/docs/toluene.pdf (accessed June, 2013)

[83] Agency for Toxic Substances and Disease Registry, *Toluene Toxicity*: *Case Studies in Environmental Medicine*, U.S. Department of Health and Human Services, Division of

liver and kidneys.[84]

12. Ethylbenzene is a commonly occurring component of petroleum. Once refined, it is used in many consumer products such as gasoline, pesticides, varnishes and paints. Ethylbenzene has been recently classified as a possible human carcinogen by the International Agency for Research on Cancer (IARC)[85], and has been associated with a number of adverse health outcomes. Breathing high levels can cause dizziness as well as throat and eye irritation; chronic, low-level exposure over several months to years can result in kidney damage as well as hearing loss.[86]

13. Xylene[87] is a VOC in petroleum. Short term exposure to xylene may result in a number of adverse human health effects including irritation of the skin, eyes, nose and throat, difficulty breathing, damage to the lungs, impaired memory, and possible damage to the liver and kidneys. Long term exposure may affect the nervous system presenting symptoms such as headaches, lack of muscle coordination, dizziness, confusion, and loss of balance.[88] More serious long term health effects include memory impairment, red and white blood cell abnormalities, abnormal heartbeat (in laboratory workers), liver damage, mutagenesis (mutations of genes), reproductive system effects, and death due to respiratory failure.[89]

14. Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during incomplete combustion.[90,91,92] Infants and children are *especially*

Toxicology and Environmental Medicine, February 2001, http://www.atsdr.cdc.gov/csem/toluene/docs/toluene.pdf (accessed June, 2013)

[84] National Institute for Occupational Safety and Health, 'Toluene', *NIOSH Pocket Guide to Chemical Hazards*, 2010, http://www.cdc.gov/niosh/npg/npgd0619.html (accessed June 2013)

[85] Henderson, Leigh, David Brusick, Flora Ratpan, and Gauke Veenstra, 'A Review of the Genotoxicity of Ethylbenzene', *Mutation Research/Reviews in Mutation Research,* 635 (2007), 81-89 <doi:10.1016/j.mrrev.2007.03.001>

[86] Agency of Toxic Substances and Disease Registry, *Toxicological Profile for Ethylbenzene*, *ToxFAQs*, 2010, http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=382&tid=66 (accessed June 2013)

[87] Also known as dimethyl benzene

[88] Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Xylene,* U.S. Department of Health and Human Services, August 2007.

[89] Zoveidavianpoor, M., A. Samsuri, and S. R. Shadizadeh, 'The Clean Up of Asphaltene Deposits in Oil Wells', *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, 35 (2013), 22–31 <doi:10.1080/15567036.2011.619630>

[90] Salmon A.G. and Meehan T. Potential Impact of Environmental Exposures to Polycyclic Organic Material (POM) on Children's Health, California Office of Environmental Health Hazard Assessment (OEHHA). http://www.oehha.ca.gov/public_info/public/kids/pdf/PAHs%20on%20Children's%20Health.pdf

susceptible to the hazards of PAHs, a class of known human mutagens, carcinogens, and developmental toxicants found in diesel exhaust.[93] Greater lifetime cancer risks result from exposure to carcinogens at a young age. These substances are known to cross the placenta to harm the unborn fetus, contributing to fetal mortality, increased cancer risk and birth defects.[94] Prenatal exposure to PAHs may also be a risk factor for the early development of asthma-related symptoms and can adversely affect children's cognitive development, with implications for diminished school performance.[95] Exposure of children to PAHs at levels measured in polluted areas can also adversely affect IQ.[96]

15. Lead is a well-known toxic heavy metal with diverse and severe health impacts.[97] In particular, lead is associated with neurological, hematological, and immune effects on children, and hematological, cardiovascular and renal effects on adults. Children are particularly sensitive to the effects of lead, including sensory, motor, cognitive and behavioral impacts. Cognitive effects of special concern include decrements in IQ scores and academic achievement, as well as attention deficit problems. Children in poverty and black, non-Hispanic children face higher exposures to lead and are consequently more susceptible to lead's health impacts. Reproductive effects, such as

---

[91] Agency for Toxic Substances and Disease Registry, Public Health Statement for Polycyclic Aromatic Hydrocarbons (PAHs). August 1995.
http://www.atsdr.cdc.gov/PHS/PHS.asp?id=120&tid=25
[92] Perera FP. DNA Damage from Polycyclic Aromatic Hydrocarbons Measured by Benzo[a]pyrene-DNA Adducts in Mothers and Newborns from Northern Manhattan, The World Trade Center Area, Poland, and ChinaCancer Epidemiol Biomarkers Prev 2005;14(3):709–14.
[93] Salmon A.G. and Meehan T. "Potential Impact of Environmental Exposures to Polycyclic Organic Material (POM) on Children's Health," California Office of Environmental Health Hazard Assessment (OEHHA).
http://www.oehha.ca.gov/public_info/public/kids/pdf/PAHs%20on%20Children's%20Health.pdf
Agency for Toxic Substances and Disease Registry, Public Health Statement for Polycyclic Aromatic Hydrocarbons (PAHs). August 1995.
http://www.atsdr.cdc.gov/PHS/PHS.asp?id=120&tid=25.
[94] Perera FP. "DNA Damage from Polycyclic Aromatic Hydrocarbons Measured by Benzo[a]pyrene-DNA Adducts in Mothers and Newborns from Northern Manhattan, The World Trade Center Area, Poland, and China," *Cancer Epidemiology Biomarkers & Prevention* 14, no. 3 (2005):709–14.
[95] Perera FP, Rauh V, Tsai WY, Kinney P, Camann D, et al. "Effects of transplacental exposure to environmental pollutants on birth outcomes in amultiethnic population," *Environmental Health Perspective* 111 (2003): 201–205.
Perera FP et. al. "Effect of Prenatal Exposure to Airborne Polycyclic Aromatic Hydrocarbons on Neurodevelopment in the First 3 Years of Life among Inner-City Children," *Environmental Health Perspective* 114 (2006):1287–1292.
[96] Perera, FP et. al. "Prenatal Airborne Polycyclic Aromatic Hydrocarbon Exposure and Child IQ at Age 5 Years," *Pediatrics* 124 (2009):e195–e202.
[97] The lead health impacts are also derived from the final rule on the National Ambient Air Quality Standards for Lead, 73 Fed. Reg. 66964, 66975-76 (Nov. 12, 2008).

decreased sperm count in men and spontaneous abortions in women, have been associated with lead exposure. EPA has classified lead as a probable human carcinogen.

16. Nickel is associated with chronic dermatitis, respiratory impacts and potentially also reproductive impacts.[98] The EPA has classified nickel refinery subsulfide as a Group A, human carcinogen and nickel carbonyl as a Group B2, probable human carcinogen.

D. Accidental Releases

The Benicia Refinery was built before current American Petroleum Institute (API) standards were developed to control corrosion and before piping manufacturers began producing carbon steel in compliance with current metallurgical codes. While some of Benicia's metallurgy was updated as part of the VIP, metallurgy used throughout much of the Refinery is likely not adequate to handle the unique chemical composition of tar sands crudes without significant upgrades. There is no assurance that required metallurgical upgrades would occur as they are very expensive and not required by any regulatory framework. Experience with changes in crude slate at the nearby Chevron Refinery in Richmond suggests that failure to perform required metallurgical upgrades can lead to catastrophic accidents.[99] The IS/MND is silent on corrosion issues and metallurgical conditions of the Refinery.

Both DilBit and SynBit crudes have high Total Acid Numbers (TAN), which indicates high organic acid content, typically naphthenic acids. These acids are known to cause corrosion at high temperatures, such as occur in many refining units, e.g., in the feed to cokers. Crude oils with a TAN number greater than 0.5 mg KOH/g[100] are generally considered to be potentially corrosive and indicative of a level of concern. A TAN number greater than 1.0 mg KOH/g is considered to be very high. Canadian tar sands crudes are high TAN crudes. The DilBits, for example, range from 0.98 to 2.42 mg KOH/g.[101]

Sulfidation corrosion from elevated concentrations of sulfur compounds in some of the heavier distillation cuts is also a major concern, especially in the vacuum distillation column, coker, and hydrotreater units. The specific suite of sulfur compounds may lead to increased corrosion. The IS/MND did not disclose either the specific suite of sulfur compounds or the TAN for the proposed crude imports.

---

[98] Agency for toxic substances and Disease Registry, Public Health Statements, http://www.atsdr.cdc.gov/

[99] U.S. Chemical Safety and Hazard Investigation Board, Interim Investigation Report, Chevron Richmond Refinery Fire, Chevron Richmond Refinery, Richmond, California, August 6, 2012, Draft for Public Release, April 15, 2013, Available at; http://www.csb.gov/chevron-refinery-fire/.

[100] The Total Acid Number measures the composition of acids in a crude. The TAN value is measured as the number of milligrams (mg) of potassium hydroxide (KOH) needed to neutralize the acids in one gram of oil.

[101] www.crudemonitor.ca.

A crude slate change could result in corrosion from the particular suite of sulfur compounds or naphthenic acid content, which can lead to significant accidental releases, even if the crude slate is within the current design slate basis, due to compositional differences. This recently occurred at the nearby Chevron Richmond Refinery, which gradually changed crude slates, while staying within its established crude unit design basis for total weight percent sulfur of the blended feed to the crude unit. The IS/MND and VIP FEIR assume, however, that crude slate changes within the refinery design range of sulfur and API will not be a problem. In fact, although the sulfur composition at Chevron Richmond remained within the design range, they did change significantly over time.[102] This change increased corrosion rates in the 4-sidecut line, which led to a catastrophic pipe failure in the #4 Crude Unit on August 6, 2012. This release sent 15,000 people from the surrounding area for medical treatment due to the release and created huge black clouds of pollution billowing across the Bay. It also put workers at the unit in grave danger, with several escaping the gas cloud and inferno narrowly.

These types of accidents can be reasonably expected to result from incorporating tar sands crudes into the Benicia slate, even if the range of sulfur and gravity of the crudes remains the same, unless significant upgrades in metallurgy occur, as these crudes have a significant concentration of sulfur in the heavy components of the crude coupled with high TAN and high solids, which aggravate corrosion. The gas oil and vacuum resid piping, for example, may not be able to withstand naphthenic acid or sulfidation corrosion from tar sands crudes, leading to catastrophic releases.[103] Catastrophic releases of air pollution from these types of accidents were not considered in the IS/MND.

Refinery emissions released in upsets and malfunctions can, in some cases, be greater than total operational emissions recorded in formal inventories. For example, a recent investigation of 18 Texas oil refineries between 2003 and 2008 found that “upset events” were frequent, with some single upset events producing more toxic air pollution than what was reported to the federal Toxics Release Inventory database for the entire year.[104] These potential emissions must be evaluated and mitigated.

E. Unmitigated Impacts of Locomotive Emissions

The location of air emissions matters a great deal with respect to exposure levels and resulting health impacts to workers and residents. Yet the IS/MND fails to evaluate the likely pollutant exposure levels from locomotive activity of the proposed project compared to the marine shipping activity that would be replaced. In fact, the IS/MND states that the resulting emissions from rail activity will be lower than shipping. It is not clear whether that comparison accounted for all of the environmental regulations that shippers must now comply with

---

[102] US Chemical Safety and Hazard Investigation Board, 2013, p.34 ("While Chevron stayed under its established crude unit design basis for total wt. % sulfur of the blended feed to the crude unit, the sulfur composition significantly increased over time. This increase in sulfur composition likely increased corrosion rates in the 4-sidecut line.").
[103] See, for example, Turini and others, 2011.
[104] J. Ozymy and M.L. Jarrell, Upset over Air Pollution: Analyzing Upset Event Emissions at Petroleum Refineries, Review of Policy Research, v. 28, no. 4, 2011.

including much cleaner, lower sulfur marine fuels. Regardless, the slightly lower locomotive emissions reported are misleading because those emissions are occurring much closer to residential populations and thus may result in significantly higher exposure to toxic diesel exhaust.

The diesel engines in locomotives emit fine particulate matter (particles that are 2.5 microns or less in diameter or "PM2.5"), NOx, and VOCs along with many other toxic chemicals.[105] The soot in diesel exhaust—diesel PM—is especially toxic, not only due to the very small size of the soot particles, but also because these particles contain roughly 40 different toxic air contaminants, 15 of which are recognized carcinogens.[106] In fact, diesel PM itself has been identified as a carcinogen by the World Health Organization as well as the State of California,[107] which lists it as a "Toxic Air Contaminant." Dozens of studies have shown a high risk of lung cancer in occupations with high diesel exposures, including rail workers, truck drivers, and miners. Recent studies of miners indicate that the most heavily exposed workers have a risk of lung cancer approaching that of heavy smokers; studies also show that elevated risks of lung cancer apply not only to workers but to the general population in areas with high levels of diesel PM (*e.g.,* near freeways and busy freight corridors).[108]

Moreover, diesel pollution is estimated to contribute to roughly 60,000 or more premature deaths attributable to outdoor air pollution in the U.S.[109] People who live or go to school near

---

[105] NRDC, Clean Cargo: A Guide to Reducing Diesel Air Pollution from the Freight Industry in Your Community, January 2013.

[106] Diesel exhaust contains the following toxic constituents: acetaldehyde, acrolein, aniline, antimony compounds, arsenic, benzene, beryllium compounds, biphenyl, bis[2-ethylhexyl]phthalate, 1,3-butadiene, cadmium, chlorine, chlorobenzene, chromium compounds, cobalt compounds, cresol isomers, cyanide compounds, dioxins and dibenzofurans, dibutylphthalate, ethyl benzene, formaldehyde, hexane, inorganic lead, manganese compounds, mercury compounds, methanol, methyl ethyl ketone, naphthalene, nickel, 4-nitrobiphenyl, phenol, phosphorus, POM including PAHs and their derivatives, propionaldehyde, selenium compounds, styrene, toluene, xylenes.
www.oehha.ca.gov/public_info/facts/dieselfacts.html;
www.oehha.ca.gov/air/toxic_contaminants/html/Diesel%20Exhaust.htm.

[107] www.oehha.ca.gov/prop65/prop65_list/files/P65single021712.pdf;
http://press.iarc.fr/pr213_E.pdf.

[108] Silverman, D.T., et al. "The Diesel Exhaust in Miners Study: A Nested Case-Control Study of Lung Cancer and Diesel Exhaust," Journal of the National Cancer Institute, Vol. 104, No. 11, June 6, 2012,
www.oxfordjournals.org/our_journals/jnci/press_releases/silvermandjs034.pdf.

[109] According to U.S. EPA, the following regulations avoid 52,000 annual premature deaths by 2030: 2001 highway Diesel (8,300); 2004 Nonroad Diesel (12,000), 2008 Locomotive/Marine (1,100), 2010 Emission Control Area (IMO ECA)/marine fuel (31,000). Assuming a 90% diesel PM reduction from each rule (though some of the rules yield 95% reductions), this means that diesel PM emissions led to roughly 58,200 premature deaths before the rules were in place. This is likely a significant under-estimate since several diesel PM sources are not accounted for here, such as light duty diesel trucks and stationary diesel engines.

rail yards face disproportionately higher exposure to diesel exhaust and associated health impacts, including increased risks of asthma and other respiratory effects, cancer, adverse birth outcomes, adverse impacts to the brain (including potentially higher risk of autism),[110] heart disease, and premature death.[111]

---

[110] Autism spectrum disorders (ASDs) - a group of developmental disabilities that can cause significant social, communication and behavioral challenges - have increased 78 percent since 2002 to impact 1 in 88 children, according to the Centers for Disease Control and Prevention (CDC), *see* http://www.cdc.gov/Features/CountingAutism/. While experts are still working to better understand the risk factor, they agree that risk factors are not only genetic but environmental. Several recent studies in California have shown how air pollution contributes to autism, finding elevated risks in areas of elevated air pollution and in close proximity to freeways.

[111] Kim, J., et al. "Traffic-Related Air Pollution and Respiratory Health: East Bay Children's Respiratory Health Study," *American Journal of Respiratory and Critical Care Medicine* 2004;170:520-526.

McConnell, R., et al. "Childhood Incident Asthma and Traffic-Related Air Pollution at Home and School," *Environmental Health Perspectives* 2010; 118(7):1021-1026.

Van Vliet, P., M. Knape, et al. "Motor Vehicle Exhaust and Chronic Respiratory Symptoms in Children Living Near Freeways," *Environmental Research* 1997; 74(2):122-32.

Appatova, A.S., et al. "Proximal Exposure of Public Schools and Students to Major Roadways: A Nationwide U.S. Survey," *Journal of Environmental Planning and Management* 2008; 51(5):631-646.

Nicolai, T., D. Carr, S.K. Weiland, H. Duhme, O. Von Ehrenstein, C. Wagner, and E. von Mutius. "Urban Traffic and Pollutant Exposure Related to Respiratory Outcomes and Atopy in a Large Sample of Children," *European Respiratory Journal* 2003*;*21:956–963.

Brunekreef, B.; N.A. Janssen, J. de Hartog, H. Harssema, M. Knape, and P. van Vliet. "Air Pollution From Truck Traffic and Lung Function in Children Living Near Motorways," *Epidemiology* 1997; 8(3):298-303.

Duhme, H., S.K. Weiland, et al. "The Association Between Self-Reported Symptoms of Asthma and Allergic Rhinitis and Self-reported Traffic Density on Street of Residence in Adolescents," *Epidemiology* 1996; 7(6):578-582.

Edwards, J., S. Walters, et al. "Hospital Admissions for Asthma in Preschool Children: Relationship to Major Roads in Birmingham, United Kingdom," *Archives of Environmental Health* 1994; 49(4):223-227.

Gauderman W.J., et al. "Childhood Asthma and Exposure to Traffic and Nitrogen Dioxide," *Epidemiology* 2005; 16:737-743.

McConnell, R., Berhane K, Yao L, Jerrett M, Lurmann F, Gilliland F, et al. 2006. Traffic, susceptibility, and childhood. *Environ Health Perspect* 2006; 114(5):766-772.

Gauderman WJ et al. Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study. *Lancet* 2007; 369(19561): 571-7.

Wilhelm et al.. Environmental Public Health Tracking of Childhood Asthma Using California Health Interview Survey, Traffic, and Outdoor Air Pollution Data. *Environmental Health Perspectives* 2008;116(8):1254-1260.

Meng et al.. Are Frequent Asthma Symptoms Among Low-Income Individuals Related to Heavy Traffic Near Homes, Vulnerabilities, or Both? AEP 2008; 18(5):343-350.

Detailed health assessments of some major California rail yards found extremely high cancer risk from the operations, with elevated cancer risk extending as far as eight miles away.[112] Locomotives may produce about half of all harmful diesel particulate matter emissions in rail yards.[113] Locomotive engines are not only highly polluting, they are incredibly long-lasting, which means many older, high-polluting locomotives are still in operation throughout the U.S.[114] Emissions standards for locomotives lag behind the standards for trucks and even off-road equipment. New Tier 4 standards, comparable to those for modern trucks, will not start

---

Venn et al. Living Near A Main Road and the Risk of Wheezing Illness in Children. *American Journal of Respiratory and Critical Care Medicine* 2001; 164:2177-2180.
Lin, Munsie, Hwang, Fitzgerald, and Cayo.. Childhood Asthma Hospitalization and Residential Exposure to State Route Traffic. *Environmental Research, Section A* 2002; 88:73-81.
English P., Neutra R., Scalf R. Sullivan M. Waller L. Zhu L. Examining Associations Between Childhood Asthma and Traffic Flow Using a Geographic Information System. *Environmental Health Perspectives* 1999; 107(9):761-767.
van Vliet et al.. Motor exhaust and chronic respiratory symptoms in children living near freeways. *Environmental Research* 1997; 74:12-132.
Pearson et al.. Distance-weighted traffic density in proximity to a home is a risk factor for leukemia and other childhood cancers. *Journal of Air and Waste Management Association* 2000; 50:175-180.
Raaschou-Nielsen, O., Hertel, O., Thomsen, B.L., & Olsen, J.H. Air Pollution from traffic at the residence of children with cancer. *Am J Epidemiol* 2001; 153:433-443.
Knox and Gilman. Hazard proximities of childhood cancers in Great Britain from 1953-1980. *Journal of Epidemiology and Community Health* 1997; 51:151-159.
Hoek, Brunekreef, Goldbohn, Fischer, van den Brandt. Association between mortality and indicators of traffic-related air pollution in the Netherlands: a cohort study. *Lancet* 2002; 360(9341):1203-9.
Finkelstein et.al. Traffic Air Pollution and Mortality Rate Advancement Periods. *Am J Epidemiol* 2004; 160:173-177.
Gan, W. Q. Changes in Residential Proximity to Road Traffic and the Risk of Death from Coronary Heart Disease. *Epidemiology* 2010; 21(5):642-649.
Heather E. Volk, PhD, MPH; Fred Lurmann; Bryan Penfold; Irva Hertz-Picciotto, PhD; Rob McConnell, MD. Traffic-Related Air Pollution, Particulate Matter, and Autism. *JAMA Psychiatry.* 2013;70(1):71-77. doi:10.1001/jamapsychiatry.2013.266.
[112] California Air Resources Board, Railyard Health Risk Assessments and Mitigation Measures, www.arb.ca.gov/railyard/hra/hra.htm. Cancer risks exceed 1,000 per million next to some of the largest railyards.
[113] "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel Particulate Matter at High-Priority California Railyards." California Air Resources Board, July 5, 2011. Available at: http://www.arb.ca.gov/railyard/commitments/suppcomceqa070511.pdf, page 2.
[114]EPA, Fact Sheet: EPA Finalizes More Stringent Emissions Standards for Locomotive Engines and Marine Compression-Ignition Engines (PDF) (5 pp, 134K, EPA420-F-08-004, March 2008); available at:
http://www.epa.gov/otaq/regs/nonroad/420f08004.pdf

to be phased in until 2015; these Tier 4 locomotives will emit 80 percent less NOx and 90 percent less PM than a train engine built in 2008.[115] Where Tier 4 locomotives are not yet available, diesel particulate filters (DPFs) and selective catalytic reduction (SCR, a common catalyst based technology used to reduce NOx emissions) can be installed on existing locomotives to achieve emissions reductions similar to those of certified Tier 4s.[116]

Also, very high concentrations of NO_2 are present in the exhaust emissions from diesel train engines that would be used at the newly proposed rail terminal.[117] These NO_2 emissions are routinely high enough to exceed the new 1-hour NO_2 standard. While annual NO_2 emissions may be offset by reducing ship imports, the ambient impacts would occur at different locations and times, exceeding the new 1-hour NO_2 standard. This was not considered in the IS/MND and is a significant impact that requires that an EIR be prepared. These emissions can and must be mitigated, for example by using an electronic positioning system,[118] rather than the locomotive engine, to move the cars through the unloading facility.

In addition to electronic positioning systems, mitigations for line haul locomotives should also be included. We recommend tier 4 compliant locomotives or locomotives retrofitted with exhaust controls that can meet tier 4 standards; and a commitment not to idle locomotive engines in the unloading facility, including the use of locomotive idle controls.

II. Public Safety and Noise Impacts

With residential areas just 3,000 feet away from this project (IS/MND at I-2), noise from this project is certain to be a major nuisance. It appears from the project description (IS/MND at I-11 and elsewhere) that the rail activity of four 50-car trains per day would occur predominantly at night. Operations would occur constantly, "24 hours per day/7 days per week/365 days per year." (IS/MND at I-11) Each train crossing Park Road would block that intersection for more than eight minutes for a total of more than half an hour per day of that intersection being blocked (IS/MND at I-11).

While the travel delays caused by lengthy rail crossings may pose a safety concern and a nuisance to the community, our primary concern over health impacts related to the additional rail traffic is in regard to noise. The analysis erroneously dismisses noise from the additional train traffic as "not result[ing] in substantial permanent increases in ambient noise levels," and

---

[115] U.S. Environmental Protection Agency. "EPA Finalizes More Stringent Emissions Standards for Locomotives and Marine Compression-Ignition Engines." Regulatory Announcement EPA420-F-08-004, March 2008. Available at: http://www.epa.gov/otaq/regs/nonroad/420f08004.htm.

[116] West Coast Collaborative, Locomotive and Rail Sector meeting materials, 2012, http://westcoastcollaborative.org/wkgrp-loco.htm.

[117] See attached expert report from Dr. Phyllis Fox.

[118] See, for example, Oregon Department of Environmental Quality, Standard Air Contaminant Discharge Permit, Coyote Island Terminal, LLC, July 24, 20120, p. 3, Condition 1.1.a (an electric powered positioning system for maneuvering railcars through the Railcar Unloading Building).

the project "noise would be similar to noise levels generated by existing refinery operations." (IS/MND at II-53 and II-54) The analysis fails to consider the horns and noise of the four additional trains going through at-grade crossings, particularly at night when most of the activity is expected. Grade separations at major rail crossings should be considered as mitigation.

The IS/MND also fails to adequately address residents' existing noise concerns or to discuss the adverse effects that noise has on people. The IS/MND provides no attempt to gauge existing levels of communication interference, sleep interference or physiological responses and annoyance, nor does it attempt to predict future levels associated with the Project.

The IS/MND also dismisses impacts related to construction noise, on the basis that the nearest residence is 2,700 feet away and thus the project is in compliance with local performance standards (IS/MND at II-53). However, compliance with a certain standard does not necessarily mean noise impacts are insignificant.[119] This is especially true in an area that is already adversely impacted by high noise levels. The IS/MND (at II-52) concedes that worst case noise impacts could be 58 dBA at the nearest residence. In fact, noise from locomotive horns may be much higher and it is not clear that this was considered in the IS/MND. The Federal Rail Administration estimates that railroad horns are in the 95-115 dBA range from 100 feet away and that "the noise resulting from the sounding of train horns has a similar impact to that of low flying aircraft and emergency vehicle sirens."[120]

In any case, noise levels from this project are likely to be above the level that the U.S. Environmental Protection Agency ("EPA") states is significant. EPA holds that a noise impact is significant if it exceeds 55 DNL, identified as the requisite level with an adequate margin of safety for areas with outdoor uses, including residential and recreational uses.[121] However, the IS/MND offers no mitigation for these impacts. Mitigating noise impacts is important not only to address the nuisance aspect of it but also because research on noise from transportation shows significant health impacts.

A. **Communication Interference**

A primary concern in environmental noise problems is communication interference including speech interference and interference with activities such as watching television. Normal conversational speech is in the range of 60 to 65 dBA and any noise in this range or louder may interfere with speech. There are specific methods of describing speech interference as a function of distance between speaker and listener and voice level.

---

[119] *See Oro Fino Gold Mining Corporation v. County of El Dorado*, 225 Cal. App. 872, 881-82 (1990).

[120] Federal Rail Administration, Horn Noise FAQ, available at: http://www.fra.dot.gov/Page/P0599

[121] *See* EPA, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" 21 (March, 1974), http://www.nonoise.org/library/levels74/levels74.htm.

B. **Sleep Interference**

Sleep interference is a major noise concern in noise assessment and is most critical during nighttime hours. Noise can make it difficult to fall asleep, create momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages and cause awakening. Noise may also cause awakening which a person may or may not be able to recall. Extensive research has been conducted on the effect of noise on sleep disturbance. Recommended values for desired sound levels in residential bedrooms range from 25 to 45 dBA, with 35 to 40 dBA being the norm.

The National Association of Noise Control Officials has published data on the probability of sleep disturbance with various single event noise levels. Based on experimental sleep data as related to noise exposure, a 75 dBA interior noise level event will cause noise induced awakening in 30 percent of the cases.

C. **Physiological Responses**

These are measurable effects of noise on people such as changes in pulse rate and blood pressure. Generally, physiological responses are a reaction to a loud short term noise such as a rifle shot or a loud jet overflight, or in this case the horn of a train. Noise above 60 decibels ("db") has been shown to have distinct psychological impacts, such as worsening children's mental health, concentration, and classroom behavior in children at school.[122] Other studies show that chronic noise exposure contributes to a worsening of heart disease and higher rates of stroke, after accounting for the risks association with air pollution.[123]

---

[122] Matsuoka, M., Hricko, Al, Gottlieb, R., and De Lara, J., Global Trade Impacts: Addressing the Health, Social and Environmental Consequences of Moving International Freight through Our Communities, Occidental College and University of Southern California (Los Angeles, 2011) (hereinafter "Global Trade Impacts"), citing World Health Organization, Guidelines for Community Noise, Chapter 3, Adverse Health Effects of Noise (1999), available at: http://www.who.int/docstore/peh/noise/Comnoise3.htm; van Kempen, E.E., van Kamp, I., Stellato, R.K., et al., "Children's Annoyance Reactions to Aircraft and Road Traffic Noise," J. Accoust. Soc. Am. (2009) 125(2): 895-904; U.S. Department of Transportation, Federal Railroad. Administration, The General Health Effects of Transportation Noise (2002), Document # DTS-34-RR297-LR2 FRS/RDV-03/01; Lercher, P., "Ambient Neighborhood Noise and Children's Mental Health," Occup. Environ. Med. (2002) 59(6): 380-6; Evans, G.W., "Child Development and the Physical Environment," Annual Review of Psychology (2006) 57: 423-51.

[123] Global Trade Impacts, 18, citing Babisch, W., "Transportation Noise and Cardiovascular Risk: Updated Review and Synthesis of Epidemiological Studies Indicate that the Evidence Has Increased," Noise & Health (Jan. 2006), Vol. 8, Iss. 30, 1-29; Sorensen, M., Hvidberg, M., Andersen, Z. J., et al., "Road Traffic Noise and Stroke: A Prospective Cohort Study," Eur. Heart J. (Jan. 25, 2011).

Annoyance is a very individual characteristic which can vary widely from person to person. What one person considers tolerable can be quite unbearable to another of equal hearing capability. The level of annoyance depends on the characteristics of the noise, defined as the loudness, frequency, time and duration of the noise, and how much speech and/or sleep interference results from the noise. The level of annoyance is also a function of the attitude of the receiver. Personal sensitivity to noise varies widely. It has been estimated that 2 to 10 percent of the population is highly susceptible to annoyance from noise not of their own making, while approximately 20 percent is unaffected by noise.

III. General Hazards and Ecological Risks

The IS/MND completely fails to consider or mitigate the potential for rail car accidents or spills. While the IS/MND concedes that crude oil is a hazardous material (IS/MND at II-37), it erroneously concludes that the "quantities of crude delivered by rail and marine vessel offset each other, it is, at a minimum, expected that the relative risks offset each other and that rail transport would present no new significant hazard above the current Refinery baseline risk for marine transport of crude oil to the Refinery." In fact, there is a history of major spills of hazardous materials along California rail routes.[124]

Due to the nature of the very dense and toxic diluted bitumen that the rail cars are likely to carry, as discussed above, these fuels in particular pose an especially serious environmental and public health threat when accidentally released into the environment. EPA recently noted that spills of diluted bitumen require different response action or equipment than for conventional oil spills.[125] Dilbit spills are simply more difficult and more expensive to clean up.[126] In fact, three years after a major spill of dilbit into the Kalamazoo River in Michigan, the heavy oil remains at the bottom of the river requiring dredging and $1 billion clean-up cost.[127] The IS/MND fails entirely to consider the possibility of a dilbit spill into the fragile San Francisco Bay Delta, and what the wildlife, ecosystem, economic and human health implications would be.

It is important to note that human health impacts of bituminous oil spills can be quite serious. We are only beginning to understand the full potential of impacts but spills like the one in Marshall, Michigan give a cautionary sense of how severe impacts can be. There public health officials found numerous acute health impacts lasting for days and spanning numerous areas: Cardiovascular, dermal, gastrointestinal, neurological, ocular, renal, respiratory and other

---

[124] For example, there was a very major spill into Upper Sacramento River in 1991. See: http://www.dfg.ca.gov/ospr/NRDA/Cantara.aspx

[125] EPA, Comment letter to US Department of State regarding the Supplemental Draft Environmental Impact Statement from TransCanada's proposed Keystone XL project, 2013.

[126] Environmental Working Group, Poisons in the Pipeline, Tests Find Toxic Stew in Oil Spill, June 2013, page 6.

[127] EPA, 2013

impacts. [128, 129]

IV. Conclusion

The Crude by Rail Project has significant unmitigated effects on the environment. These effects must be analyzed in an Environmental Impact Report and fully mitigated before this Project may lawfully be approved.

Sincerely,

Diane Bailey, Senior Scientist
dbailey@nrdc.org
415-875-6127

Elizabeth Forsyth
Attorney
eforsyth@nrdc.org
415-875-6162

---

[128] Michigan Department of Community Health, *Acute Health Impacts of the Enbridge Oil Spill*, November 2010. http://www.michigan.gov/documents/mdch/enbridge_oil_spill_epi_report_with_cover_11_22_10_339101_7.pdf [accessed 19 June 2013]

[129] U.S Department of Health and Human Services and ATSDR, *Kalamazoo River/Enbridge Spill: Evaluation of Crude Oil Release to Talmadge Creek and Kalamazoo River on Residential Drinking Water Wells in Nearby Communities*, 27 February 2013, p. 90. http://www.michigan.gov/documents/mdch/enbridge_oil_spill_epi_report_with_cover_11_22_10_339101_7.pdf [accessed 20 June 2013]

Comments on
Initial Study/Mitigated Negative Declaration (IS/MND)
Valero Crude by Rail Project
Benicia, California

Use Permit Application 12PLN-00063

Ian Goodman
Brigid Rowan

the goodman group, ltd.
www.thegoodman.com

July 1, 2013

Table of Contents

1. Introduction 1
2. Context and Information for Market Analysis of the Proposed Project 4
3. Benicia Refinery Reconfiguration Project (VIP) 9
3.1. Introduction 9
3.2. Nexus with the Proposed Rail Project 9
4. Benicia Refinery Crude Supply 16

LIST OF APPENDICES

A: Resume of Ian Goodman

B: Resume of Brigid Rowan

C: Valero Investor Relations Website: Information Posted

D: Valero Presentation: UBS Global Oil and Gas Conference

E: Valero Presentation: Refining 101

F: Valero Presentation: Benicia Refinery Tour - July 9, 2007

G: Valero Presentation: Benicia Refinery Tour - August 17, 2010

H: Marathon Petroleum Presentation: Refining 101

I: CCQTA Presentation: Canadian Crude Oil Quality: Past, Present and Future Direction

1. Introduction

As described in the draft Initial Study/Mitigated Negative Declaration (IS/MND) issued by the City of Benicia:[1]

> The proposed Valero Crude by Rail Project would allow the Valero Benicia Refinery (Refinery) access to additional North American-sourced crude oil for delivery to the Refinery by railroad. The Project would involve the installation and modification of Refinery non-process equipment that would allow the Refinery to receive a portion of its crude oil deliveries by railcar replacing equal quantities of crude currently being delivered to the Refinery by marine vessel. Valero intends to replace up to 70,000 barrels per day of the crude oil currently supplied to the Refinery by marine vessel with an equivalent amount of crude oil transported by rail cars. **The crude oil to be transported by rail cars is expected to be of similar quality compared to existing crude oil imported by marine vessels. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.**

Valero has applied to the Bay Area Air Quality Management District (BAAQMD) for a construction permit for the proposed Crude by Rail Project (the Project). The Authority to Construct Application (ATC) is Appendix A1 to the IS/MND.[2] In the BAAQMD proceeding, Valero responded to questions by the BAAQMD in an April 11, 2013 letter (Valero Response to BAAQMD April 11, 2013).[3]

The IS/MND assumes that the Project will not significantly affect crude quality and will not displace crude delivered by pipeline. As further explained in the Comments on IS/MND submitted by Dr. Phyllis Fox (Fox Comments), refinery air emissions can increase due to changes in crude quality. Thus, to meaningfully evaluate the proposed Valero Refinery Crude by Rail Project, it is necessary to consider how the crudes delivered by rail might differ from those that would be delivered by marine vessel and pipeline. Simple summary information (such as

[1] ESA, Valero Crude by Rail Project, Initial Study/Mitigated Negative Declaration, Use Permit Application 12PLN-00063, Prepared for City of Benicia, May 2013, MND p. 1 (emphasis added).

[2] In these Comments, all references to the ATC are to the Public Document. We have not been provided with access to the full version of this document, which includes content that Valero claims to be Confidential Business Information.

[3] In these Comments, all references to the Valero April 11, 2013 Response to BAAQMD are to the Public Document. We have not been provided with access to the full version of this document, which includes content that Valero claims to be Confidential Business Information.

API gravity and sulfur content) is not sufficient as a measure of crude quality, since refinery processing is affected by a wide range of crude quality attributes.[4]

These Comments were prepared by Ian Goodman[5] and Brigid Rowan[6] of The Goodman Group, Ltd. (TGG), a consulting firm specializing in energy and regulatory economics.[7] TGG was retained to provide a Market Analysis to evaluate how the proposed Crude by Rail Project could affect crude supply (and thus quality) for the Refinery.[8] The evaluation undertaken by TGG is therefore also an input provided to assist Dr. Fox in her evaluation of the proposed Project. TGG and Phyllis Fox conferred during the preparation of their respective Comments, and (where relevant) each of the Comments makes reference to the other.

In evaluating complex energy issues, TGG's orientation is to undertake a deep and comprehensive analysis of the relevant economic and other issues. However, the IS/MND touches upon a very wide range of issues regarding rapidly evolving crude markets. As further discussed in Sections 2, 3, and 4 and the Fox Comments, much of the relevant information relating to the proposed Project is incomplete and/or not publicly available. In some instances, relevant information has not been publicly disclosed because Valero claims it to be Confidential Business Information.[9] In other instances, the IS/MND and other Project documents have failed to consider the Project's relevant context, and thus do not adequately evaluate the relevant issues based on the relevant information. Put more simply, in many instances, relevant information is not even identified, much less evaluated. Given the limited time, information, and other resources available, it is simply impractical for TGG to undertake a full independent analysis.

In light of these constraints, TGG has provided a sound alternative analysis that offers useful guidance to policymakers. In particular, the alternative analysis provided in these Comments provides more useful guidance than does the IS/MND. Based on flawed, simplistic, and

---

[4] See Fox Comments, Section 2 below, and, e.g., Canadian Crude Oil Quality, Past, Present and Future Direction: A Historical Perspective. Canadian Crude Quality Technical Association (CCQTA), Presented to the Canadian Heavy Oil Association (CHOA) February 7, 2012, attached to these Comments as Appendix I (especially pp. 4, 6-14, 19-25).

[5] Resume of Ian Goodman is provided as Appendix A to these Comments.

[6] Resume of Brigid Rowan is provided as Appendix B to these Comments.

[7] www.thegoodman.com

[8] These Comments were co-authored by Ian Goodman and Brigid Rowan, co-authors of "Report evaluating the Keystone XL (KXL) Draft Supplemental Environmental Impact Statement (DSEIS) Market Analysis" that was filed April 22, 2013 as an attachment to the DSEIS Comments jointly submitted by the Sierra Club, NRDC, and 14 other environmental and public interest organizations: http://switchboard.nrdc.org/blogs/aswift/Comments%20of%20Sierra%20Club%2C%20et.%20al.%2C%20on%20the%20Keystone%20XL%20DSEIS.4.22.13.pdf

[9] As discussed in footnotes 2 and 3, we do not have access to the full version of certain Project documents, which include content that Valero claims to be Confidential Business Information. We thus have access to only the Public Document versions of the ATC (which is Appendix A1 to the IS/MND) and the Valero Response to BAAQMD April 11, 2013.

incomplete data and assumptions, the IS/MND assumes that the proposed Project will not significantly affect crude quality. From the information now available, TGG concludes that the proposed Project could significantly affect crude quality. Based on guidance from our alternative analysis, the Fox Comments, and other input received as part of the Comment process, the City of Benicia should undertake a full Environmental Impact Report (EIR) in order to provide a sound basis for decision-making on the proposed Valero Crude by Rail Project.

Sections 2 and 3 demonstrate how the IS/MND issued by the City of Benicia depends on incomplete and flawed information and analysis that do not constitute a meaningful basis for decision-making. The relevant information and analysis for meaningful evaluation of the Project are available and are in fact used by Valero as a basis for its business decisions; but Valero has chosen not to consider or disclose this relevant information. Issues relating to historical and future crude supply for the Benicia Refinery are considered at length in Section 4.

Section 2 discusses the broader market context, which informs Valero's decisions. This section demonstrates that in order to evaluate the Project, Valero would have already undertaken an extensive market analysis involving detailed information on crude supply and quality. At Valero (and other refiners), refinery planning, operations, and capital project decisions are based on very detailed analysis that explicitly considers the broader market and the specifics of each refinery, processing units, feedstock and product. However, instead of providing the relevant information on crude supply and quality (that Valero already possesses and uses for its internal decision-making), Valero has instead provided a vague and incoherent consideration of crude supply and quality for the IS/MND (and for the ATC, which is Appendix A1 to the IS/MND).

Section 3 highlights another major flaw in Valero's Project proposal: the complete failure to disclose and consider the Valero Improvement Project (VIP), another major and related project at the Benicia Refinery. The VIP is a large-scale ongoing reconfiguration project at the Refinery to enable a large shift in crude supply to Cost-Advantaged heavier, sour crudes. Therefore the VIP creates significant and ongoing changes to the Refinery configuration and affects crude supply and quality. The proposed Crude by Rail Project can only be meaningfully evaluated in the context of the VIP. Again, because of Valero's failure to consider and disclose information on the VIP as part of its Project proposal, the IS/MND is based on incomplete and flawed information and analysis.

As demonstrated in Sections 2 and 3, the IS/MND has failed to provide adequate information regarding crude supply and quality, which is necessary in order to evaluate the impact of the Project. However, information provided elsewhere does offer some insight into the crudes now being processed at Benicia and thus what type of crudes might be delivered by rail. Based on this information, Section 4 discusses issues related to historical and future crude supply for the Refinery and draws some conclusions regarding the impact of the Project on crude supply and quality.

2. Context and Information for Market Analysis of the Proposed Project

Petroleum markets are large, complex, and highly interconnected. In turn, Petroleum Market Analysis can be highly complex, with significant interrelationships between its various elements. Petroleum markets are also highly dynamic and interactive.

Refining is a very information-intensive activity. Valero is particularly well-positioned to have high-quality information resources, and to use these resources to be successful in all aspects of refining. As the world's largest independent refiner,[10] Valero is involved in a very wide range of activities relating to refining:

> Valero has grown from a regional energy company with a single refinery to the world's largest independent refiner, with 16 refineries stretching from California to Canada to the United Kingdom. With this network of refineries, Valero has a combined throughput capacity of approximately 3 million barrels per day.[11]

Through its corporate website and other channels, Valero discloses extensive ongoing information to investors, including events and presentations; key commodity prices and other industry fundamentals; financial reports, filings and statements; and other disclosures. Information currently posted on the Valero Investor Relations website is shown in Appendix C.

Valero's most recent Investor Presentation (UBS Global Oil and Gas Conference, May 21-22, 2013) is attached to these Comments as Appendix D. This Presentation provides useful information regarding the proposed Crude by Rail Project at the Benicia Refinery and more generally about Valero's plans to use rail and other logistics to access Cost-Advantaged Crudes from the Canadian tar sands and other sources.[12]

As this Presentation clearly shows, development of the proposed Benicia Crude by Rail Project is not occurring in isolation. Rather, this Project is very much part of the dramatic shifts now underway throughout the North American oil system.[13] This Project can only be meaningfully

---

[10] Independent refiners (such as Valero and Tesoro) do not have their own crude production, so their entire crude supply must be sourced from third parties. Integrated oil companies (such as Chevron and Shell) engage in both crude production (oil wells) and crude processing (oil refineries).

[11] http://www.valero.com/OURBUSINESS/Pages/RefiningOurBusiness.aspx

[12] Appendix D, pages 6-11, 25, 32, 44-45.

[13] These shifts, and their implications for the Benicia Crude by Rail Project, will be addressed in Section 4 of these Comments.

evaluated within the broader Market Analysis context; Valero's internal decision-making in regard to the proposed Project is based on its evaluation of this broader market context.

This broader context is not adequately considered in the IS/MND and other Project Documents. However when communicating with investors, Valero has provided much more useful information resources concerning this broader context. Valero's most recent "Refining 101" Presentation (January 2013) is attached as Appendix E. The focus of that presentation is on the fundamentals of refining, which are generally relevant for Valero's refineries throughout the US, Canada, and globally.

But the content in the general Refining 101 Presentation is also similar to the content provided by Valero in Investor Presentations specific to the Benicia Refinery. Presentations for Benicia Refinery Tours on July 9, 2007 and August 17, 2010 are attached as Appendices F and G, respectively. There is very substantial overlap between the content in Valero's Presentations for Refining 101 (Appendix E) and the Benicia Refinery Tours in 2007 and 2010 (Appendices F and G).

The Refining 101 and Refinery Tour Presentations show the framework and types of information that Valero utilizes in undertaking Market Analysis and crude sourcing for the Benicia Refinery. These Presentations provide confirmation that issues relating to crude supply and quality can only be meaningfully evaluated in the context of refinery configuration.

Moreover, despite Valero's broad and repeated claims as to what is Confidential Business Information in regard to the IS/MND and other Project documents, the framework and information that Valero utilizes in undertaking Market Analysis and crude sourcing is (in various ways) not unique to Benicia or Valero. Other refiners (including Valero's direct competitors) utilize similar framework and information in undertaking Market Analysis and Crude Sourcing. For example, Marathon Petroleum (another leading independent refiner) also has a "Refining 101" Presentation (attached as Appendix H) that is quite similar to that which Valero has provided. There is very substantial overlap between the content in Marathon's Refining 101 Presentation (Appendix H) and Valero's Presentations (Appendices E, F, and G).

The vague and incoherent consideration of crude quality in the IS/MND and other publicly available Project Documents is in notable contrast to how Valero (and other refiners) actually undertake refinery planning, operations, and capital decisions. At Valero (and other refiners), refinery planning, operations, and capital project decisions are based on very detailed analysis that explicitly considers the highly differentiated specifics of each type of refinery, processing unit, feedstock, and product.

As emphasized in the attached Presentations (Appendices E, F, G, and H), each petroleum refinery is uniquely configured to process a set of raw materials (crude slate) into a desired set

of products (product slate). Moreover, each type of crude is also unique. Refinery configuration is key in determining the suitability of crudes for a given refinery.[14] Crude selection is based on the relative economics of available choices, assisted by analysis using Linear Programming (LP) models. These complex LP models incorporate representations of each refinery unit's operations, every potential feedstock and product, and take into account varying properties and pricing:

- **Refinery configuration plays a large part in determining the suitability of crudes and feedstocks in a given refinery**
- Crude and feedstock selection is based on the relative economics of available choices assisted by analysis using LP models[15]

[…]

- Valero uses linear programming models (LP) to optimize its refineries
- LPs are complex models that incorporate:
  - Representations of each refinery unit's operations
  - **Every potential feedstock, intermediate, and product**
    - **Takes into account varying properties and pricing**
- LP results guide decisions on refinery utilization, feedstock purchases, and product yields
- **Valero does this by unit, by refinery, and across its portfolio of refineries**[16]

Each type of crude has unique physical and chemical properties, and crudes differ widely in their characteristics. Crude quality is a central element in refinery planning, operations, and capital project decisions. High quality and very detailed crude oil assay[17] information is essential for refinery planning, operations, and capital project decisions:

---

[14] The simplest refinery configuration, called a topping refinery, consists of tankage, a distillation unit, recovery facilities for gases and light hydrocarbons, and the necessary utility systems (steam, power, and water-treatment plants).Topping refineries may produce large quantities of unfinished oils.

The addition of hydrotreating and reforming units to this basic configuration results in a more flexible hydroskimming refinery, which can also produce desulfurized distillate fuels and high-octane gasoline. But these refineries still produce a large portion of their output as heavy (residual) fuel oil, asphalt, and other heavy (and typically low value) products.

The most versatile refinery configuration is known as a conversion refinery. A medium conversion refinery incorporates all the basic building blocks found in both the topping and hydroskimming refineries, but it also features gas oil conversion plants such as catalytic cracking and hydrocracking units, olefin conversion plants such as alkylation or polymerization units.

A high conversion refinery also has coking units for sharply reducing or eliminating the production of residual fuels. High conversion refineries can produce a large portion of their output as gasoline, with the balance distributed between distillates (diesel, jet fuel, and light fuel oil), liquefied petroleum gases (propane/butane), and a small quantity of petroleum coke.

[15] Valero Refining 101 Presentation (Appendix E, p. 19, emphasis added).

[16] Valero Refining 101 Presentation (Appendix E, p. 17, emphasis added).

[17] A crude oil assay is a test performed by a laboratory on a sample to evaluate the crude's physical and chemical properties. Crude oil assays typically measure viscosity, density, acidity and sulfur content, and other properties. For sources and additional information regarding crude oil assays, see footnote 18; Intertek Crude Oil Assay

(footnote continued on next page)

Crude Oil Assay Program

- Crude oils are characterized utilizing a very comprehensive testing slate
- Typical full crude assay cost:
  - $10,000 - $20,000 per crude
- Information is used for:
  - Purchase decisions
  - Refining planning and optimization
  - Capital project decisions

[…]

Analytical Testing

- A representative sample of the crude is distilled in the laboratory under similar conditions as the refinery.
- Ten or more boiling range fractions are obtained.
- Very extensive testing is conducted on the whole crude and the various fractions.
- Tests performed are selected based on the products.

[…]

Converting Information to Intelligence

- Following the analytical testing, special software programs are used to put the raw analytical data into a form that conclusions, comparisons, and correlations can be made.
- Sophisticated computer models use the crude assay data together with operational data and price information to allow for optimal planning and operation. [18]

(footnote continued from previous page)
Testing http://www.intertek.com/petroleum/crude-assay/; and Alberta Ministry of Energy http://www.energy.alberta.ca/OilSands/1708.asp.

[18] Marathon Petroleum Refining 101 Presentation (Appendix H, pp. 13, 14, 16, emphasis bold in original, emphasis underlining added). The crude oil assay program activities described by Marathon Petroleum are representative of those at Valero and across the oil industry. Assay data are used by refineries to determine if a crude is compatible for a particular refinery or if it could cause yield, quality, production, environmental and other problems.
There is extensive collaboration between refiners and across the industry in regard to crude quality, notably via Crude Oil Quality Association (COQA http://www.coqa-inc.org/) and Canadian Crude Quality Technical Association (CCQTA http://www.ccqta.com/). See, for example, CCQTA, Canadian Crude Oil Quality Past, Present and Future Direction, February 7, 2012, attached to these Comments as Appendix I, p. 8: "Need more than sulfur and gravity to determine the "acceptability and valuation" of crude oil in a refinery. The crude oil's hydrocarbon footprint and contaminants determine the value of crudes;" Valuing Opportunity Crudes with Haverly H/COMET, David Alexander, Haverly Systems. March 7, 2013 (showing use of assay data by refiners and across the industry http://www.coqa-inc.org/20130306-07_Alexander.pdf); and Domestic Sweet/WTI Specifications, June 2010 (involving both Marathon and Valero http://www.coqa-inc.org/06102010_Sutton.pdf).

As discussed in the Fox Comments, the crude assay information relied upon by Valero (and other refiners) provides the types of detailed data required to evaluate refinery air emissions. [19] But Valero has failed to publicly disclose the information required to meaningfully evaluate emissions for the proposed Crude by Rail Project at the Benicia Refinery.

The vague and incoherent consideration of crude quality in the IS/MND and other publicly available Project documents does not meaningfully reflect how Valero (and other refiners) actually undertake refinery planning, operations, and capital project decisions. The issue of concern is not whether Valero has the information regarding crude quality that is required to meaningfully evaluate the proposed Crude by Rail Project, since Valero clearly does have this information. Rather, the issue of concern is that Valero has failed to disclose the relevant information that it utilized internally to evaluate the proposed Project, And in turn, the broader and most relevant issue of concern then becomes that the IS/MND issued by the City of Benicia depends on incomplete and flawed information and analysis that do not constitute a meaningful basis for decision-making.

[19] As shown in the Marathon Petroleum Refining 101 Presentation (Appendix H, p. 17) and footnote 18, the crude assay information relied upon by Valero and other refiners provides the types of data identified in the Fox Comments as required to evaluate emissions.

3. Benicia Refinery Reconfiguration Project (VIP)

3.1. Introduction

As demonstrated in Section 2, the IS/MND and other publicly available Project documents fail to disclose and consider relevant information, notably in regard to the Market Analysis context and crude quality. But the failure to disclose and consider relevant information is actually even more profound and pervasive than would be concluded based just on Section 2. As discussed below and in the Fox Comments, the IS/MND and all publicly available Project documents completely fail to disclose and consider the Valero Improvement Project (VIP), another major (and related) project at the Benicia Refinery. Once again, the IS/MND depends on incomplete and flawed information and analysis that do not constitute a meaningful basis for decision-making.

The VIP is a large-scale ongoing reconfiguration project at the Benicia Refinery to enable a large shift in crude supply to Cost-Advantaged heavier, sour crudes. The proposed Crude by Rail Project can only be meaningfully evaluated in the context of the Benicia Refinery configuration and crude supply. Any changes in the Refinery configuration (particularly substantial and ongoing changes) that significantly affect crude supply must also be considered as part of a meaningful evaluation of the proposed Project.

The VIP clearly creates significant and ongoing changes to the Refinery configuration and crude supply. The VIP is specifically intended to affect Benicia crude supply, notably to enable a large shift to Cost-Advantaged heavier, sour crudes. Therefore, the proposed Crude by Rail Project can only be meaningfully evaluated in the context of the VIP. But there is no mention of the VIP in the IS/MND and all publicly available Project documents. Meanwhile, the VIP is prominently featured in Valero's disclosures to investors regarding the Benicia Refinery.

The VIP is a very large and complex project that is being implemented over an extended period, both preceding and overlapping implementation of the proposed Crude by Rail Project. The VIP affects crude supply, both preceding and overlapping implementation of the proposed Crude by Rail Project. The IS/MND and other publicly available Project documents fail to disclose and consider the VIP and also provide only vague generalities in regard to which crudes have been and will be processed at the Benicia Refinery. Meanwhile, Valero's publicly available disclosures to investors provide considerably more and better information regarding Refinery crude supply.

3.2. Nexus with the Proposed Rail Project

As explained in the Benicia Refinery Tour - July 9, 2007 Presentation:

Valero Benicia Refinery

- Significant modifications and upgrades have made the refinery one of the most complex and profitable refineries in the United States[20]

Benicia Feedstocks

- Crude slate includes Alaska North Slope (ANS), San Joaquin Valley (SJV), and a wide variety of other crudes
  - 80% received by ship across Refinery docks
  - 20% received by pipeline
- Shifting crude slate
  - When acquired in 2000, 80% of Benicia's crude was ANS
  - Today, less than 40% ANS
- Versatile, high-conversion facility with ability to process heavy, sour crudes
  - 35% heavy sour, 47% medium/light sour, 2% acidic sweet, 16% other
- Capable of processing imported intermediate feedstocks[21]

Benicia Projects in Development

- Valero Improvement Project (VIP) development under way for 2010 turnaround and beyond
  - Crude "Sour-up" to reduce dependence on ANS
    - New desalter
    - Sulfur removal and sulfur recovery capacity improvements
  - Flue gas scrubber for Coker and FCC
  - New hydrogen manufacturing unit[22]

The Benicia Refinery Tour - July 9, 2007 Presentation also provides a flow diagram for the Refinery.[23] Meanwhile, in the permitting process for the proposed Crude by Rail Project, Valero claims that the Process Flow Diagram is Confidential Business Information.[24]

As compared with the Benicia Refinery Tour - July 9, 2007 Presentation, the August 17, 2010 Refinery Tour Presentation provides similar and updated information in regard to which crudes have been and will be processed at the Refinery:

Benicia Feedstocks

- Crude slate includes a wide variety of international crudes, San Joaquin Valley (SJV), and Alaska North Slope (ANS)
  - 75% received by ship across refinery docks
  - 25% received by pipeline
- Shifting crude slate

[20] Appendix F, p. 20 (emphasis bold in original).
[21] Appendix F, p. 23 (emphasis bold in original, emphasis underlining added).
[22] Appendix F, p. 26 (emphasis bold in original, emphasis underlining added).
[23] Appendix F, p. 29.
[24] Valero Authority to Construct Application to BAAQMD (ATC), Appendix A, which is in turn Appendix A1 to the IS/MND.

– When acquired in 2000, 80% of Benicia's crude was ANS
– Today, less than 10% ANS
• Versatile, high-conversion facility with ability to process heavy, sour crudes
– 35% heavy sour, 47% medium/light sour, 18% other
• Capable of processing imported intermediate feedstocks[25]

The information provided in the two Refinery Tour Presentations reveals that crude slate for the Benicia Refinery has shifted dramatically, since this refinery was acquired by Valero in 2000. ANS was 80% of crude supply in 2000, dropping to less than 40% in 2007 and less than 10% in 2010. There has also been a smaller shift towards crudes delivered by pipeline, which rose from 20% of total crude supply in 2007 to 25% in 2010. Issues relating to historical and future crude supply for the Benicia Refinery will be considered at length in Section 4.

In 2010, the VIP to reconfigure the Refinery was ongoing, and construction of the massive flue gas scrubber is featured prominently in the 2010 Refinery Tour Presentation.[26]

The proposed Crude by Rail Project is intended to modify Refinery crude supply, notably via a shift to North American-sourced crude that can be delivered by rail. As noted above and disclosed to investors by Valero, issues relating to crude supply and quality can only be meaningfully evaluated in the context of refinery configuration:

> Refinery configuration plays a large part in determining the suitability of crudes and feedstocks in a given refinery[27]

Thus, as indicated above, the proposed Crude by Rail Project can only be meaningfully evaluated in the context of the Benicia Refinery configuration. Any changes in the Refinery configuration (particularly significant and ongoing changes) that could significantly affect crude supply must also be considered as part of a meaningful evaluation. The VIP clearly creates significant and ongoing changes to the Refinery configuration: it is specifically intended to affect Benicia crude supply, notably to enable a large shift to Cost-Advantaged heavier, sour crudes.

Moreover, as discussed below and in the Fox Comments, the VIP is a very large and complex project that is being implemented over an extended period, both preceding and overlapping implementation of the proposed Crude by Rail Project. Hence, the VIP has the potential to interact with the proposed Crude by Rail Project in a variety of ways. Put simply, the VIP is a key part of the relevant context for the Crude by Rail Project, but the VIP has not been disclosed or considered in the IS/MND and other Project Documents.

---

[25] Valero Presentation, Benicia Refinery Tour, August 17, 2010 (Appendix G, p. 29, emphasis bold in original, emphasis underlining added).
[26] Appendix G, pp. 31-34.
[27] Valero Refining 101 Presentation (Appendix E, p. 19).

Initiated in 2002, the VIP[28] was designed to enable a large shift in crude supply to Cost-Advantaged heavier, sour crudes:

> The VIP would implement a series of modifications and additions that are focused on four objectives.
>
> 1. **Provide ability to process lower grades of raw materials**. [footnote 1 in original: As used in this document, the term "raw materials" is defined as crude oil and gas oil feedstocks.]
> 2. Provide flexibility to substitute raw materials – crude oil instead of gas oil.
> 3. Optimize operations for efficient production of clean burning fuels.
> 4. Mitigate project-related impacts to avoid detrimental effects on the community.[29]
>
> […]
>
> The refinery currently imports and processes two primary raw materials – crude oil and gas oil. **Currently, about 30% of the refinery feedstocks are lower-grade raw materials, with higher levels of sulfur and higher heavy pitch content. The VIP changes would allow the refinery to purchase and process additional volumes of lower-grade raw materials (crude oils or gas oils). In general terms, the refinery would be able to increase this percentage to about 60%, raising the average sulfur content of the imported raw materials from current levels of about 1 - 1.5% up to future levels of about 2 - 2.5%.**
>
> With the increase in maximum crude rate, there would also be an opportunity for the refinery to reduce processing of gas oil when economics favor the substitution of crude oil. Although the project would result in a nominal increase of about 25% in crude oil processing capacity that increase in capacity is expected to result in only a 10% increase in gasoline production. This is because a reduction in gas oil processing would be called for to keep the refinery operations balanced.
>
> It should be further noted that any increase in gasoline production capacity would be contingent upon the availability of optimum crude blends to meet the refinery's

---

[28] ESA, Valero Refining Company's Land Use Application for the Valero Improvement Project, Environmental Impact Report, Draft, October 2002 (VIP DEIR)
http://www.ci.benicia.ca.us/vertical/sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7B529090B4-087B-435C-9799-5C137730DD7F%7D.PDF
The Benicia Planning Commission certified the Final EIR, consisting of the DEIR and the Responses to Comments in Resolution No. 03-4. This FEIR was amended in 2007-2008. Supporting documents available at:
http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC=%7B737165B4-11C5-4974-9B0B-0AE4AC535ECC%7D.

[29] VIP DEIR, p. 1-1, emphasis added.

> capabilities. **The refinery purchases crude and gas oil in the market place, and the optimum blends are not always available. The proposed project provides the refinery with the flexibility to utilize diverse qualities of raw materials, especially the lower priced ones that are higher in sulfur content,** but it does not necessarily imply that there would be an increase in gasoline production.
>
> The implications of the differences in crude oil and variations in feedstocks with respect to the operation and equipment changes for the affected refinery units are described and discussed under the descriptions of the project components in Section 3.4.3 that follows. Furthermore, the material changes in the environmental effects that would result from processing the different feedstocks are described in detail in Chapter 4, Environmental Setting, Impacts and Mitigations, of this document.[30]

As indicated in the citation above, the VIP was designed to enable a doubling in the processing of heavier, sour feedstocks (from 30% to 60% of total feedstocks), and also to provide flexibility to process more crude oil and less gas oil. Put simply, the VIP enables a very large shift in Refinery crude supply to heavier, sour crudes.

To enable this very large shift in crude supply, the VIP includes large-scale modifications to many parts of the Refinery. As further discussed in the Fox Comments, these modifications consist of expansions and other upgrading of the units required to process heavier, sour crudes (including modifications to the coker, hydrocracking, hydrofining, hydrogen production, and crude tankage):

> The VIP would modify and install typical refining equipment -- piping, heat exchangers, instrumentation, catalytic reactors, fractionation equipment, pumps, compressors, furnaces, tanks, and their associated facilities. These changes would include installation of new facilities as well as minor changes to existing facilities. The components of the project include the following:
>
> - Pipestill modifications to increase crude oil processing capacity by approximately 25%
> - Fluid Catalytic Cracker Unit Feed Flexibility modifications to process different feeds
> - **Coker Unit modifications to process additional feed**
> - **Increased refinery capacity to remove and recover sulfur**
> - Flue Gas Scrubber to reduce emissions from the main stack
> - **Additional hydrogen production to support hydrofining and hydrocracking**
> - **Hydrofining optimization changes**

[30] VIP DEIR, p. 3-20 – 3-25, emphasis added.

- **Modifications to maximize hydrocracking, alkylation, and reforming capacity**
- Adding a Guard Reactor to the Hydrotreater
- Modifications to optimize fractionation processes
- New and modified existing combustion sources
- Use of additional water
- Modifications to the wastewater treatment facility
- Added support facilities and infrastructure
- **Added new crude tankage**
- **Import and export changes** [31]

The VIP import and export changes relate to increased imports of crude (and other feedstocks) and increased exports of refinery products:

> ***IMPORT AND EXPORT LOGISTICS***
> *Introduction*
> *The increased import of crude oil and gas oil and export of refinery products will result in increases in surface transportation.* [32]

In particular, the VIP was estimated to increase Benicia Refinery shipments of both inputs and outputs:

- increased ship traffic due to increased imports of crude,[33]
- increased ship traffic due to increased exports of coke production,[34] and
- increased train, truck, and pipeline shipments to deliver increased production of coke and various other refinery products. [35]

The VIP was estimated to have substantial transportation impacts, with overall ship traffic (imports and exports) estimated to increase by over 10%.[36]

The VIP is a very large-scale project, with very large impacts on Refinery crude supply, production, and marine and other transportation.

---

[31] VIP DEIR, pp. 1-1 – 1-2, emphasis added.
[32] VIP DEIR, p. 3-51, emphasis bold and italics in original.
[33] Crude imports increase by 36 ships per year, partially offset by a decrease of 24 ships and barges per year for gas oil imports, with a resulting net increase of 12 ships per year for crude and gas oil dock movements (VIP DEIR, pp. 3-51 – 3-52, 4.8-14).
[34] The VIP includes coker modifications to expand coker capacity from approximately 30,000 bpd to 35,000 bpd and to otherwise facilitate increased processing of heavier feedstocks, with a resulting increase in production of petroleum coke and other products (VIP DEIR, pp. 3-30 – 3-32). Coke exports increase by 12 ships per year, with 5 additional rail cars per day of coke to dock area (VIP DEIR, p. 3-51 – 3-52).
[35] VIP DEIR, pp. 3-51 – 3-52; see also footnote 34 regarding rail shipments of coke to dock area.
[36] Baseline ship visits of 229 per year increase by 24 per year (net increase of 12 additional ships per year for crude and gas oil imports (see footnote 33), plus 12 additional ships per year for coke exports (see footnote 34); (VIP DEIR, p. 3-51 – 3-52, 4.8-14).

Interactions between the VIP and Crude by Rail Project are of particular concern given the timing of the two projects. As further discussed in the Fox Comments, the VIP is a very large and complex project that is being implemented over an extended period, both preceding and overlapping implementation of the proposed Crude by Rail Project. Completion and full operation of the VIP has been delayed. The Hydrogen Plant is not expected online until the end of 2014, and Valero has filed a request with the BAAQMD to extend the construction permit for the Hydrogen Plant through December 2014 to accommodate this delay.[37] Moreover, as further explained in the Fox Comments, delays relating to the Hydrogen Plant can significantly affect other aspects of the VIP.[38]

Hence, the VIP has the potential to substantially interact with the proposed Crude by Rail Project in a variety of significant ways. As emphasized above, the VIP is a key part of the relevant context for the Crude by Rail Project, but the VIP has not been disclosed or considered in the IS/MND and other Project Documents.

As the above discussion of the VIP clearly shows, the Benicia Crude by Rail Project proposal is not occurring in isolation. Rather, this Project is very much related to the VIP. This Project can only be meaningfully evaluated within the context of the VIP, and Valero's internal decision-making in regard to the proposed Project is based on its evaluation of how these related projects would interact.

As also discussed in the Fox Comments, Valero has failed to publicly disclose the information required to meaningfully evaluate the proposed Crude by Rail Project at the Benicia Refinery, in combination with the ongoing VIP.

The consideration of proposed Project, absent mention of the VIP, in the IS/MND and other publicly available Project documents does not meaningfully reflect how Valero (and other refiners) actually undertake capital project decisions. The issue of concern is not whether Valero has the information regarding VIP that is required to meaningfully evaluate the proposed Crude by Rail Project, since Valero clearly does have this information. Rather, the issue of concern is that Valero has failed to disclose the relevant information that it utilized internally to evaluate the proposed Project, And in turn, the broader and most relevant issue of concern then becomes that the IS/MND issued by the City of Benicia depends on incomplete and flawed information and analysis that do not constitute a meaningful basis for decision-making.

---

[37] ENSR Corporation, Environmental Analysis, Valero Improvement Project Amendments, September 2007 (2007 Amendments), Table 2.5.1-1 and VIP Semi-Annual Construction Report for the first half of 2012 - Revised, August 1, 2012 (showing the Hydrogen Plant starting up 4th quarter of 2014).

[38] Heavier, sour crudes (and especially Canadian tar sands crudes) require intensive refinery processing that is hydrogen-intensive.

4. Benicia Refinery Crude Supply

As demonstrated in Sections 2 and 3, the IS/MND has failed to provide adequate information regarding crude supply and quality, which is necessary in order to evaluate the impact of the Project. However, information provided elsewhere does offer some insight into the crudes now being processed at Benicia and thus what type of crudes might be delivered by rail and displaced by rail. This section first explains why adequate information on the impact of the Project on crude supply and quality is essential. Then, based on information provided elsewhere, this section discusses issues related to historical and future crude supply for the Refinery and draws some conclusions regarding the impact of the Project on crude supply and quality.

To meaningfully evaluate the proposed Valero Refinery Crude by Rail Project, it is necessary to consider how the crudes delivered by rail might differ from those that would be delivered by marine vessel.

Moreover, while the IS/MND assumes that crude delivered by rail would not displace crude delivered to the Refinery by pipeline, no basis for this assumption is provided. Likewise, the MND does not impose any conditions to restrict displacement of pipeline deliveries. Thus, to meaningfully evaluate the proposed Valero Refinery Crude by Rail Project, it is also necessary to consider how the crudes delivered by rail might differ from those that would be delivered by pipeline.

The IS/MND does not provide sufficient information to meaningfully evaluate crude quality for the crudes that would be delivered by rail. Likewise, the IS/MND does not provide sufficient information to meaningfully evaluate crude quality for the crudes that would be displaced by rail deliveries (i.e., crude deliveries by marine vessel and possibly by pipeline). In turn, the IS/MND does not provide sufficient information to meaningfully evaluate the impact on crude quality as a result of the shift (crude by rail displacing crude by marine vessel, and possibly pipeline).

This paucity of information is notable. As indicated above and further explained below, Valero has extensive, high-quality information regarding crude quality, but Valero has chosen not to disclose this information. Thus, we are left to make educated guesses based on the very limited publicly available information.

As the operator of the Refinery, Valero has very high-quality information regarding historical crude supply and quality attributes. Such information is essential for crude procurement and

refinery operations. Put simply, Valero needs to know what it is buying: the attributes of each specific crude affect its value and how it will be processed at the refinery.[39]

Likewise, in analyzing whether to undertake the proposed Project, Valero had to project what type of crudes will be available by rail vs. marine vessel (and pipeline), and how a shift to rail would affect the cost of crude supply, refinery operations, product output, and profitability.

Despite the paucity of information provided by Valero, the IS/MND has accepted and repeated Valero's simplistic assumptions that the proposed Project will not significantly affect crude quality.

Echoing Valero,[40] the IS/MND provides inadequate detail on the quality of the crude oil delivered by rail, identifying it only as "North American-sourced crude oil" that is "expected to be of similar quality compared to existing crude oil delivered by marine vessels" (MND, p. 1).

The Initial Study indicates the Refinery currently processes a blended slate of crude oil with a gravity ranging from 20° to 30° API[41] and a sulfur content ranging from 0.6% to 1.9%, based on 2011 to 2012 data.[42] Beyond that, no information about this crude slate is disclosed. The Initial Study also claims that the "North American-sourced crude oils are expected to replace crude oils of similar gravity and sulfur content currently brought in by ship," reporting the rail deliveries to have a gravity that ranges from 20° to 43.5^{o} API and a sulfur content that ranges from 0.06% to 3.1%.[43]

Thus, the Initial Study concludes that "it is anticipated that the Refinery would continue to operate within its existing specifications for crude oil gravity and sulfur content range." [44] Further, it concludes that the Refinery would not need to change existing operations or process equipment, "nor would emissions from Refinery operations change (with the exception of the

---

[39] As discussed in Valero Response to BAAQMD April 11, 2013 (pp. 3, 8), Valero typically blends crudes together to meet Refinery specifications. Detailed information regarding each crude is required as input to decisions on crude sourcing and blending. See Appendix E (Valero Refining 101, pp. 17-21), Appendix H (Marathon Refining 101, pp. 12-18), Appendix I (CCQTA Presentation: Canadian Crude Oil Quality: Past, Present, and Future Direction), and Valero Response to BAAQMD April 11, 2013 (p. 8).

[40] Environmental Resources Management (ERM),Valero Crude by Rail Project Description, Benicia Refinery, Benicia, California, March 2013, pp. 5-6.

[41] As also explained in the Fox Comments, tthe specific gravity of crude oil is typically measured using the American Petroleum Institute (API) standard or the API gravity of the crude oil. The API gravity is a measure of the weight of crude oil in relation to the weight of water (which has an API gravity of 10 degrees). Heavy crude oil has an API gravity of 18° or less. The oil is viscous and resistant to flow. Intermediate crude has an API greater than 18° but less than 36°. Light crude has an API gravity of greater than 36°.

[42] IS, pp. 1-2, 1-6.

[43] IS, pp. 1-2, 1-6.

[44] IS, pp. 1-2, 1-6.

storage tank service and rail unloading emissions) as a result of accepting and refining the proposed North American-sourced crudes." IS, pp. 1-2, 1-6, 1-7.

As further discussed in Fox Comments, Valero has now claimed the crudes delivered by rail will actually tend to be lighter and sweeter than the existing crude supply that would be displaced. Valero has applied to the Bay Area Air Quality Management District (BAAQMD) for a construction permit for the Crude by Rail Project. The Authority to Construct Application (ATC) is Appendix A1 to the IS/MND. In the BAAQMD proceeding, Valero responded to questions by the BAAQMD in an April 11, 2013 letter. In this letter, Valero repeatedly describes the crudes that would be imported as light sweet crudes that will cause the current slate to become "sweeter", "lighter in gravity and lower in sulfur than the average Padd V or average Valero crude slate," and as "ANS look-alikes or sweeter". (4/11/13 BAAQMD RTC).[45]

The Refining 101 Presentation (Appendix C, p. 7) provides a chart of Basic Refining Concepts, which has also been provided in Valero Response to BAAQMD April 11, 2013 (p. 4). The Refining 101 Presentation (Appendix C, p. 5) also provides a chart of Crude Oil Quality by Types.[46] The Valero Response to BAAQMD April 11, 2013 (p. 8) makes reference to a similar chart, which Valero appears to have redacted from the Public Document, based on a claim that it is Confidential Business Information:

> The graph below identifies Padd V historical data, the blended crude feedstock criteria for the Valero refinery (green box), and historic crudes processed at this refinery from 2007 through 2012. The crudes proposed to be brought in by rail are those that fall into the lower right corner of the graph, which would be lighter in gravity and lower in sulfur than the average Padd V or average Valero crude slate.

---

[45] Letter from Susan K. Gustofson, Valero to Thu Bui, BAAQMD, transmitting Crude by Rail Project, Response to BAAQMD 3/20/2013 Project Questions, April 11, 2013, Public Version, pp. 5 ("North American sourced crudes are typically characterized as "sweet" meaning they contain less than 0.5 wt% sulfur. The North American sourced crudes currently available to the Valero Benicia refinery are expected to have sulfur below 0.5 wt% which is well below the typical crude slate average of 1.4 wt%. Therefore, these crudes directionally sweeten the crude slate and reduce the amount of refinery fuel gas sulfur treatment required."), 6 ("...the crude slate is expected to be sweeter with the introduction of North American sourced crudes."), 7 ("North American sourced crudes are expected to be sweeter than existing average crude slate", "North American sourced crudes are characterized as sweet and are expected to have sulfur content lower than current crude slate sulfur average"), 8 ("The crudes proposed to be brought in by rail are those that fall into the lower right corner of the graph, which would be lighter in gravity and lower in sulfur than the average Padd V or average Valero crude slate."), 8 ("...the proposed North American sourced crudes are expected to be ANS look-alikes or sweeter...there is not expected to be any difference in emissions...compared to existing operations."), 9 ("North American-sourced crudes proposed to be received by railcar are ANS look-alikes or sweeter..").

[46] A similar chart of Crude Oil Quality by Types is provided in Valero Presentation, Benicia Refinery Tour, July 9, 2007 (Appendix F, p. 5).

Based on Valero's chart of Crude Oil Quality by Types (The Refining 101 Presentation, Appendix C, p. 5), the North American-sourced crudes that "fall into the lower right corner of the graph" and are "ANS look-alikes or sweeter", and are likely to be delivered by rail, are Bakken and possibly Eagle Ford.[47]

Meanwhile, as also shown on Valero's chart of Crude Oil Quality by Types (The Refining 101 Presentation, Appendix C, p. 5), the other North American-sourced crudes and tar sands Dilbits (WCS and Cold Lake). These heavy, sour crudes are upper left corner of the graph.

So as further discussed in Fox Comments, the North American-sourced crude that are likely to be delivered by rail are either very light and sweet, or very heavy and very sour. Hence, depending on the specific crudes that would be delivered by rail, crude quality could differ enormously. And as discussed in Fox Comments, crude quality has very important implications in terms of air emissions and other impacts.

Thus, to meaningfully evaluate the proposed Crude by Rail Project, it is essential that the analysis be based on a detailed representation of the specific crude types that would be delivered by rail, and those that would be displaced. Put simply, in this context, even more than usual, meaningful project evaluation requires good information.

Yet as emphasized above, in the context of the Benicia Crude by Rail Project IS/MND, very little information has been provided regarding crude supply and quality. But information provided elsewhere does offer some insight into the crudes now being processed at Benicia and thus what type of crudes might be delivered by rail.

As disclosed by Valero to investors and discussed in Section 3, the Benicia Refinery used to process very large amounts of Alaska North Slope (ANS), a medium sour crude delivered by marine vessel. But in recent years, Benicia has shifted away from processing ANS and by 2010 it was reported to be less than 10% of total supply.[48]

As also disclosed by Valero to investors and discussed in Section 3, the Benicia Refinery processes sizable amounts of San Joaquin Valley (SJV) crude received by pipeline, comprising

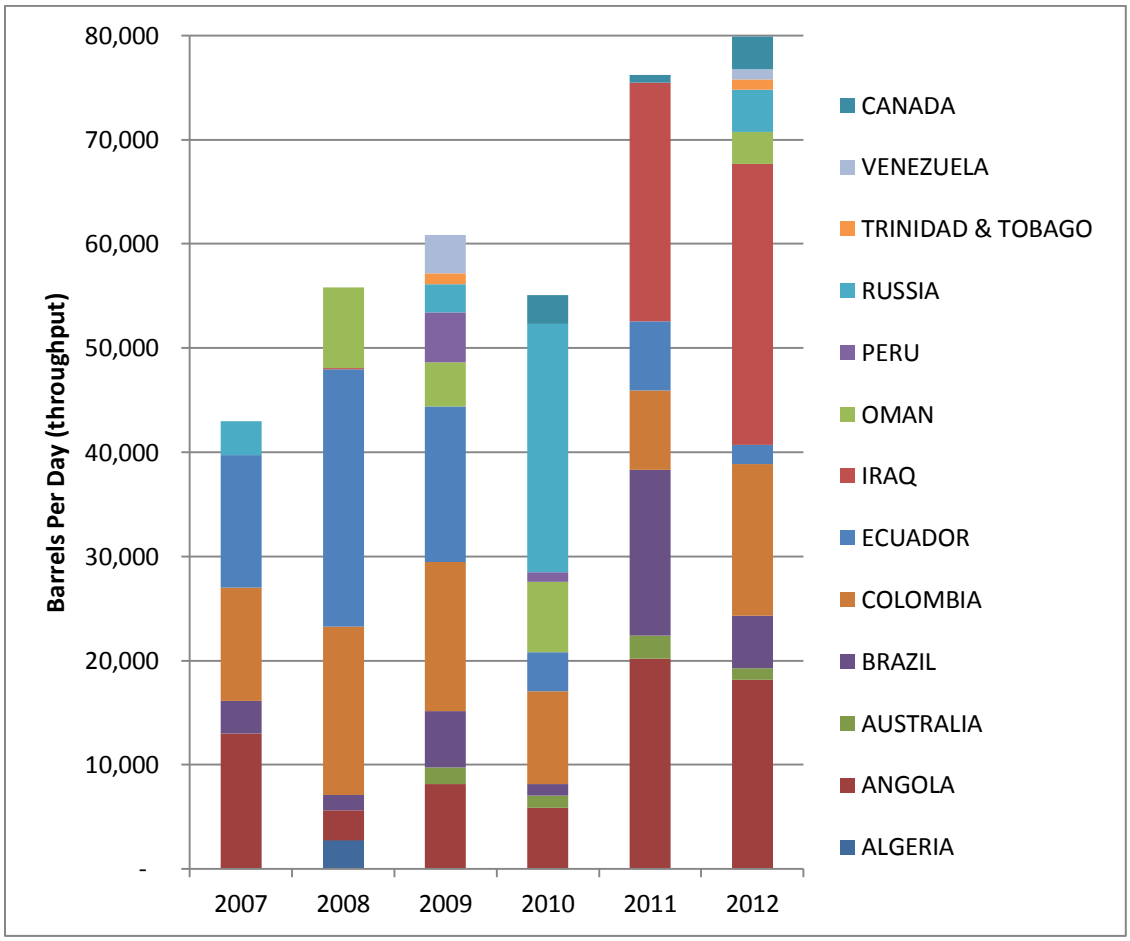
[47] The North American-sourced crudes that "fall into the lower right corner of the graph" and are "ANS look-alikes or sweeter" appearing on the chart also include LLS Light and WTI, but these crudes are not commonly delivered by rail.

[48] Valero Presentation, Benicia Refinery Tour, July 9, 2007 (Appendix F, p. 23); Valero Presentation, Benicia Refinery Tour, August 17, 2010 (Appendix G, p. 29). ANS was 80% of crude supply when Valero acquired the Refinery in 2000, dropping to less than 40% in 2007.

20% of total supply in 2007 and 25% in 2010.[49] This heavy, viscous crude is produced in California and transported to Bay Area refineries in a heated pipeline.[50]

The Benicia Refinery also processes large amounts of imported crudes delivered by marine vessel. There is some information available regarding these imports, via reports from US EIA.[51] Figure 1 shows the breakdown of imports by country of origin over the 2007-2012 period.

Figure 1
Imported Crudes Refined at Valero Benicia 2007-2012



[49] Valero Presentation, Benicia Refinery Tour, July 9, 2007 (Appendix F, p. 23); Valero Presentation, Benicia Refinery Tour, August 17, 2010 (Appendix G, p. 29).
[50] California Crude Oil Production And Imports, California Energy Commission Staff Paper, April 2006, CEC-600-2006-006 http://www.energy.ca.gov/2006publications/CEC-600-2006-006/CEC-600-2006-006.PDF
[51] EIA Data for Company Level Imports, with destination, country of origin, quantity, API gravity, and sulfur content for each shipment. http://www.eia.gov/petroleum/imports/companylevel/

Over the last 3 years (2010-2012), the Benicia refinery has imported an average of about 70,000 barrels per day (bpd), but the trend has been upward (approximately 55,000 bpd in 2010, 76,000 bpd in 2011, and 80,000 bpd in 2012).[52]

Meanwhile, according to data in the IS/MND, total crude deliveries by marine vessel to the Benicia Refinery have averaged about 86,000 bpd over the same period.[53] This indicates that marine deliveries to the Benicia Refinery are now virtually all imports, with only a small amount of other crudes by water (notably domestic ANS).

Thus, to the extent that the proposed Project would displace deliveries of crude by marine vessel, these would be mainly imported crudes, and also possibly a small amount of domestic ANS. Therefore, the crude quality attributes of imported crudes could be an important factor in assessing the impacts of the proposed Crude by Rail Project, since these may be indicative of quality for the crude supply that would be displaced.

The EIA data on imports does not provide any in-depth information on crude quality. But data are reported for each shipment, specifying country of origin gravity, and sulfur content. Thus, some rough matching to crude type is possible.

For example, starting in 2010, the Benicia Refinery has been importing Canadian crudes with API gravity ranging from 20.8° to 22.3° and sulfur content exceeding 3.5%. These characteristics are consistent with those of tar sands Dilbits.[54]

---

[52] As defined in the IS/MND (p. I-6), the 3-year Baseline period for the Crude by Rail Project is December 10, 2009 through December 9, 2012. However, the US EIA import data is reported for monthly periods, such that it is not possible to differentiate between imports occurring earlier or later within a month. Thus, the EIA data for December 2009 and 2012 imports during the Baseline Period (December 10, 2009 – December 31, 2009 and December 1, 2012- December 9, 2012) cannot be distinguished from data for December 2009 and 2012 imports outside of the Baseline Period (December 1, 2009 – December 9, 2009 and December 10, 2012- December 31, 2012). Given this data limitation and the large amount of overlap between the Baseline Period and calendar years, the analysis of EIA import data in these Comments is based on the 3-year period 2010-2012. The results of this analysis of calendar year data for 2010-2012 will likely closely approximate the results of analysis based on the 3-year Baseline Period (December 10, 2009 through December 9, 2012). Valero has all of the data required to analyze crude supply in the Baseline Period, and these data should be disclosed in order to enable meaningful (and efficient) review of the proposed Crude by Rail Project.

[53] IS p. I-1 estimates 70,000 bpd of Crude by Rail could displace 81% of marine deliveries, based on 3-year baseline period December 10, 2009 – December 9, 2012. This implies total marine deliveries of about 86,000 bpd (70,000 / 0.81 = 86,420). IS Att. B-4, p. 1 reports marine vessel deliveries for 3-year baseline period total 93,361,985 barrels, so about 85,000 bpd (93,361,985 / 365 * 3 = 85,262).

[54] There is extensive discussion of Alberta tar sands Dilbits in the Fox Comments. For characteristics of specific tar sands dilbits see CrudeMonitor http://www.crudemonitor.ca, including:
Access Western Blend (AWB) -http://www.crudemonitor.ca/crude.php?acr=AWB;
Borealis Heavy Blend (BHB) -http://www.crudemonitor.ca/crude.php?acr=BHB;
Christina Dilbit Blend (CDB) -http://www.crudemonitor.ca/crude.php?acr=CDB;
Cold Lake (CL) -http://www.crudemonitor.ca/crude.php?acr=CL;
(footnote continued on next page)

Moreover, as will be further discussed later in this section, pricing for tar sands crudes (and especially Dilbits) has been heavily discounted, such that it is economically attractive for Valero to utilize these crudes at the Benicia Refinery (which can process heavy sour crudes, such as tar sands Dilbits). The constraint has been that there has been very limited capability to deliver these crudes to West Coast refineries. There are currently no crude pipelines linking Alberta and California, and only one, relatively small pipeline and marine terminal that can deliver crude from Alberta to the West Coast.

Thus, the only practical delivery method to Benicia has been via the Trans Mountain Pipeline from Alberta to British Columbia, and then by marine vessel from the Westridge Marine Terminal in Burnaby (near Vancouver) to California. But demand for transportation via this pipeline and terminal has far exceeded supply.[55]

So even if additional shipments of tar sands crudes to Benicia might have been profitable, they have not been feasible. Thus, averaged over the 2010-12 period, the Benicia Refinery has imported only about 2,000 bpd of tar sands Dilbits (approximately 3,000 bpd in 2010 and 2012, but less than 1,000 bpd in 2011). As will be further discussed below, the proposed Benicia Crude by Rail Project would enable much larger deliveries of tar sands Dilbits to this Refinery.

While the Refinery has been able to import only small amounts of tar sands crudes, it has instead been importing significant amounts of other heavy and medium crudes. Over the 2010-12 period, Benicia imported crudes with API gravity ranging from 17.6° to 23.0° from a variety of countries other than Canada (Angola, Australia, Brazil, Columbia, Ecuador, and Peru). These

---

(footnote continued from previous page)
Peace River Heavy (PH) -http://www.crudemonitor.ca/crude.php?acr=PH;
Seal Heavy (SH) -http://www.crudemonitor.ca/crude.php?acr=SH;
Statoil Cheecham Blend (SCB) -http://www.crudemonitor.ca/crude.php?acr=SCB;
Wabasca Heavy (WH) -http://www.crudemonitor.ca/crude.php?acr=WH;
Western Canadian Select (WCS) -http://www.crudemonitor.ca/crude.php?acr=WCS;
Albian Heavy Synthetic (AHS) (DilSynBit) - http://www.crudemonitor.ca/crude.php?acr=AHS.

[55] Trans Mountain Pipeline has filed a Project Description with the Canadian National Energy Board to initiate the application process for authorization to substantially expand the capacity of this pipeline and marine terminal.
http://www.neb.gc.ca/clf-nsi/rthnb/pplctnsbfrthnb/trnsmntnxpnsn/trnsmntnxpnsn-eng.html
Likewise, Enbridge is seeking authorization to construct the Northern Gateway Project, which would also include a pipeline from Alberta to British Columbia and a marine terminal.
http://gatewaypanel.review-examen.gc.ca/clf-nsi/hm-eng.html
Both of these projects could enable increased deliveries of tar sands crudes to West Coast refineries. But both of these projects are also subject to very strong opposition, delays, and may never be completed.
See e.g., discussion of Trans Mountain and Northern Gateway Pipelines in the Keystone XL Draft Supplemental EIS http://keystonepipeline-xl.state.gov/documents/organization/205644.pdf pp. 2.2-19, 27.
Thus, the Benicia Crude by Rail Project could enable large scale deliveries of tar sands crudes sooner than would these other projects involving pipelines and marine terminals in British Columbia.

other imports have averaged about 16,000 bpd over the 2010-12 period (approximately 10,000-12,000 bpd in 2010 and 2012, but more than 27,000 bpd in 2011).

But while these other crude imports have been similar in gravity to tar sands Dilbit, they typically have had much lower sulfur content (approximately 1.5% in 2010, but only about 1.0% in 2011 and 2012).[56] Thus, if the proposed Crude by Rail Project delivers large amounts of tar sands Dilbits, this could displace all (or at least most) of heavy and medium crude imports from other countries now delivered by marine vessel. Moreover, imports of Canadian tar sands Dilbits would have much higher sulfur content than the heavy and medium crude imports from other countries during the 2010-2012 period.

In general, and all else being equal, higher sulfur crudes are discounted relative to lower sulfur crudes. As discussed in the Fox Comments, higher sulfur crudes require more processing to remove the sulfur and are thus more costly to refine. Alternatively, to the extent that is feasible/permissible to produce/market refined products with higher sulfur content, these products typically are discounted relative to products with lower sulfur content.

Given that crudes with higher sulfur content are typically discounted relative to lower sulfur crudes, it is notable that the crudes actually processed by Valero in the 2010-2012 period did not have particularly high sulfur content. Notably, with the exception of a small amount of tar sands Dilbits (which had sulfur content exceeding 3.5%), crude imports had a sulfur content averaging 1.0-1.5% (including even the relatively heavy crudes imported from countries other than Canada).

The IS/MND and various materials submitted by Valero for the Crude by Rail Project (and disclosed publicly) do not provide a useful explanation of crude sourcing during the 3-year Baseline Period and subsequently. But considerable insight is provided by consideration of the VIP in connection with the Crude by Rail Project. As further discussed in the Fox Comments and in Section 3, the VIP is nowhere mentioned in the IS/MND or any of the other materials relating to the Crude by Rail Project. But the VIP is key to understanding crude sourcing during the Baseline Period and how it may change subsequently (and in connection with the Crude by Rail Project).

Notably, as further discussed in the Fox Comments and Section 3, the VIP includes an expansion in hydrogen production (and specifically a new Hydrogen Plant) to support hydrofining (desulfurization), with refinery capacity to remove and recover sulfur increasing by

[56] For all Benicia Refinery imports (all gravities from all countries), sulfur content averaged about 1.0% in 2010, 1.4% in 2011, and 1.3% in 2012. Thus, the sulfur content of heavy and medium crude imports from countries other than Canada were similar to (and often lower than) the sulfur content of all imports. Stated another way, over the 2010-2012 period, crudes that were more heavy were not more typically more sour, except for the imports of tar sands Dilbits (that were relatively heavy and very sour).

50% (from 320 ton/day to 480 ton/day).[57] But as also discussed in the Fox Comments, completion of the Hydrogen Plant has been delayed and, is not estimated to startup until the end of 2014. [58]

Hence, crude sourcing during the 3-year Baseline Period appears to have been shaped by two major constraints. First, deliveries via marine vessel provided very little capability to access tar sands crudes. Second, capability to process sour crudes may have substantially limited by desulfurization capability (which in turn was affected by delays in completing the new Hydrogen Plant). As a result of these two constraints operating in tandem, crude supply during the Baseline Period included only minimal amounts of tar sands crudes. Specifically, there were only 1,000-3,000 bpd of Dilbits (which are relatively heavy and have high sulfur content).

More generally, imported crude supply during the Baseline Period was not especially heavy or sour. Gravity averaged around 29 in 2010, 25 in 2011, and 27 in 2012. Sulfur content averaged about 1.0% in 2010, 1.4% in 2011, and 1.3% in 2012.

But both of these major constraints (i.e., limited access to tar sands crudes and limited desulfurization capability) may be removed relatively soon. Refinery crude supply could then shift substantially towards heavier, sour crudes, and specifically tar sands Dilbits.

The Benicia Crude by Rail Project would provide capability to deliver 70,000 bpd of crude supply. As the Project is now proposed, there would not be any specific and separate conditions limiting the types of crudes that could be supplied by rail. Valero could thus use the facility to bring in any crudes that can handled by the facility and processed at the Benicia Refinery. As further discussed in the Fox Comments, heavy, sour tar crudes (and specifically Dilbits) are likely to comprise a large portion of deliveries by rail, especially as unit train loading facilities are built out in Alberta.

Likewise, as also further discussed in the Fox Comments, the new Hydrogen Plant is estimated to be in-service by 2015. The Refinery could then process the very heavy sour crude slate that the VIP was designed for. Heavy sour crudes With the VIP fully operational, this Refinery could process approximately 100,000 BPD of heavy sour crudes.[59] Thus, the full 70,000 BPD capacity

[57] VIP DEIR, pp. 3-33, 39-40. See footnote 28 for more information on the VIP.

[58] Valero filed a request with the BAAQMD to extend the construction permit for the Hydrogen Plant through December 2014 to accommodate this delay. ENSR Corporation, Environmental Analysis, Valero Improvement Project Amendments, September 2007 (2007 Amendments), Table 2.5.1-1 and VIP Semi-Annual Construction Report for the first half of 2012 - Revised, August 1, 2012 (showing the Hydrogen Plant starting up 4th quarter of 2014).

[59] "The Refinery's crude oil processing rate is limited to an annual average of 165,000 barrels per day (daily maximum of 180,000 barrels per day) by Bay Area Air Quality Management District (BAAQMD) permit."(IS p. I-1) 60% of 165,000 BPD equals 99,000 BPD. Even if some of these heavy sour crudes are delivered by pipeline, most (if not all) of the crude by Rail could be heavy, sour. In the 2007-2010 period, the refinery received 20-25% of its (footnote continued on next page)

of the Crude by Rail Project could be used for heavy sour crudes, and specifically tar sands Dilbits, from 2015 onward. And even before then, tar sands dilbits could comprise a sizable portion of overall crude deliveries by rail.

As further discussed in the Fox Comments, evaluation of the proposed Crude by Rail Project should consider a range of potential scenarios, and particularly scenarios that are worst case in terms of adverse impacts. Thus, the City of Benicia should undertake a full EIR in order to provide a sound basis for decision-making on the proposed Valero Crude by Rail Project.

(footnote continued from previous page)
crude by pipeline, so in the order of 25,000-35,000 BPD (Valero, Benicia Refinery Tour Slides, July 9, 2007, Appendix F, p. 26; Valero, Benicia Refinery Tour Slides, August 17, 2010, Appendix G p. 29). Also, while it is assumed in the IS/MND that Crude by Rail deliveries will only displace marine deliveries, it is possible that rail deliveries will displace pipeline deliveries. The crude being delivered by pipeline is very heavy and viscous. So to the extent that Crude by Rail deliveries displace deliveries of very heavy crude by pipeline, very large amounts of tar sands dilbitDilbits could be processed at the Benicia Refinery (up to and even exceeding the full 70,000 bpd capacity of the proposed Crude by Rail Project).

APPENDICES

A: Resume of Ian Goodman

B: Resume of Brigid Rowan

C: Valero Investor Relations Website: Information Posted

D: Valero Presentation: UBS Global Oil and Gas Conference

E: Valero Presentation: Refining 101

F: Valero Presentation: Benicia Refinery Tour - July 9, 2007

G: Valero Presentation: Benicia Refinery Tour - August 17, 2010

H: Marathon Petroleum Presentation: Refining 101

I: CCQTA Presentation: Canadian Crude Oil Quality: Past, Present and Future Direction

Comments

on

Initial Study/Mitigated Negative Declaration (IS/MND)

for the

Valero Crude by Rail Project

Benicia, California

Use Permit Application 12PLN-00063

July 1, 2013

Prepared by
Phyllis Fox, Ph.D., PE
Consulting Engineer
745 White Pine Ave.
Rockledge, FL 32955

TABLE OF CONTENTS

I. Introduction 1

II. Air Emissions Would Increase Due To Changes In Crude Quality 2

A. Related Projects Not Disclosed 5

B. All Increases in Emissions Must Be Considered Under CEQA 8

C. What Crude Will Be Imported By Rail? 9

1. The IS/MND Crude by Rail Project Is Inconsistent with the VIP Project 10

2. What Crudes Are Likely To Be Refined? 12

D. Why Does The Specific Crudes Matter? 19

1. Emissions From Diluent 22

2. Composition of Tar Sands Bitumen 28

a. Higher Concentrations of Asphaltenes And Resins 29

b. Hydrogen Deficient 30

c. Higher Concentrations of Catalyst Contaminants 30

E. Does the VIP FEIR Mitigate The Impacts Of Refining Tar Sands Crudes? 31

1. The Impacts from VIP and Crude by Rail Project Must Be Considered Together 32

2. The Impacts from the VIP Project and the Crude By Rail Project Are Cumulatively Considerable 33

3. The Regulatory Framework Has Changed 33

III. Accidental Releases Will Increase 35

I. INTRODUCTION

The Valero Benicia Refinery (Refinery) is proposing to import certain unidentified "North American-sourced crude oils" to the Refinery by railroad (Project). The City of Benicia has issued a draft Initial Study/Mitigated Negative Declaration (IS/MND)[1] for this Project. I was asked to review the IS/MND and prepare comments on the impact of the imported crude on air emissions from the Refinery.

My analyses, presented below, indicate the subject "North American-sourced crudes" that would be imported by rail are likely to include Canadian tar sand crudes blended with diluent or "DilBits". These have the potential to increase emissions compared to the current crude slate, which would result in potentially significant impacts not disclosed in the IS/MND. The "North American-sourced crudes" may also include light sweet shale oil crudes, such as Bakken, which also have the potential to increase emissions, and result in significant environmental impacts, compared to the current crude slate.

The pollutants in the diluent blended with these DilBit crudes and in the light sweet shale crudes include significant amounts of hazardous air pollutants, such as benzene, a potent carcinogen. These would be emitted at many fugitive components in the Refinery, including compressors, pumps, valves, fittings, and tanks, in greater amounts than from other crudes that are currently being refined or have otherwise been proposed.

These increased emissions would result in significant air quality impacts not acknowledged in the IS/MND. These include significant increases in volatile organic compounds (VOCs); hazardous air pollutants, including benzene and lead, which will cause significant health impacts; and highly odiferous sulfur compounds that would individually and cumulatively cause malodors, degrade ambient air quality, increase the incidence of accidental releases, and adversely affect the health of workers and residents around the Refinery. Further, the high acid levels in these crudes would accelerate corrosion of refinery components, contributing to equipment failure and increased accidental releases. Thus, an EIR should be prepared to properly analyze these impacts and identify mitigation measures.

Finally, the Project description is very incomplete and inadequate to sustain the conclusions in the IS/MND. The *sine qua non* of a CEQA analysis is a baseline (physical condition of environment, e.g., emissions, at time of analysis). The baseline is required to evaluate the significance of increases due to the Project. The IS/MND contains no baseline conditions for any impact.

The Project description fails to identify the crudes that would be imported, the crudes that would be displaced, all of the key chemical composition data required to

[1] ESA, Valero Crude by Rail Project, Initial Study/Mitigated Negative Declaration, Use Permit Application 12PLN-00063, Prepared for City of Benicia, May 2013.

assess crude quality and resulting impacts, and Project process flow diagrams and design documents essential to assess impacts. In short, the IS/MND fails to provide a meaningful description of the Project. The number and nature of the deficiencies are so substantial that the IS/MND should be withdrawn and replaced with a draft EIR with a complete Project description and a thorough environmental impact analysis.

My resume is included in Attachment 1 to these comments. I have over 40 years of experience in the field of environmental engineering, including air emissions and air pollution control; greenhouse gas emission inventory and control; air quality management; water quality and water supply investigations; hazardous waste investigations; environmental permitting; nuisance investigations (odor, noise); environmental impact reports, including CEQA/NEPA documentation; risk assessments; and litigation support.

I have a M.S. and Ph.D. in environmental engineering from the University of California at Berkeley with minors in Hydrology and Mathematics. I am a licensed professional engineer (chemical, environmental) in five states; a Board Certified Environmental Engineer, certified in Air Pollution Control by the American Academy of Environmental Engineers; and a Qualified Environmental Professional, certified by the Institute of Professional Environmental Practice.

I have prepared comments, responses to comments and sections of EIRs for both proponents and opponents of projects on air quality, water supply, water quality, hazardous waste, public health, risk assessment, worker health and safety, odor, risk of upset, noise, land use and other areas for well over 100 CEQA documents. This work includes Environmental Impact Reports (EIRs), Negative Declarations (NDs), and Mitigated Negative Declarations (MNDs) for all California refineries as well as various other permitting actions for tar sands refinery upgrades in Indiana, Louisiana, Michigan, Ohio, South Dakota, Utah, and Texas. My work has been cited in two published CEQA opinions: (1) *Berkeley Keep Jets Over the Bay Committee, City of San Leandro, and City of Alameda et al. v. Board of Port Commissioners* (August 30, 2001) 111 Cal.Rptr.2d 598 and *Communities for a Better Environment v. South Coast Air Quality Management Dist. (2010) 48 Cal.4th 310*.

Ian Goodman and Brigid Rowan of The Goodman Group, Ltd. (TGG) are also submitting Comments on IS/MND (TGG Comments) and specifically are undertaking an evaluation of crude supply. I have relied on their report in my analysis. I conferred with TGG (Ian Goodman) during the preparation of our respective Comments, and (where relevant), each of the Comments makes reference to the other.

II. AIR EMISSIONS WOULD INCREASE DUE TO CHANGES IN CRUDE QUALITY

The Project will allow the Refinery to replace up to 70,000 barrels per day (BPD) of crude oil currently transported by marine vessel with an equivalent amount of crude oil transported by rail. MND, p. 1; IS, p. I-1. The crude oil imported by rail is identified

only as "North American-sourced crude oil" that is "expected to be of similar quality compared to existing crude oil imported by marine vessels." MND, p. 1; IS, p. I-1. The specific "North American-sourced crude oils" are not identified. As discussed below, all crudes are not created equal.

The IS/MND also asserts that imports by rail would not displace crude delivered by pipeline (heavy sour San Joaquin Valley crudes), would not result in an increase in the production of existing products or byproducts, and would require no modification to Refinery process equipment. MND, p. 1, IS, p. I-1. However, the Initial Study does not contain any of the information required to evaluate these claims and their resulting environmental impacts. In fact, key project description and emissions data required to assess this claim and resulting environmental impacts are claimed as confidential (ATC, Appx. A, Appx. B (Attachs. B-1, B-2, B-4)), preventing meaningful public review. Further, the MND does not recommend any conditions that would assure these fundamental (and undisclosed) assumptions are in fact implemented. The MND, for example, does not limit the quality of the rail imports, the origin of the rail imports, nor the quality of displaced ship imports. These are serious flaws as crude quality determines environmental impacts, as explained elsewhere in these comments.

The emissions from a refinery depend upon the composition of the crude that it refines. The Initial Study indicates the Refinery currently processes a blended slate of crude oil with a gravity that ranges from 20° to 30° API[2] and a sulfur content that ranges from 0.6% to 1.9%, based on 2011 to 2012 data. IS, pp. I-2, I-6. However, nothing else about this crude slate is disclosed. The undisclosed information determines the environmental impacts.

The Initial Study also asserts that the "North American-sourced crude oils are expected to replace crude oils of similar gravity and sulfur content currently brought in by ship," reporting the rail imports to have a gravity that ranges from 20° to 43.5^o API and a sulfur content that ranges from 0.06% to 3.1%. IS, pp. I-2, I-6. Thus, the Initial Study concludes that "it is anticipated that the Refinery would continue to operate within its existing specifications for crude oil gravity and sulfur content range." *Ibid.* Further, it concludes that the Refinery would not need to change existing operations or process equipment, "nor would emissions from Refinery operations change (with the exception of the storage tank service and rail unloading emissions) as a result of accepting and refining the proposed North American-sourced crudes." IS, pp. I-2, I-6, I-7. These conclusions are unsupported and likely wrong.

First, the ability of a refinery to process a particular crude and the resulting emissions depend upon many more variables than just the API gravity and sulfur

[2] The specific gravity of crude oil is typically measured using the American Petroleum Institute (API) standard or the API gravity of the crude oil. The API gravity is a measure of the weight of crude oil in relation to the weight of water (which has an API gravity of 10 degrees). Heavy crude oil has an API gravity of 18° or less. The oil is viscous and resistant to flow. Intermediate crude has an API greater than 18° but less than 36°. Light crude has an API gravity of greater than 36°.

content.[3] Valero certainly knows this and could not evaluate crudes to include in its swap without substantially more information than disclosed in the IS/MND. The same information Valero uses to select crudes is required to assess environmental impacts. This critical information is missing from the record. The public has been left in the dark to guess what the crude quality and thus impacts might be. This contravenes the information disclosure requirements of CEQA. There are major chemical differences between the crudes currently imported by ship and available "North American-sourced crude oils" that could only arrive by rail.[4]

Second, the range of two crude characteristics does not reveal anything about the median and average value of those parameters, which ultimately determine emissions. The sulfur content of the crude slate, for example, could continue to fluctuate between 0.6% to 1.9% while the average sulfur content of the slate could creep up, which has in fact happened at California refineries[5] as well as elsewhere.[6]

Third, the IS/MND does not include any conditions of certification that would prevent the selection of any North American-sourced crude available by rail, either currently or in the future. Many such crudes have unique chemical characteristics that would result in significant environmental impacts not disclosed in the IS/MND. As discussed elsewhere in these comments, the Refinery is in the process of being modified to allow it to process a larger amount of also unidentified heavy high sulfur crudes, which Valero admits would increase the sulfur content of the crude and make it heavier. The refining of many of these crudes would result in significant environmental impacts. In fact, the most economically attractive heavy high sulfur crudes, those derived from Canadian tar sands bitumens, are only available in large quantities to the Refinery by rail. Thus, absent conditions of certification to the contrary, it is possible that a rail terminal would allow the import of heavy high sulfur crudes in the future, after the current

---

[3] See, for example, CCQTA, Canadian Crude Oil Quality Past, Present and Future Direction, February 7, 2012, pp. 8 ("Need more than sulfur and gravity to determine the "acceptability and valuation" of crude oil in a refinery. The crude oil's hydrocarbon footprint and contaminants determine the value of crudes.."), Available at: http://www.choa.ab.ca/index.php/ci_id/9210/la_id/1/, provided as Appendix I to TGG Comments.

[4] D. Stratiev and others, Evaluation of Crude Oil Quality, Petroleum & Coal, v. 52, no. 1, pp. 35-43, 2010, Available at: http://www.vurup.sk/sites/vurup.sk/archivedsite/www.vurup.sk/pc/vol52_2010/issue1/pdf/pc_1_2010_stratiev_051.pdf. See also www.crudemonitor.ca.

[5] Margaret Sheridan, California Crude Oil Production and Imports, California Energy Commissions Staff Paper, April 2006.

[6] EIA, Crude Oil Input Qualities, Available at: http://www.eia.gov/dnav/pet/PET_PNP_CRQ_A_EPC0_YCS_PCT_M.htm; Greg L. Armstrong, Crude Oil Trends & Recent Developments, January 11, 2012, pp. 19-20, Available at: http://www.ipaa.org/meetings/ppt/2012TIPRO/January/012012-Armstrong.pdf and Edward J. Swain, Sulfur, Coke, and Crude Quality - Conclusion U.S. Crude Slate Continues to Get Heavier, Higher in Sulfur, Oil & Gas Journal, January 9, 1995, Available at: http://www.ogj.com/articles/print/volume-93/issue-2/in-this-issue/refining/sulfur-coke-and-crude-quality-conclusion-us-crude-slate-continues-to-get-heavier-higher-in-sulfur.html.

modifications are complete, that would increase emissions relative to the current baseline, causing significant undisclosed environmental impacts.

This would be consistent with statements in the IS/MND that rail imports are "expected to be of similar quality compared to existing crude oil imported by marine vessels." MND, p. 1; IS, p. I-1. Further, many of the tar sands crudes fall within the range of API gravity and sulfur content reported in the IS/MND, from 20° to 43.5^{o} API and a sulfur content that ranges from 0.06% to 3.1%. IS, pp. I-2, I-6. Crude oil import data reported by Valero to the U.S. Energy Information Administration (EIA) and discussed below indicate that the Refinery is currently importing Canadian tar sands crudes.

Thus, without crude assay data and conditions of certification that restrict crude quality to that analyzed in the CEQA documents, and at least annual reporting to assure compliance, the Refinery has the discretion to import any crude that is cheaper, regardless of environmental impacts. This could include heavy sour Canadian tar sands crudes. As discussed elsewhere in these comments, heavy sour Canadian tar sands crudes are a worst case for environmental impacts. They would increase air emissions and result in other significant impacts, relative to the current baseline, that were not considered in the IS/MND.

A. Related Projects Not Disclosed

Valero is currently in final phases of constructing the Valero Improvement Project or VIP, which will not be fully operational until the end of 2014. The Crude by Rail Project should be evaluated in the context of the VIP FEIR, not through an isolated IS/MND that fails to even disclose this precedent, related project that it is modifying.

The VIP is designed to facilitate the import and processing of much higher sulfur and heavier crudes than the current slate, The VIP would permit the Refinery to process heavier, high sulfur feedstocks as 60% of total supply, up from just 30% prior to the VIP.[7] The VIP has been permitted and is in the final stages of construction. VIP DEIR 2002.[8] The VIP project includes the following elements that are designed specifically to allow a shift to a much lower quality crude slate:

---

[7] VIP DEIR, p. 3-20 ("The refinery currently imports and processes two primary raw materials – crude oil and gas oil. Currently, about 30% of the refinery feedstocks are lower-grade raw materials, with higher levels of sulfur and higher heavy pitch content. The VIP changes would allow the refinery to purchase and process additional volumes of lower-grade raw materials (crude oils or gas oils). In general terms, the refinery would be able to increase this percentage to about 60%, raising the average sulfur content of the imported raw materials from current levels of about 1 - 1.5% up to future levels of about 2 - 2.5%.").

[8] ESA, Valero Refining Company's Land Use Application for the Valero Improvement Project, Environmental Impact Report, Draft, October 2002 (DEIR), The Benicia Planning Commission certified the Final EIR, consisting of the DEIR and the Responses to Comments in Resolution No. 03-4. This FEIR was amended in 2007. Supporting documents available at:

- Pipestill (crude unit) modifications to increase crude oil processing capacity from 135,000 BPD to 165,000 BPD, or by approximately 25% (VIP DEIR, p. 3-27);
- Fluid Catalytic Cracker Unit Feed Flexibility modifications to process different feeds and increase process rate from 72,000 BPD to 75,000 BPD or higher on occasion (VIP DEIR, p. 3-28; VIP Amend., p. 2-21);
- Coker Unit modifications from 30,000 BPD to 35,000 BPD (VIP DEIR, p. 3-30);
- Increased refinery capacity to remove and recover sulfur from 320 ton/day to 480 ton/day (VIP DEIR, p. 3-33)
- Flue Gas Scrubber to reduce emissions from the main stack (VIP DEIR, Sec. 3.4.3.5);
- Increase hydrogen production from 160 to 190 MMscf/day to support hydrofining and hydrocracking (VIP DEIR, p. 3-39);
- Hydrofining optimization changes (VIP DEIR, Sec. 3.4.3.7);
- Modifications to maximize hydrocracking, alkylation, and reforming capacity (VIP DEIR, Sec. 3.4.3.8);
- Adding a Guard Reactor to the Hydrotreater (VIP DEIR, Sec. 3.4.3.9);
- Modifications to optimize fractionation processes (VIP DEIR, Sec. 3.4.3.10);
- New and modified existing combustion sources (VIP DEIR, Sec. 3.4.3.11);
- Use of 150 gpm of additional water (VIP DEIR, Sec. 3.4.3.12);
- Modifications to the wastewater treatment facility (VIP DEIR, Sec. 3.4.3.13);
- An additional desalter vessel to remove salts and solids (VIP Adden., Table 2.1.1-1);
- Added support facilities and infrastructure (VIP DEIR, Sec. 3.4.3.14);
- Added new crude tankage (VIP DEIR, Sec. 3.4.3.15);
- Increased import and export ship and train traffic (VIP DEIR, Sec. 3.4.3.16).

These are the types of modifications that would be required to increase the amount of heavy sour crude processed at the Refinery. These modifications were

---

http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC=%7B737165B4-11C5-4974-9B0B-0AE4AC535ECC%7D.

estimated to increase electricity demand by 23 MW[9] and natural gas consumption by 9.6 MMscf/day. (VIP DEIR, pp. 2-3). They were also estimated to increase the firing rate of heaters and boilers throughout the Refinery by 400 MMBtu/hr (VIP DEIR, p. 3-47)[10]. These increased utility demands increase emissions.

They also would have other adverse impacts not disclosed in the VIP FEIR that must be disclosed in the Crude by Rail Project. Most of the modifications have started up. However, the last major part of the VIP project, the Hydrogen Plant, the critical link required to tie the rest of the Project together, is not estimated to startup until the end of 2014. Valero filed a request with the BAAQMD to extend the construction permit for the Hydrogen Plant through December 2014 to accommodate this delay.[11]

The VIP was specifically designed to allow the Refinery to shift to a much heavier, higher sulfur crude slate. The subject crudes would have sulfur contents up to 4% and would require heated tanks for storage.[12] These are "heavy sour crudes". There are only a few crudes with these characteristics that might meet Valero's other goal of lowering the cost of petroleum feedstocks. VIP DEIR, pp. 3-32, 3-35. As further

---

[9] Increased by 1.5 MW in 2007 with the addition of a new desalter. VIP Environmental Analysis, September 2007, p. 2-21.

[10] In the 2007 amendment, reduced by 100 MMBtu/hr by installing a new, more efficient Hydrogen Unit than originally planned for in the 2003 VIP FEIR and increased by 70 MMBtu/hr to facilitate FCCU modifications. VIP Environmental Analysis, September 2007, pp. 2-18, 2-21.

[11] ENSR Corporation, Environmental Analysis, Valero Improvement Project Amendments, September 2007 (2007 Amendments), Table 2.5.1-1 and VIP Semi-Annual Construction Report for the first half of 2012 - Revised, August 1, 2012 (showing the Hydrogen Plant starting up 4th quarter of 2014).

[12] VIP DEIR, pp. 1-1 (The purpose of the VIP is to allow the Refinery to process certain "lower grades of raw material" (crude oil and gas oil), 3-16 ("lower grade of crude"), 3-28 (the FCCU would be modified to allow it to "develop the flexibility to process heavier feedstocks.."), 3-30 ("[a] key characteristic of the new petroleum crude blends to be processed...is a higher percentage of heavier hydrocarbons than in the crude mix now processed.."), 3-32 ("the VIP would enable the refinery to process lower cost petroleum feedstocks (crudes) that could contain up to twice the sulfur content of the crudes presently processed at the refinery."), 3-35 ("[t]he VIP modifications to the refinery would enable the processing of additional lower cost heavy petroleum feedstocks (crudes) with higher sulfur. One characteristic of these crudes is that they could contains about 4% sulfur, up to twice the average sulfur content of the crudes presently processed at the refinery. Though these crudes are not necessarily new to the refinery, there would be more of them processed."), 3-45 (with the changes in feed stock characteristics anticipated after the VIP modifications..."), 3-46 ("The VIP would require more heat provided by combustion because more oil products will be processed than at present and because the VIP new crude blends will consist of heavier components which require more heat for processing...than the present crude blend."), 3-49 ("Several tanks that would store heavy feedstocks would need to be fitted with steam heating equipment. By heating the heavy oil, the viscosity would be reduced enough to allow more efficient pumping."), 4.2-19 ("The VIP proposes to process a higher percentage of lower grades of crude oil with greater sulfur content than it presently can process."), 4.5-3 (The project would...allow lower grade materials to be refined there."), p. 4.8-10 ("[t]he lower grade crude oils expected in the project..."), 4.8-11 ("heavier crude feedstocks", "heavier feedstock", "feedstock changes"), 4.8-14 (there will be about three additional ships per month for crude oil transport and a reduction of two barges and ships for gas oil transport."), 8-4 ("Valero proposes to develop the capability to economically process additional heavy crudes and crudes with more sulfur on average than those processed at the refinery since 1970.").

discussed in TGG Comments and Section C below, Canadian tar sands are the most proximate and cost effective option to achieve Valero's goals for the Benicia Refinery.[13]

Thus, clearly, Valero is in the process of implementing a major expansion project to allow it to process increased amounts of heavy sour crude, consistent with the composition of Canadian tar sands crudes. The VIP is nearly complete. The last component, a new Hydrogen Plant, is scheduled to startup at the end of 2014. An increase in hydrogen is essential to refining increased amounts of heavy sour crude. Thus, the anticipated increase in heavy sour crude has not yet occurred. This is confirmed by the U. S. Energy Information Administration (EIA) crude import data,[14] which shows only a tiny amount of heavy sour (>3.5%) crudes delivered to Benicia. The EIA crude import data for 2010 to 2012 indicate 0.5% to 2% of the crude slate originated in Canada with an API gravity (20.8^{o}-22.6^{o}) and sulfur content (3.54%-3.75%) consistent with Canadian tar sand crudes.[15]

Thus, for purposes of CEQA analysis, the baseline for the Crude by Rail Project is the period 12/10/10 to 12/9/12 (IS, p. I-6), a period when very little Canadian tar sands crude was being processed. The Crude by Rail CEQA analysis must evaluate impacts relative to physical conditions as they existed during this period. The IS/MND assumes the proposed crude switch could occur without any change to Refinery process equipment or increases in production of existing products or byproducts. IS, p. I-1. This would likely be feasible if full buildout of the VIP is assumed as the baseline.

B. All Increases In Emissions Must Be Considered Under CEQA

The IS/MND fails to disclose or quantify the increases in emissions that could result from modifying the crude slate. However, replacing 70,000 BPD or 81% of its ship imports or nearly half (70/165 = 0.43) of its entire current crude slate with tar sands crudes in the long term would make the overall slate heavier, increase emissions, and result in significant environmental impacts.

The use of the proper CEQA baseline is critical to accurately evaluate impacts. The Refinery operates under a permit issued by the Bay Area Air Quality Management District (BAAQMD). This permit establishes maximum amounts of regulated pollutants that can be emitted, including those permitted pursuant to the VIP. The Crude by Rail Project may result in increases in emissions that fall within the limits in this and other permits and plans, such as the VIP FEIR and still result in significant impacts. Permit limits and conditions of certification in previous CEQA actions do not establish the baseline for purposes of the CEQA review for the Crude by Rail Project.

---

[13] See, for example, Stratiev et al. 2010, Table 1 and Wikipedia, List of Crude Oil Products, Available at: http://en.wikipedia.org/wiki/List_of_crude_oil_products.

[14] EIA, Petroleum & Other Liquids, Company Level Imports, Available at: http://www.eia.gov/petroleum/imports/companylevel/.

[15] www.crudemonitor.ca.

A long line of Court of Appeal decisions and a California Supreme Court decision hold that impacts of a proposed project are to be compared to the actual environmental conditions existing at the time of CEQA analysis, rather than to allowable conditions defined by a plan or regulatory framework, such as the BAAQMD permit or the VIP FEIR. The California Supreme Court specifically concluded, in a case that I worked on involving the ConocoPhillips refinery in Los Angeles, that the pre-existing permits did not establish the baseline for CEQA analysis. *(2010) 48 Cal.4th 31.*

Thus, while the emission increases identified below may well fall within existing Permit limits, this does not exclude them from CEQA review for the Crude by Rail Project. The increases in emissions that will occur from importing "North American-sourced crudes" must be quantified and evaluated under CEQA as of current conditions, regardless of permit limits. The IS/MND does not do this. To the extent that these emissions were considered in the related VIP Project, these emissions and mitigations must be evaluated within the regulatory and other frameworks on the ground during the baseline period. Much has changed since the 1999 to 2001 baseline used to evaluate the VIP, which will be modified by the Crude-by-Rail project.

My analyses presented below indicate that these increases would be significant, would exceed BAAQMD CEQA significance thresholds and potentially would contribute to adverse health impacts, malodors, and major accidental releases, as well as degradation of ambient air quality. The IS/MND is silent on these potential emission increases and their environmental consequences. My analysis indicates these impacts are significant and unmitigated, requiring the preparation of an EIR.

C. What Crude Will Be Imported By Rail?

Refining generates emissions. The type and amount of emissions depend upon the chemical characteristics of the specific crudes included in the slate. The central question that must be answered to determine environmental impacts of the Crude by Rail Project is what crude(s) will be imported by rail, and what crude(s) will replace them, for the life of the Project. This is not disclosed in the IS/MND, presenting a mystery for reviewers.

In fact, the IS/MND goes to great lengths to not identify the crudes that would be imported, quoting only ranges in two parameters -- sulfur content and API gravity -- which are irrelevant to potential impacts. The IS/MND claims nothing would change except the mode of transportation, from ship to rail. It ignores all impacts related to the crude itself. Thus, the IS/MND is asserting a claim that is inconsistent with the massive refinery upgrade and expansion currently underway. The VIP heavy sour crude expansion would not be built if Valero was really planning to sweeten and lighten up its crude slate. Further, the IS/MND claims as confidential all information that one could potentially use to identify these crudes, including crude quality data, process flow diagrams, and critical support for the emission calculations. ATC, Appx. A, B.

1. The IS/MND Crude By Rail Project Is Inconsistent With The VIP Project

As explained above, the Refinery is being extensively modified to allow it to process increased amounts of heavy sour crudes, consistent with Canadian tar sands crudes. However, the IS/MND asserts the opposite. The VIP was specifically designed to allow the Refinery to increase the amount of heavy sour crudes in its slate, up to 60% of the total. [16] Valero characterized the VIP as a "crude 'sour-up'" to reduce dependence on ANS.[17] With the VIP fully operational, this Refinery could process approximately 100,000 BPD of heavy sour crudes. [18] Thus, the full 70,000 BPD capacity of the Crude by Rail Project could be used for heavy sour crudes.

Meanwhile, as of 2010, Valero stated that it had the ability to process 35% heavy sour crude, 47% medium/light sour crude, and 18% other.[19] or less than 60,000 BPD of heavy sour crude. So prior to completion of the VIP, this Refinery could process substantial amounts of heavy sour crudes, but much less than it will be able to in the near future. And once a Crude by Rail Project is in place, it could be used to deliver the heavy sour crudes that this Refinery can process.

The IS/MND does not even mention the VIP nor attempt to resolve this inconsistency.

Valero has applied to the Bay Area Air Quality Management District (BAAQMD) for a construction permit for the Crude by Rail Project. The Authority to Construct Application (ATC) is Appendix A to the IS/MND. In the BAAQMD proceeding, Valero responded to questions by the BAAQMD in an April 11, 2013 letter. In this letter, Valero repeatedly describes the crudes that would be imported as light sweet crudes that will cause the current slate to become "sweeter", "lighter in gravity and lower in sulfur than the average Padd V or average Valero crude slate," and as "ANS look-alikes or sweeter". (4/11/13 BAAQMD RTC).[20]

---

[16] VIP DEIR, p. 3-20.

[17] Valero, Benicia Refinery Tour Slides, July 9, 2007, p. 26, provided as Appendix F to TGG Comments.

[18] IS p. I-1 ("The Refinery's crude oil processing rate is limited to an annual average of 165,000 barrels per day (daily maximum of 180,000 barrels per day) by Bay Area Air Quality Management District (BAAQMD) permit."). 60% of 165,000 BPD equals 99,000 BPD. Even if some of these heavy sour crudes are delivered by pipeline, most (if not all) of the crude by Rail could be heavy, sour. In the 2007-2010 period, the refinery received 20-25% of its crude by pipeline, so in the order of 25,000-35,000 BPD (Valero, Benicia Refinery Tour Slides, July 9, 2007, p. 26, provided as Appendix F to TGG Comments; Valero, Benicia Refinery Tour Slides, August 17, 2010, p. 29, provided as Appendix G to TGG Comments).

[19] Valero, Benicia Refinery Tour Slides, August 17, 2010, p. 29, provided as Appendix G to TGG Comments.

[20] Letter from Susan K. Gustofson, Valero to Thu Bui, BAAQMD, transmitting Crude by Rail Project, Response to BAAQMD 3/20/2013 Project Questions, April 11, 2013, Public Version, pp. 5 ("North American sourced crudes are typically characterized as "sweet" meaning they contain less than 0.5 wt% sulfur. The North American sourced crudes **currently** available to the Valero Benicia refinery are expected

This is exactly the opposite of claims in the VIP FEIR. It further is unlikely as a long-term strategy due to the physical changes that have been and are currently being made to the Refinery. Sourcing North American light sweet crudes by rail may be an interim strategy to boost profits while VIP construction is being completed, but it is not a likely or even credible long-term option. Using the Benicia Crude by Rail Project to deliver heavy, sour tar sands Dilbits is much more consistent with VIP, especially given the large capital investments that have already occurred, on-going construction of the VIP to allow more processing of heavy sour crudes, and the economic benefits of running these cheaper lower grade crudes.

Valero's response to the BAAQMD only asserts "[t]he North American sourced crudes **currently** available to the Valero Benicia refinery are expected to have sulfur below 0.5 wt%." Response to BAAQMD, p. 5. This says nothing about the future. The VIP project is currently incomplete. The Hydrogen Plant, which ties the VIP together and is essential to process increased amounts of heavy sour crude, will not be operational until the end of 2014. The Crude by Rail Project would be operational by the end of 2013 and would thus operate for about a year before the VIP would be fully operational.

Thus, it is conceivable that during this interim period, Valero would deliver increased amounts of a light sweet crude by rail, perhaps Bakken,[21] which may continue to be available at a cost that is competitive compared to other crudes in its current slate. Interim imports of Bakken may occur while sufficient export facilities are constructed in Canada to handle the large unit trains proposed for Benicia.[22] However, especially in the long term, the rail terminal could be used to import Canadian tar sands crudes planned for the VIP as the IS/MND does not propose any conditions of certification to limit rail import to only light sweet crudes. As further discussed in TGG Comments, the import of tar sands crudes is likely as the Refinery will have been upgraded to process them, and they are likely to be discounted relative to other crudes available to the Refinery. Alternatively, Valero could blend heavy sour tar sands crude with light sweet North American crudes, such as Bakken, to make a "pseudo" Alaskan North Slope (ANS)

---

to have sulfur below 0.5 wt% which is well below the typical crude slate average of 1.4 wt%. Therefore, these crudes directionally sweeten the crude slate and reduce the amount of refinery fuel gas sulfur treatment required."), 6 ("...the crude slate is expected to be sweeter with the introduction of North American sourced crudes."), 7 ("North American sourced crudes are expected to be sweeter than existing average crude slate", "North American sourced crudes are characterized as sweet and are expected to have sulfur content lower than current crude slate sulfur average"), 8 ("The crudes proposed to be brought in by rail are those that fall into the lower right corner of the graph, which would be lighter in gravity and lower in sulfur than the average Padd V or average Valero crude slate."), 8 ("...the proposed North American sourced crudes are expected to be ANS look-alikes or sweeter...there is not expected to be any difference in emissions...compared to existing operations."), 9 ("North American-sourced crudes proposed to be received by railcar are ANS look-alikes or sweeter..").

[21] John R. Auers, The Prospects for Bakken Crude from a Refiners Perspective, November 16, 2010, Available at: http://turnermason.com/Publications/petroleum-publications_assets/Bakken-Crude.pdf.

[22] Sandy Fielden, Crude Loves Rock'n'Rail - Heat It! Bitumen by Rail (Part 2), March 19, 2013, Available at: http://www.rbnenergy.com/crude-loves-rocknrail-bitumen-by-rail-part-2.

substitute,[23] thus importing some of both. Regardless, tar sands crudes cannot be eliminated as a rail terminal import.

Further, even assuming the import of light sweet crudes to lighten up the slate, the Crude by Rail project would result in changes in emissions that were not considered in either the VIP FEIR or the instant IS/MND. For example, lighter crudes would increase emissions of VOCs and volatile hazardous organic pollutants (HAPs) from tanks, pumps, compressors, valves and connectors throughout the Refinery. These increases have not been evaluated in either the VIP FEIR nor the IS/MND.

Regardless, you cannot simultaneously lighten up and heavy up the crude slate and sour up and sweeten up the crude slate. It is either one or the other. The IS/MND does not disclose which it is, claiming it is neither, just the status quo without identifying the status quo. In the long-term, given the modifications to the Refinery, the most likely option is to import increased amounts of sour heavy Canadian tar sands crudes by rail. This option cannot be eliminated as the Refinery has been upgraded to handle these crudes and they will improve profit margins. Further, the worst case must be evaluated under CEQA absent conditions of certification prohibiting it.

Heavy sour crudes were anticipated to arrive by ship in the VIP, which assumed about three additional ships per month of heavy sour crude and two less barges and ships of gas oil. VIP DEIR, p. 4.8-14. The IS/MND, however, is contingent upon a comparable decrease in ship traffic. However, as further discussed in TGG Comments, due to delays in securing pipeline capacity and port facilities to export Canadian tar sands by ship, the only current way for Valero to take advantage of tar sands crudes and cost effectively deploy the VIP capital improvements is to import Canadian tar sands crudes by rail.

2. What Crudes Are Likely To Be Refined?

The first step in determining emission increases is to identify the crudes that are involved in the proposed switch. The crudes that the Refinery imported between 2007 and 2013 are summarized in Figure 1 from data reported by Valero to the EIA.[24] All of these crudes arrive by ship.[25]

Figure 1 shows that a small amount of crude currently arrives from Canada. The EIA composition data for this crude is consistent with heavy sour tar sands crudes. The puzzle that the IS/MND reviewer is left to unravel is which of these crudes will be

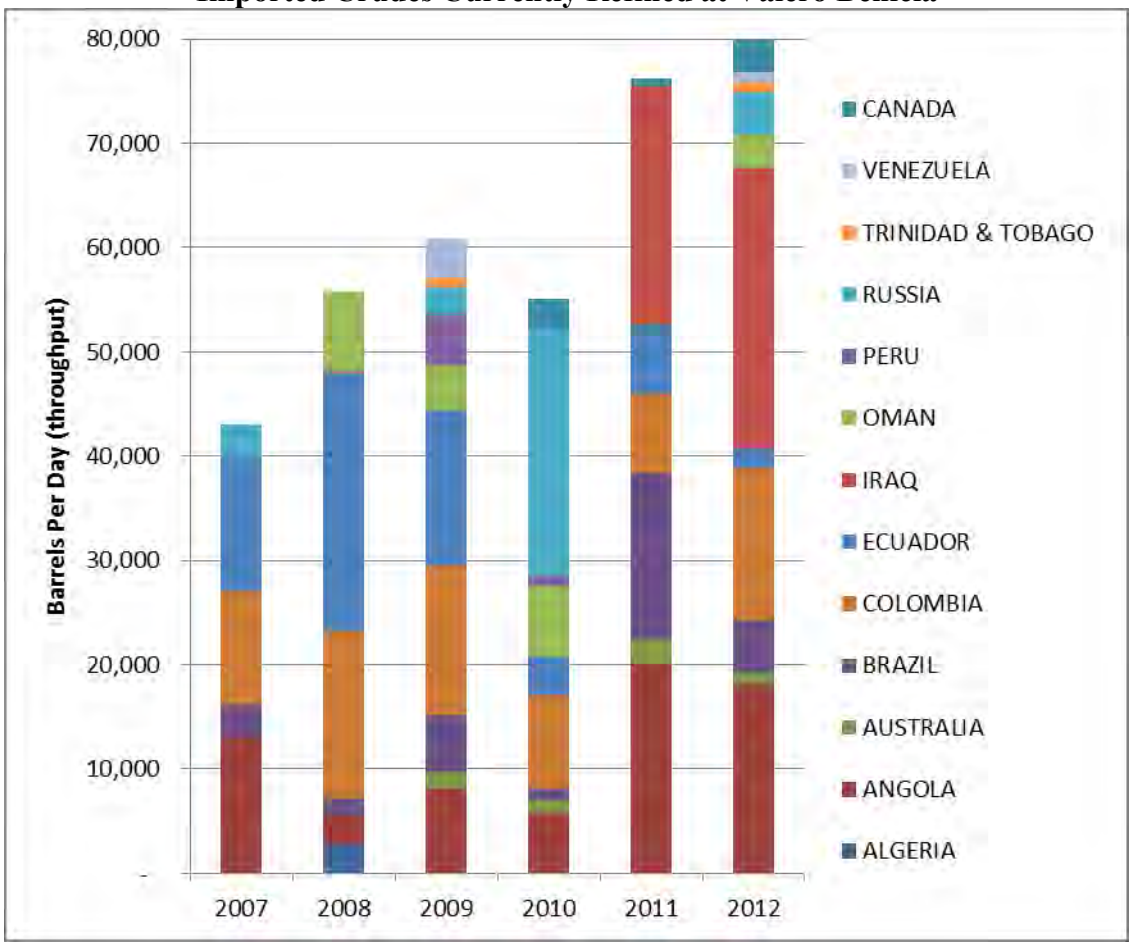
[23] John R. Auers and John Mayes, North American Production Boom Pushes Crude Blending, Oil & Gas Journal, May 6, 2013, Available at: http://www.ogj.com/articles/print/volume-111/issue-5/processing/north-american-production-boom-pushes.html.

[24] EIA, Petroleum & Other Liquids, Company Level Imports, Available at: http://www.eia.gov/petroleum/imports/companylevel/.

[25] In addition to these imports by ship, the Refinery also processes some domestic crudes, including ANS (which arrives by ship) and California crudes (which arrive by heated pipeline).

replaced by "North American-sourced crudes" and what "North American-sourced crudes" will do the replacing. The IS/MND contains none of the information needed to solve this puzzle and thus is inadequate.

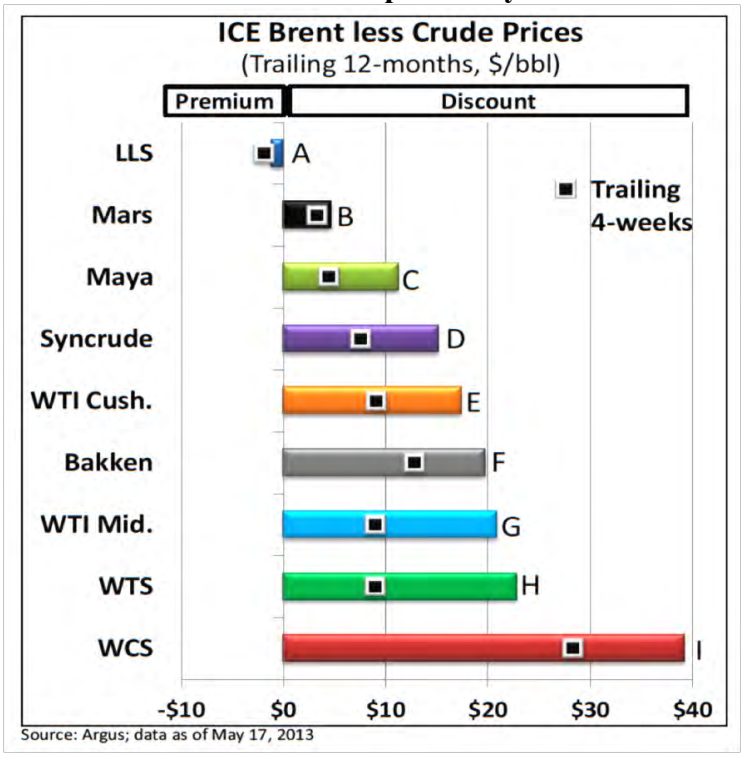
Figure 1
Imported Crudes Currently Refined at Valero Benicia



A recent presentation by Valero indicates that it plans to import "cost-advantaged crude oil" to its Benicia refinery.[26] This is consistent with the VIP, which is designed to allow the Refinery to process increased amounts of cheaper heavier sourer crudes. The cost-advantaged crude oils identified by Valero are shown in Figure 2.

[26] Valero, UBS Global Oil and Gas Conference, May 21-22, 2013, p. 10, Available at: http://www.valero.com/InvestorRelations/Pages/EventsPresentations.aspx. provided as Appendix D to TGG Comments.

Figure 2
Cost-Advantaged Crudes
That Could Be Imported By Rail[27]



The largest growth in cost-advantaged crudes is coming from U.S. shale crudes and heavy Canadian tar sands crudes, both of which are "North American-sourced crude

[27] **Brent** is light sweet crude oil sourced from the North Sea, priced at export point there. It has an API gravity of 37.9° and 0.45% sulfur. **LLS** is light Louisiana sweet, priced at St. James, LA. It has an API gravity of 37.0° and 0.38% sulfur. **MARS** is a medium sour blended crude marketed into the Gulf coast and mid-continent regions, priced at Clovelly LA. It has an API gravity of 28.7° and 1.8% sulfur. **Maya** is a heavy sour crude oil from Mexico, priced at export point there. It has an API gravity of 22° and 3.3% sulfur. **WTI Cush.** is West Texas Intermediate crude priced at Cushing, OK, a major trading hub for crude oil. It is a light crude oil with an API gravity of 39.0° and 0.4% sulfur (see also http://en.wikipedia.org/wiki/West_Texas_Intermediate). **WTI Mid**. is West Texas Intermediate (API gravity of 39.0° and 0.4% sulfur) priced at Midland TX (proximate to Permian Basin production). **WTS** is west Texas Sour priced at Midland, TX and an API gravity of 33.5° and 1.9% sulfur. **Syncrude** is a light sweet synthetic Canadian tar sands crude consisting of a bottomless blend of hydrotreated naphtha, distillate, and gas oil fractions produced from a coker and hydrocracker based upgrader facility in Canada; priced at Edmonton Alberta. It typically has an API gravity of 31.0° to 33.0° and 0.1% to 0.2% sulfur (see also http://www.crudemonitor.ca/crude.php?acr=SYN). **WCS** is Western Canadian Select, priced at Hardesty, Alberta. This is a tar sands DilBit crude with API gravity of 20.0° to 21.0° and 3.4% to 3.7% sulfur (see also http://www.crudemonitor.ca/crude.php?acr=WCS).
Sources: Valero crude price data (in Figure 2) are sourced to Argus, so crude specifications in this footnote are based on Argus Methodology and Specifications: Americas Crude (Last Updated: May 2013) http://media.argusmedia.com/~/media/Files/PDFs/Meth/argus_americas_crude.pdf and (for Brent) Argus Crude (Updated: June 2013) http://media.argusmedia.com/~/media/Files/PDFs/Meth/argus_crude.pdf
The pricing locations specified are those shown in Valero, UBS Global Oil and Gas Conference, May 21-22, 2013, p. 8, Available at: http://www.valero.com/InvestorRelations/Pages/EventsPresentations.aspx, provided as Appendix D to TGG Comments.

oils." The puzzle then is to figure out which of the cost-advantaged crudes in Figure 2 that Valero would import to Benicia by rail and which of the crudes currently imported by ship, shown in Figure 1, would be replaced. Due to the paucity of information, only a first order guess is possible. The IS/MND is deficient for placing the burden on the reviewer of piecing together Valero's plans.

The Canadian tar sands crudes (except the syncrudes) are heavy sour crudes while the U.S. shale crudes are light sweet crudes. The modifications to the Refinery made under the VIP set it up to process increased amounts of heavy sour crudes, not the light sweet crudes such as those from U.S. shale crudes. Thus, the light sweet shale crudes are unlikely to be the long-term choice. However, in the interim, before the VIP is implemented, it is possible that light sweet shale crudes would be imported to bridge the gap between bringing the entire VIP on line and fuller build out of unit train loading terminal capacity in Canada.[28] This is confirmed by the economics of the plays.

Valero's list of cost-advantaged crudes in Figure 2 indicates that the most cost-advantaged crude is Western Canadian Select (WCS),[29] which is Canadian tar sands bitumen diluted to pipeline specifications with 25% to 30% diluent or a "DilBit." I refer to these DilBit crudes in these comments as tar sands crudes. The diluent is typically natural gas condensate, pentanes, or naphtha.[30] Most of the tar sands crudes are too heavy to flow in a pipeline. Thus, they must be diluted or thinned with a lighter hydrocarbon stream to reduce viscosity and density to meet pipeline specifications. More diluent is required in the winter than summer to maintain flow rates during cold weather. The IS/MND and VIP FEIR are silent on the presence, composition and emissions from this diluent. However, the potential rail import of DilBits cannot be eliminated and is the most likely rail import due to economic considerations. The failure to disclose the potential import of tar sands crudes is a significant omission as the emissions from handling this material are large and significant.

As further discussed in TGG Comments, tar sands crudes are produced in Northern Alberta, which is landlocked and remote from the refineries that can process these crudes. Compared with other potential markets for these crudes, California is relatively proximate and has refineries configured to process heavy sour crudes. Transportation costs from Alberta to California may thus be low enough to make the delivered cost of tar sands crudes attractive for California refineries.

---

[28] Fielden, March 19, 2013.

[29] Cenovus Energy, Western Canadian Select (WCS) Fact Sheet, Available at :http://www.cenovus.com/operations/doing-business-with-us/marketing/western-canadian-select-fact-sheet.html. See also CrudeMonitor.ca - Canadian Crude Quality Monitoring, Available at: http://www.crudemonitor.ca/crude.php?acr=WCS.

[30] Gary R. Brierley, Visnja A. Gembicki, and Tim M. Cowan, Changing Refinery Configurations for Heavy and Synthetic Crude Processing, Available at: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7BA07DE342-E9B1-402A-83F7-36B18DC3DD05%7D&documentTitle=5639138.

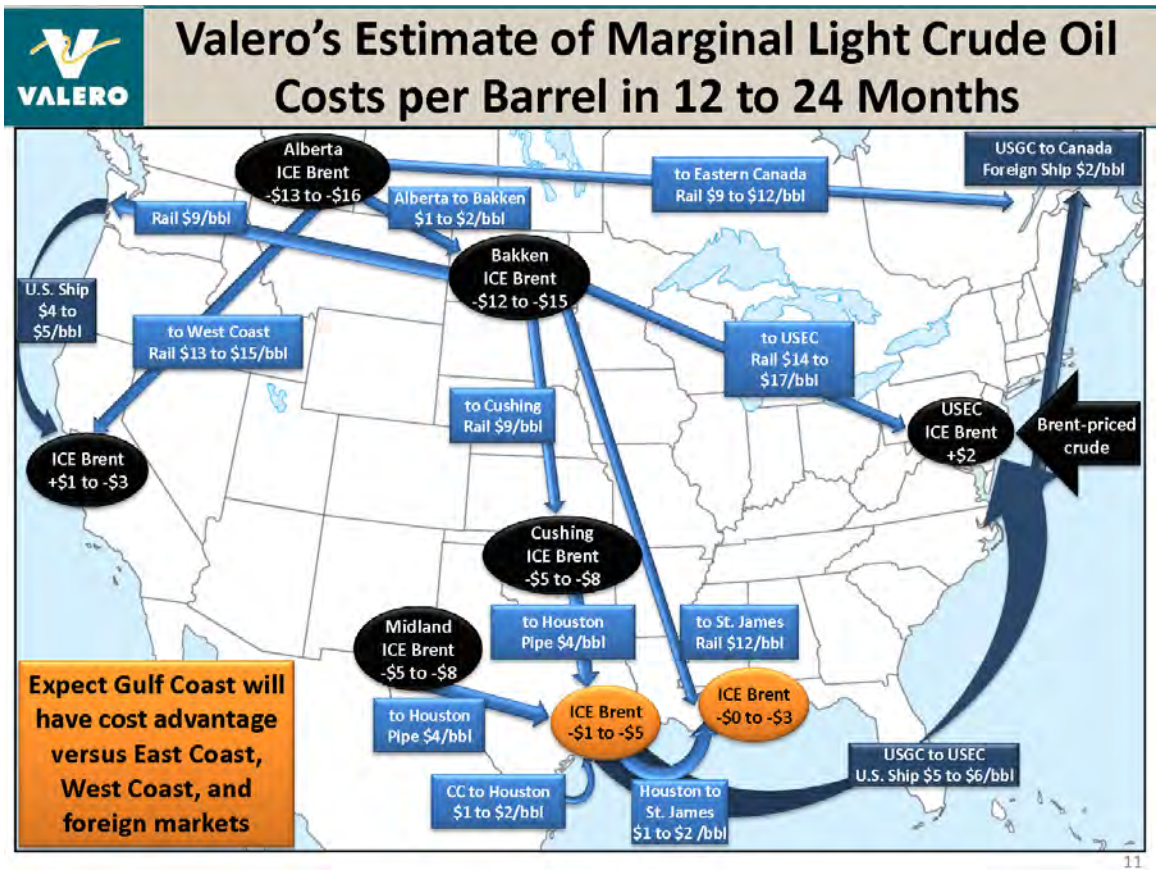
Figure 2 shows the most cost-advantaged crude is WCS, or a DilBit, which sells for a discount of nearly $40/bbl compared to ICE Brent.[31] Assuming Valero's reported light crude rail delivery cost of $13/bbl to $15/bbl,[32] WCE would arrive at Benicia at a discount of $23/bbl to $25/bbl relative to ICE Brent. Rail delivery costs for heavy crude would be somewhat higher, and heavy, sour crudes are less valuable than Brent (the global benchmark for light, sweet crudes). Still, the price of WCS delivered to Benicia may is likely lower (and very likely competitive), compared with all the other cost-advantaged crudes (Fig. 2). Thus, the most likely crude that Valero will import by rail at Benicia after the VIP is fully implemented is one of the tar sands crudes. The API gravity and sulfur content of these crudes are consistent with those projected in the VIP FEIR and fall within the ranges reported in the IS/MND.

The cost advantage to delivering North American-sourced light sweet crudes by rail is less than for tar sands crudes. The North American light crudes are discounted less relative to conventional light sweet crudes (ICE Brent) due to North American light crudes having more desirable qualities and being less relatively proximate to Benicia. These include marginal light crude oils from Alberta, Bakken, and Texas. The cost advantage of these crudes may be small (or completely disappear) after adding the cost of transport by rail to Benicia. This is demonstrated by Valero's analysis summarized in Figure 3.

[31] Brent crude is a major trading classification of sweet light crude oil sourced from the North Sea. Brent is the leading global price benchmark for Atlantic basin crude oils and is used to price two thirds of the world's internationally traded crude oil supplies. It contains about 0.37% sulfur and has an API gravity of 38.06°. It is traded on the electronic IntercontinentalExchange, know as ICE. See: http://en.wikipedia.org/wiki/Brent_Crude.

[32] Valero, May 21-22, 2013, p. 11, provided as Appendix D to TGG Comments.

Figure 3
Valero's Estimate of Marginal Light Crude Oil Costs per Barrel



The Bakken crude, for example, the closest U.S. cost-advantaged crude, is reported by Valero at a discount of $12/bbl to $15/bbl relative to ICE Brent. (Fig. 3). Valero indicates it would be sent by rail ($9/bbl) to an undisclosed port in Washington and then by ship to Benicia ($4/bbl to $5/bbl). The delivered cost at Benicia would be $1/bbl to $2/bbl **highe**r than ICE Brent if the initial crude discount relative to ICE Brent were $12/bbl. It would be -$1/bbl to -$2/bbl lower if the discount relative to ICE Brent were -$15/bbl.

Even if the delivered cost of Bakken into the California market would be slightly above Brent, this might still provide some savings to refiners, relative to the delivered costs of other crudes. The competitive position of Bakken (and other crudes) will depend in part on the pricing dynamics in the crude markets,[33] and also how specific refineries are configured.[34]

[33] Crude pricing is highly dynamic and varies in part based on crude flows. To the extent that California (and other North American coastal markets) are importing Brent and other waterborne crudes, delivered costs typically include a small premium to cover the cost of importing the crudes by tanker. In Valero's analysis in Figure 3, Brent-priced crude is assumed to be imported into East Coast US (PA/NJ), with the

The delivered cost of Alberta light Syncrude would be slightly more favorable. As reported by Valero, Syncrude is at a discount of $15/bbl relative to ICE Brent. (Fig. 2). And as previously noted, Valero indicates it would be sent by rail ($9/bbl) to an undisclosed port in Washington and then by ship to Benicia ($4/bbl to $5/bbl). The delivered cost at Benicia would be $1/bbl to $2/bbl below ICE Brent. However, the Benicia Refinery is not designed to process this crude and likely could accept only a small amount of it, much less than 70,000 bbl/day.[35]

Thus, it is unlikely that Valero would import light sweet crudes by rail if it were feasible to process the cheaper WCS tar sands crude. In the short term, through at least the end of 2014, when the VIP Hydrogen Plant goes on line, it may not be feasible to refine large amount of the WCS tar sands crudes. Thus, in the short-term, some of these light sweet shale crudes may very well be sourced to improve profits. However, the long term prospects for these light sweet crudes are more uncertain, given the discount of tar sands crudes and the physical modifications to the Refinery.

My following comments on environmental impacts of the Crude by Rail Project assume up to 100% DilBit tar sands crudes would be imported, as they represent a worst case for air emissions. However, 100% tar sands bitumen, Alberta Syncrude and light sweet shale crudes cannot be eliminated as part of a future potential mix of "North American-sourced crude" for the Refinery. It is impossible to identify what that mix might be, given the inadequate Project description. As impacts will be significant, regardless of the mix, an EIR should be prepared to evaluate the impacts of the full range of likely future imports.

The Project description suggests that undiluted bitumen would not be imported but it also suggests only light sweet material would be imported. To import undiluted bitumen, the railcars would have to be insulated to prevent the bitumen from solidifying in cold weather and equipped with steam-coils to re-heat the bitumen at Benicia for

---

delivered price there at a $2 premium over Brent. Market analysis typically assumes that overseas tanker delivery (e.g., from Brent to East or Gulf Coast) costs about $2/barrel.

[34] Bakken and other light, sweet shale crudes are especially attractive for less complex refineries that are configured for light, sweet crudes, as opposed to more complex refineries that can process heavier, sour feedstocks.

[35] Ebullated Bed Hydroprocessing's Role in Bitumen Upgrading, Refinery Operations, July 20, 2011, p. 3, Available at: http://refineryoperations.com/downloads/refinery-operations_2-14_2011-07-20.pdf; Gerald W. Bruce, Bitumen to Finished Products, Canadian Heavy Oil Association Technical Luncheon, November 9, 2005, See pages captioned: Processing SCO and SCO Challenges, Available at: http://www.powershow.com/view/7004d-OGExM/Bitumen_to_Finished_Products_Presented_by_Gerald_W_Bruce_Jacobs_Canada_Inc_Canadian_Heavy_Oil_.Ass_powerpoint_ppt_presentation; Chris McManaman, The Major Challenges Facing the Future of Oil Sands Development, ("While SCO commands a premium price to WTI and is in many ways comparable to light sweet crude, the high aromaticity of bitumen from which it is derived limits its penetration into refineries that are not specially equipped to handle it. A typical refinery is limited to between 10-20% of SCO in its crude slate"), January 17, 2008, Available at: http://gembaoilsands.blogspot.com/2008/01/markets.html.

unloading.[36] Further, the storage tanks would have to be heated as bitumen is too viscous to pump at ambient temperatures. The Initial Study identifies only conventional bottom-unload, closed-dome rail cars. ATC, p. 7. The Project description states the "North American crude oil would flow readily at ambient temperatures. Therefore, this Project would not increase the steam demand..." IS, p. 9. However, this does not eliminate pure bitumen as some of the storage tanks in the VIP are heated (VIP DEIR, p. 3-49) and the railcars could be replaced with heated cars in the future unless conditions of certification specifically require unheated cars without insulation and steam coils.

To import undiluted bitumen, the offloading facility would have to be equipped with steam and nitrogen injection systems to heat the rail car coils and remove the crude.[37] The IS/MND and ATC suggest conventional unloading racks. However, Appendix A to the ATC, which contains the drawings and specifications required to affirmatively make this determination, are claimed as confidential business information, preventing full disclosure of the Project description. The details of the loading racks are key to determining the types of crude that can be imported and hence, their impacts. Absent any design information on the loading racks, import of 100% bitumen cannot be eliminated and must be evaluated in an EIR.

In sum, the price discount of tar sands crudes relative to conventional light sweet crudes makes them an attractive crude to import by rail. The Refinery is configured to upgrade these crudes. As discussed in TGG Comments, presentations made by Valero in numerous fora indicate that it is considering importing tar sands crudes, most likely DilBit crudes. Thus, the following sections discuss the impact on emissions of switching from crudes currently imported by ship (Fig. 1) to up to 70,000 BPD of tar sands crudes.[38]

D. Why Does The Specific Crudes Matter?

The air quality impacts of refining North American-sourced crudes such as tar sands crudes depend on the chemical and physical composition of the refinery slate with tar sands crude compared to the current slate.

The chemical composition of tar sands crudes is different in important ways from the current Refinery slate.[39] The current slate includes very little tar sands crudes, from

---

[36] Fielden, March 19, 2013.

[37] Fielden, March 19, 2013.

[38] As discussed above, crudes other than Dilbits may be delivered by rail to the Benicia Refinery, especially in the short-term prior to completion of the VIP (Hydrogen Plant) and pending fuller build out of unit train loading facilities in Alberta.

[39] Straatiev and other, 2010, Table 1; Brian Hitchon and R.H. Filby, Geochemical Studies - 1 Trace Elements in Alberta Crude Oils, http://www.ags.gov.ab.ca/publications/OFR/PDF/OFR_1983_02.PDF; F.S. Jacobs and R.H. Filby, Trace Element Composition of Athabasca Tar Sands and Extracted Bitumens, Atomic and Nuclear Methods in Fossil Energy Research, 1982, pp 49-59; James G. Speight, The Desulfurization of Heavy Oils and Residua, Marcel Dekker, Inc., 1981, Tables 1-1, 2-2, 2-3, 2-4 and p. 13 and James G. Speight, Synthetic Fuels Handbook: Properties, Process, and Performance, McGraw-Hill,

0.5% to 2% of the Refinery total crude slate over the period 2010 to 2012 (Fig. 1). The Crude by Rail Project could increase the heavy sour tar sands crude by up to 70,000 BPD, or up to 42% of the permitted Refinery throughput. This represents a significant increase in a crude that will increase emissions compared to the current Refinery slate.

The U.S. Geological Survey ("USGS"), for example, reported that "natural bitumen," the source of all Canadian tar sands-derived oils, contains 102 times more copper, 21 times more vanadium, 11 times more sulfur, six times more nitrogen, 11 times more nickel, and 5 times more lead than conventional heavy crude oil, such as those currently refined from Ecuador, Columbia, and Brazil.[40]

The environmental damage caused by these pollutants includes acid rain; bioaccumulation of toxic chemicals up the food chain; the formation of ground-level ozone and smog; visibility impairment in Class I areas, such as National Parks; odor impacts that affect residents near the Refinery; accidental releases due to corrosion of refinery equipment; and depletion of soil nutrients.

Additionally, many of these chemicals pose a direct health hazard from air emissions. These metals, for example, mostly end up in the coke. Greater amounts of coke are produced by the tar sands crudes than the current crude slate. The California Air Resources Board has classified lead as a pollutant with no safe threshold level of exposure below which there are no adverse health effects. Thus, just the increase in lead from switching up to 42% of the slate to tar sands crude is a significant impact that was not disclosed in the IS/MND. Accordingly, crude quality is critical to a thorough evaluation of the impacts of a crude switch, such as proposed here.

A good crude assay is essential for comprehensive crude oil evaluation.[41] The type of data required to evaluate emissions would require, at a minimum, the following information for both the current slate, the future slate, the displaced crudes, and the unidentified "North American-sourced crudes":

- Trace elements (As, B, Cd, Cl, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, U, V, Zn)
- Nitrogen (total & basic)
- Sulfur (total, mercaptans, H_2S)
- Residue properties (saturates, aromatics, resins)
- Acidity

2008, Tables A.2, A.3, and A.4; Pat Swafford, Evaluating Canadian Crudes in US Gulf Coast Refineries, Crude Oil Quality Association Meeting, February 11, 2010, Available at: http://www.coqa-inc.org/20100211_Swafford_Crude_Evaluations.pdf .

[40] R.F. Meyer, E.D. Attanasi, and P.A. Freeman, Heavy Oil and Natural Bitumen Resources in Geological Basins of the World, U.S. Geological Survey Open-File Report 2007-1084, 2007, p. 14, Table 1, Available at http://pubs.usgs.gov/of/2007/1084/OF2007-1084v1.pdf.

[41] CCQTA February 7, 2012, p. 10.

- Aromatics content
- Asphaltenes (pentane, hexane and heptane insolubles)
- Hydrogen content
- Carbon residue (Ramsbottom, Conradson)
- Distillation yields
- Properties by cut
- Hydrocarbon analysis by gas chromatography

This type of information is reported in a crude assay or "fingerprint" of the oil, which are available to the applicant and was apparently supplied to the BAAQMD as confidential business information, but not the public, foreclosing any meaningful public review. The IS/MND does not identify any specific "North American-sourced crudes" that would be imported, does not contain any crude assays for the current refinery slate, the crude that would be imported by rail, or the crude that is currently imported by ship but would be replaced. The IS/MND also does not contain an analysis of the impact of changes in crude quality on air emissions, arguing instead there would be no change. Thus, the public is left to guess what the impacts might be. The Initial Study should have evaluated the impacts of refining tar sands crudes on air emissions and other residuals or included conditions of certification specifically prohibiting their import as publicly available information indicates that Valero is considering tar sands crudes as they would likely arrive at the Refinery with pricing that is competitive relative to other crudes.

As none of the basic information required to assess air quality impacts is provided in the record, I will discuss in general some of the impacts that can reasonably be expected from including tar sands crudes in the crude slate. Incorporating these "North American-sourced crudes" into the Refinery crude slate could be accomplished, for example, by meeting the API and sulfur range reported in the Initial Study, but with shifts in the means and/or major shifts in other properties, increasing emissions.

The IS/MND is based on the assumption that the composition of the crude slate will not change and thus will not impact air emissions. However, this is based only on two gross or lumper crude quality parameters and ignores the actual chemical composition of the crudes, which is not disclosed in the record.

The specific chemicals, for example, determine which ones will be volatile and lost through equipment leaks and outgassed from tanks, which ones will be difficult to remove in hydrotreaters and other refining processes (thus determining how much hydrogen and energy must be expended to remove them), which ones will cause malodors, and which ones might aggravate corrosion, leading to accidental releases. The Initial Study fails to grasp this distinction and looked only at the range of two gross lumper parameters. Thus, it has failed to satisfy the disclosure requirements of CEQA and failed to analyze relevant impacts.

For example, sulfur is not simply sulfur, but is made up of a complex collection of individual chemical compounds such as hydrogen sulfide, mercaptans, thiophene, benzothiophene, methyl sulfonic acid, dimethyl sulfone, thiacyclohexane, etc. Each crude has a different suite of individual sulfur chemicals. The impacts of "sulfur" depend upon the specific sulfur chemicals and their relative concentrations, not on the range of the "gross" amount of total sulfur expressed as weight percent sulfur, as reported in the Initial Study. The fact that the range in the total sulfur content of rail-imported crude and the current crude slate is the same is irrelevant.

The role of the specific sulfur compounds was clearly and tragically demonstrated in the recent (August 2012) catastrophic accident at the nearby Chevron Richmond Refinery. This accident was caused by the erroneous assumption that sulfur is sulfur, which led to significant corrosion. See discussion elsewhere in these comments. Similarly, while the lighter sulfur compounds such as mercaptans and disulfides found in light sweet crudes may not significantly increase the overall weight percent sulfur in the crude slate, as claimed in the IS/MND, they do lead to impacts, such as aggressive sulfidation corrosion, which can lead to accidental releases. These compounds concentrate in the lower boiling naphtha fraction and contribute to aggressive sulfidation corrosion in the convection section of naphtha hydrotreating furnaces.[42] As another example, the specific sulfur compounds will determine which compounds will be emitted from storage tanks and fugitive component, some of which could result in significant odor impacts, e.g., mercaptans. Thus, regardless of what crude might be brought in by rail, there are potential significant environmental impacts that are due to characteristics of that oil besides total sulfur and API gravity.

There are two significant differences between tar sands crudes that could be imported by rail (but not by ship due to lack of pipelines and ports) and other crudes they may displace: (1) the presence of large amounts of diluent and (2) the chemical composition of the heavy ends or residuum, which must be broken down into lighter products in a refinery.

1. Emissions From Diluent

The majority of the crudes that will be transported by rail will likely be a blend of bitumen and diluent due to their discounted price compared to conventional light sweet crudes. Pure undiluted bitumen is unlikely as the Project description does not disclose any equipment that would be necessary to handle pure bitumen but cannot be excluded as discussed elsewhere. Undiluted bitumen would eliminate the impacts discussed in this section from diluent, but would significantly increase the impacts from refining the heavy ends, namely increased use of utilities that increase combustion emissions. Setting aside undiluted bitumen, this leaves the question of the amount of diluent that would be mixed with the crude, which ultimately determines impacts.

[42] See, for example, Jim McLaughlin, Changing Your Crude Slate, Becht New, May 24, 2013, Available at: http://becht.com/news/becht-news/.

When heavy crude is shipped by pipeline, it needs to be diluted so that it will flow in the pipe. Bitumen blended to pipeline specifications can be loaded on and off conventional rail tank cars like other light crudes. However, bitumen can also be transported by rail as "RailBit," using 15% to 20% diluent. The amount of diluent depends on the type of rail tank car and design details of the offloading facilities. These have been excluded from the IS/MND, which suggests conventional rail cars and a conventional unloading terminal. Further, the number of rail cars, 100 per day, or 700 barrels per car, suggests a lighter material, with more diluent. Thus, I assume that one of the materials that will be transported by rail is conventional pipeline-quality DilBits with 20% to 30% diluent.

However, it is possible that the Project description is inadequate to distinguish between the various possible diluent mixes. There would be, for example, incentive to import RailBit rather than DilBit as it would save on the cost of diluent and transportation. Further, heavy crude refineries such as Valero generally do not want the diluent as it creates a "dumbell" crude curve that contains light components that are not useful to refineries configured to process conventional heavy crudes. Further, transport of undiluted bitumen may be safer as spills do not travel as far from the spill site.

Regardless, the mixture of diluent and bitumen does not behave the same as a conventional crude, as the distribution of hydrocarbons is very different. The blended lighter diluent generally evaporates readily when exposed to ambient conditions, leaving behind the heavy ends, the vacuum gas oil (VGO) and residuum.[43] Thus, when a DilBit is released accidentally, it will generally create a difficult to cleanup spill as the heavier bitumen will be left behind.[44] Further, in a storage tank, the diluent also can be rapidly evaporated and emitted through tank openings.

These conventional DilBits, which are the most likely "North American-sourced crude" to be imported by rail over the long term, given the current economic outlook, are sometimes referred to as "dumbell" or "barbell" crudes as the majority of the diluent is C_5 to C_{12} and the majority of the bitumen is C_{30}+ boiling range material, with very little in between.[45] This means these crudes have a lot of material boiling at each end of the boiling point curve, but little in the middle. Thus, they yield very little middle distillate fuels, such as diesel, heating oil, kerosene, and jet fuel and more coke, than other heavy crudes. A typical DilBit, for example, will have 15% to 20% by weight light material,

---

[43] The residuum is the residue obtained from the oil after nondestructive distillation has removed all of the volatile materials. Residua are black, viscous materials. They may be liquid at room temperature (from the atmospheric distillation tower) or almost solid (generally vacuum residua), depending upon the nature of the crude oil.

[44] A Dilbit Primer: How It's Different from Conventional Oil, Inside Climate News. Available at: http://insideclimatenews.org/news/20120626/dilbit-primer-diluted-bitumen-conventional-oil-tar-sands-Alberta-Kalamazoo-Keystone-XL-Enbridge?page=show.

[45] Gary R. Brierley and others, Changing Refinery Configuration for Heavy and Synthetic Crude Processing, 2006, Available at: https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7BA07DE342-E9B1-402A-83F7-36B18DC3DD05%7D&documentTitle=5639138.

basically the added diluent, 10% to 15% middle distillate, and the balance, >75% is heavy residual material (vacuum gas oil and residue) exiting the distillation column. These characteristics distinguish DilBits from crudes currently refined at Benicia.[46]

The large amount of light material that distills below 149 C is very volatile and can be emitted to the atmosphere from storage tanks and equipment leaks of fugitive components (pumps, compressors, valves, fittings) in much larger amounts than other heavy crudes that it would replace. The IS/MND does not indicate whether other heavy crudes processed at the Refinery currently arrive with diluent. However, EIA crude import data, summarized in Figure 1, do not identify any crudes that are blended with diluent. Thus, the use of diluent to transport tar sands crudes is likely an important difference between the current heavy crude slates processed at the Refinery and the tar sands crudes that could replace them. This diluent will have impacts during railcar unloading as well as at many processing units within the Refinery.

The diluent is a low molecular weight organic material with a high vapor pressure that contains high levels of VOCs, sulfur compounds, and HAPs. These would be emitted during unloading and present in emissions from the crude tank(s) and fugitive components from its entry into the Refinery with the crude until it is recovered and marketed, or at least between the desalter and downstream units where some of it is recovered. The presence of diluent would increase the vapor pressure of the crude, substantially increasing VOC and HAP emissions from tanks and fugitive component leaks compared to those from displaced heavy crudes not blended with diluent. The IS/MND and the VIP FEIR did not disclose the potential presence of diluent and made no attempt to estimate these diluent-derived emissions.

The composition of some typical diluents/condensates is reported on the website, www.crudemonitor.ca.[47] The specific diluents that would be used by the Project are unknown. The CrudeMonitor information indicates that diluent contains very high concentrations (based on 5-year averages, v/v basis) of the hazardous air pollutants (HAPs) benzene (7,200 ppm to 9,800 ppm); toluene (10,300 ppm to 25,300 ppm); ethyl benzene (900 ppm to 2,900 ppm); and xylenes (4,600 ppm to 23,900 ppm).

The sum of these four compounds is known as "BTEX" or benzene-toluene-ethylbenzene-xylene. The BTEX in diluent ranges from 27,000 ppm to 60,900 ppm. The BTEX in DilBits, blended from these materials, ranges from 8,000 ppm to 12,300 ppm.[48]

---

[46] Stratiev and others, 2010, Table 1, compared to DilBit crude data on www.crudemonitor.ca.

[47] Condensate Blend (CRW) - http://www.crudemonitor.ca/condensate.php?acr=CRW; Fort Saskatchewan Condensate (CFT) - http://www.crudemonitor.ca/condensate.php?acr=CFT; Peace Condensate (CPR) - http://www.crudemonitor.ca/condensate.php?acr=CPR; Pembina Condensate (CPM) - http://www.crudemonitor.ca/condensate.php?acr=CPM; Rangeland Condensate (CRL) - http://www.crudemonitor.ca/condensate.php?acr=CRL; Southern Lights Diluent (SLD) - http://www.crudemonitor.ca/condensate.php?acr=SLD.

[48] DilBits: Access Western Blend (AWB) -http://www.crudemonitor.ca/crude.php?acr=AWB; Borealis Heavy Blend (BHB) -http://www.crudemonitor.ca/crude.php?acr=BHB; Christina Dilbit Blend (CDB) - http://www.crudemonitor.ca/crude.php?acr=CDB; Cold Lake (CL) -

Similarly, the BTEX in synthetic crude oils (SCOs) ranges from 6,100 ppm to 14,100 ppm.[49] These are very high concentrations that were not considered in the emission calculations in the IS/MND and underlying ATC nor in the VIP FEIR. These high levels could result in significant worker and public health impacts.

The ATC estimated emissions of these compounds (ATC, Table 3-3) from Tank 1776 and fugitive components using the "default speciation profile" for crude oil from the EPA program, TANKS4.09d, for all constituents except benzene. For benzene, the IS/MND variously claims it substituted either 0.06wt.% or 0.6wt.% for the default value.[50] Thus, the IS/MND's claims as to benzene in fugitive emissions are internally inconsistent. My research indicates the TANKS default value for benzene in crude oil is 0.6wt.%.[51] The IS/MND lowered this to 0.06wt.% in its HAP emission calculations. IS/MND, Appx. A. The IS/MND contains no support for lowering EPA's crude oil default benzene level by a factor of ten. This value substantially underestimates the amount of benzene that would be present in tank and fugitive component emissions when processing either DilBits or Bakken crudes.

The value of 0.06wt.% benzene used to calculate tank and fugitive benzene emissions contradicts published crude composition for the range of North American-sourced crudes that could be imported by the Project. Table 1 compares the concentration of BTEX used to estimate BTEX emissions in the IS/MND with the BTEX concentrations in various diluents, two widely traded DilBits, including the DilBit that Valero used in its cost analysis (Fig. 2), Western Canadian Select and Bakken crude oils. This table shows that regardless of which material is imported by the Crude by Rail

---

http://www.crudemonitor.ca/crude.php?acr=CL; Peace River Heavy (PH) - http://www.crudemonitor.ca/crude.php?acr=PH; Seal Heavy (SH) - http://www.crudemonitor.ca/crude.php?acr=SH; Statoil Cheecham Blend (SCB) - http://www.crudemonitor.ca/crude.php?acr=SCB; Wabasca Heavy (WH) - http://www.crudemonitor.ca/crude.php?acr=WH; Western Canadian Select (WCS) - http://www.crudemonitor.ca/crude.php?acr=WCS; Albian Heavy Synthetic (AHS) (DilSynBit) - http://www.crudemonitor.ca/crude.php?acr=AHS.

[49] SCOs: CNRL Light Sweet Synthetic (CNS) -http://www.crudemonitor.ca/crude.php?acr=CNS; Husky Synthetic Blend (HSB) -http://www.crudemonitor.ca/crude.php?acr=HSB; Long Lake Light Synthetic (PSC) -http://www.crudemonitor.ca/crude.php?acr=PSC; Premium Albian Synthetic (PAS) - http://www.crudemonitor.ca/crude.php?acr=PAS; Shell Synthetic Light (SSX) - http://www.crudemonitor.ca/crude.php?acr=SSX; Suncor Synthetic A (OSA) - http://www.crudemonitor.ca/crude.php?acr=OSA; Syncrude Synthetic (SYN) - http://www.crudemonitor.ca/crude.php?acr=SYN.

[50] The text in the ATC, p. 11, pdf 17, in the note following Table 3-3, states that benzene in crude oil was assumed to be 0.6%. However, in Table 3-5, p. 12, pdf 18, it is stated that benzene in the crude oil was assumed to be 0.06%. Similarly, the supporting appendices indicate that 0.06% benzene was actually used in the fugitive emissions calculations. ATC, Attach. B-3, Fugitive Component Emissions, pdf 33. Similar data for tank emission calculations cannot be checked as it is claimed to be confidential. ATC, Attach. B-2.

[51] Crude oil component speciation data was obtained by using the TANKS409d model available at http://www.epa.gov/ttnchie1/software/tanks/ using the database interface to export the speciation profile for the TANKS default crude oil, *viz.*, "Data --> Speciation Profiles --> Export" menu selection and choosing crude oil. This spreadsheet confirms that the default benzene level for crude oils is 0.6wt.%.

Project, benzene emissions would be much higher than estimated in the IS/MND. Further, benzene emissions are higher in the most recently collected samples than in the five-year averages in Table 1. These benzene emissions would result in significant health impacts.

Table 1
Comparison of BTEX Levels Assumed in IS/MND with Levels in Diluents and DilBits

	Default Crude ATC Attach. B-3 (wt.%)	Diluents (5-yr Avg)[52] (wt.%)	Christina DilBit[53] (5-yr Avg) (wt.%)	Western Canadian Select[54] (5-yr Avg) (wt.%)	Bakken[55] Crude (wt.%)
Benzene	0.06	0.83-1.27	0.27	0.15	0.1-1.0
Ethylbenzene	0.4	0.11-0.33	0.06	0.06	0.33
Toluene	1.00	1.32-2.89	0.44	0.27	0.92
Xylenes	1.4	0.59-2.71	0.34	0.27	1.4

The ATC discloses that annual emissions of benzene from Tank 1776 exceed the BAAQMD chronic trigger level (6.4 lb/yr trigger level compared to a net increase of 28.3 lb/yr). ATC, p. 17-18 & Table 4-3. Further, the IS/MND and underlying ATC fail to disclose that benzene emissions from fugitive components, when calculated using the correct benzene level (> or = 0.6%, rather than 0.06%), also exceed the BAAQMD screening level (6.4 lb/hr screening level compared to 20 lb/hr emitted, adjusted to 0.6% benzene).

The Initial Study conducted a screening health risk assessment. It found no significant health impact. IS, p. II-15. However, the benzene emissions used in this analysis apparently (no support is provided in the record) were underestimated by factors of 2.5 (0.15/0.06 = 2.5) to 4.5 (0.27/0.06 =4.5) assuming DilBits and up to a factor of 17

[52] The reported range includes the following diluents: Condensate Blend, Saskatchewan Condensate, Peace Condensate, Pembina Condensate, Rangeland Condensate, and Southern Lights Diluent. The composition data for all of these diluents is found at http://www.crudemonitor.ca. Concentrations reported in volume % (v/v) in this source were converted to weight % by dividing by the ratio of compound density in kg/m^3 at 25 C (benzene =876.5 kg/m^3, toluene = 0.866.9 kg/m^3, ethylbenzene 866.5 kg/m^3, and the xylenes 863 kg/m^3) to crude oil density in kg/m3, as reported at www.crudemonitor.ca, 5-year average. See also Cenovus Energy Inc. Material Safety Data Sheet, Condensate (Sour) and Condensate (Sweet), Available at: http://www.cenovus.com/contractor/msds.html.

[53] Christina DilBit Blend (CDB) -.http://www.crudemonitor.ca/crude.php?acr=CDB. Concentrations reported in volume % (v/v) converted to weight % as explained in footnote 52.

[54] Western Canadian Select (WCS) -http://www.crudemonitor.ca/crude.php?acr=WCS. Concentrations reported in volume % (v/v) converted to weight % as explained in footnote 52.

[55] Cenovus Energy, Material Safety Data Sheet for Light Crude Oil, Bakken (benzene), Available at: http://www.cenovus.com/contractor/docs/CenovusMSDS_BakkenOil.pdf. Other components of BTEX from Keystone DEIS, Tables 3.13-1 (density) and 3.13-2 (BTEX). Concentrations reported in volume % (v/v) converted to weight % as explained in footnote 52.

(1.0/0.06=17) for Bakken crudes. There is one DilBit with a benzene concentration of 0.06wt.%, Borealis Heavy Blend. However, this represents the lower end of the range for DilBits. There is no evidence that this is the only DilBit that would be imported by rail.

Benzene is a carcinogen, the principal one included in the HAP emission calculations.[56] IS/MND, Appx. A. The only sources of benzene disclosed in the IS/MND is Tank 1776 and fugitives, which were underestimated due to the use of an anomalously low crude concentration. Thus, the cancer risk reported in the IS/MND in Table 3-3 can be adjusted for this error by multiplying the IS/MND Table 3-3 cancer risks by the benzene ratios reported above (benzene in crude of interest from Table 1 ÷ benzene assumed in the IS/MND (0.06wt.%). This assumes the contribution, if any, to cancer risk from ethylbenzene is negligible.

Thus, the reported cancer risk to the maximum exposed worker increases from 4.46 in a million (IS, Table 3-3) up to 11 (4.46x2.5=11.2) to 20 (4.46x4.5= 20.1) in a million for DilBits and up to 76 (4.46x17=76) in a million for Bakken crudes. For the maximum exposed residential receptor, the reported cancer risk increases from 2.27 (IS, Table 3-3) up to 5.7 (2.27x2.5=5.7) to 10 (2.27x4.5=10.2) in a million for DilBits and to 39 (2.27x17=39) in a million for Bakken crudes. These cancer risk levels equal or exceed the assumed cancer significance threshold of 10 in a million. IS, p. II-15. These are significant unmitigated impacts (to workers and nearby residents) that were not disclosed in the IS/MND and are directly caused by the IS/MND's failure to consider the composition of the crude that is being imported.

The CrudeMontior information also indicates that these diluents contain elevated concentrations of volatile mercaptans (9.9 to 103.5 ppm), which are highly odiferous and toxic compounds that will create odor and nuisance problems at the Refinery in the vicinity of the unloading area, crude storage tanks and supporting fugitive components. Mercaptans can be detected at concentrations substantially lower than will be present in emissions from the crude tanks and fugitive emissions from the unloading rack and related components, including pumps, valves, flanges, and connectors.[57] In fact, mercaptans are added to natural gas in very tiny amounts so that the gas can be smelled to facilitate detecting leaks.

Thus, unloading, storing, handling and refining bitumens mixed with diluent and shale crudes such as Bakken would emit VOCs, HAPs, and malodorous sulfur compounds, not found in comparable levels in conventional crudes, depending upon the DilBit or shale crude source. There are no restrictions on the crudes, diluent source or their compositions nor any requirements to monitor emissions from tanks and leaking equipment where DilBit-blended and other light crudes would be handled. As the market

---

[56] Ethylbenzene was classified by OEHHA as a weak carcinogen in 2007. See: http://oehha.ca.gov/tcdb/index.asp. As the IS/MND risk calculations were not available, it is uncertain whether the IS/MND's risk assessment included ethylbenzene as a carcinogen.

[57] American Industrial Hygiene Association, Odor Thresholds for Chemicals with Established Occupational Health Standards, 1989; American Petroleum Institute, Manual on Disposal of Refinery Wastes, Volume on Atmospheric Emissions, Chapter 16 - Odors, May 1976, Table 16-1.

has experienced shortages of diluents, any material with a suitable thinning ability could be used, which could contain currently unanticipated hazardous components.

2. Composition of Tar Sands Bitumen

The composition of tar sands crudes is chemically different from other heavy crudes currently processed at the Refinery as they are tar sands bitumen mixed with diluent. They are unique for two major reasons: (1) presence of large quantities of volatile diluent full of VOCs and toxic chemicals and (2) unique chemical composition of the bitumen. The previous comment discussed diluent. This comment discusses the unique composition of tar sands bitumens that require more intense processing and thus higher emissions.

Tar sands bitumens are composed of higher molecular weight chemicals and are deficient in hydrogen compared to conventional heavy crudes. This means more energy will be required to convert them into the same slate of refined products. Thus, most fired sources in the refinery—heaters, boilers, etc.—will have to work harder to generate the same quantity and quality of refined products. This will increase all utilities required to run the refinery - electricity, natural gas, hydrogen, water, and steam. This section discusses these bitumens and their impact on refining emissions.

Refining converts crude oils into transportation fuels. This is done by removing contaminants (sulfur, nitrogen, metals) and breaking down and reassembling chemicals present in the crude oil charge by adding hydrogen, removing carbon as coke, and applying heat, pressure, and steam in the presence of various catalysts. More intensive refining is required to convert tar sands crudes into useful products than other heavy crudes. This means a greater amount of energy must be expended to yield the same product slate. Thus, all of the combustion sources in a refinery, such as heaters and boilers, must work harder and thus emit more pollutants, than when refining conventional heavy and other crudes. The IS/MND fails completely to analyze the impact of crude composition on the resulting emissions from generating increased amount of these utilities.

Canadian tar sands bitumen is distinguished from conventional petroleum by the small concentration of low molecular weight hydrocarbons and the abundance of high molecular weight polymeric material.[58] Crudes derived from Canadian tar sands bitumen—DilBits, SCOs and SynBits—are heavier, i.e., have larger, more complex molecules such as asphaltenes,[59] some with molecular weights above 15,000.[60] They

[58] O.P. Strausz, The Chemistry of the Alberta Oil Sand Bitumen, Available at: http://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/22_3_MONTREAL_06-77_0171.pdf.

[59] Asphaltenes are nonvolatile fractions of petroleum that contain the highest proportions of heteroatoms, i.e., sulfur, nitrogen, oxygen. The asphaltene fraction is that portion of material that is precipitated when a large excess of a low-boiling liquid hydrocarbon such as pentane is added. They are dark brown to black amorphous solids that do not melt prior to decomposition and are soluble in benzene and aromatic naphthas.

generally have higher amounts of coke-forming precursors; larger amounts of contaminants (sulfur, nitrogen nickel, vanadium) that require more intense processing to remove; and are deficient in hydrogen, compared to other heavy crudes.

Thus, to convert them into the same refined products requires more utilities -- electricity, water, heat, and hydrogen. This requires that more fuel be burned in most every fired source at the refinery and that more water be circulated in heat exchangers and cooling towers. Further, this requires more fuel to be burned in any supporting off-site facilities, such as power plants that may supply electricity or Steam-Methane Reforming Plants that may supply hydrogen. Under CEQA, these indirect increases in emissions caused by a project must be included in the impact analysis. These increases in fuel consumption release increased amounts of NO_x, SO_x, VOCs, CO, PM10, PM2.5, and HAPs as well as greenhouse gas emissions (GHG). Some of the principle differences are identified below, followed by a discussion of the impacts these differences have on emissions.

a. Higher Concentrations of Asphaltenes and Resins

The severity (e.g., temperature, amount of catalyst, hydrogen) of hydrotreating depends on the type of compound a contaminant is bound up in. Lower molecular weight compounds are easier to remove. The difficulty of removal increases in this order: paraffins, naphthenes, and aromatics.[61] Most of the contaminants of concern in tar sands crudes are bound up in high molecular weight aromatic compounds such as asphaltenes that are difficult to remove, meaning more heat, hydrogen, and catalyst are required to convert them to lower molecular weight blend stocks. Some tar sands-derived vacuum gas oils (VGOs), for example, contain no paraffins of any kind. All of the molecules are aromatics, naphthenes, or sulfur species that require large amounts of hydrogen to hydrotreat, compared to other heavy crudes.[62]

Asphaltenes and resins generally occur in tar sands bitumens in much higher amounts than in other heavy crudes. They are the nonvolatile fractions of petroleum and contain the highest proportions of sulfur, nitrogen, and oxygen.[63] They have a marked effect on refining and result in the deposition of high amounts of coke during thermal processing in the coker. They also form layers of coke in hydrotreating reactors, requiring increased heat input, leading to localized or even general overheating and thus even more coke deposition. This seriously affects catalyst activity resulting in a marked decrease in the rate of desulfurization. They also require more intense processing in the

---

[60] O.P. Strausz, The Chemistry of the Alberta Oil Sand Bitumen, Available at: http://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/22_3_MONTREAL_06-77_0171.pdf.

[61] Gary et al., 2007, p. 200.

[62] See, for example, the discussion of hydrotreating and hydrocracking of Athabasca tar sands cuts in Brierley et al. 2006, pp. 11-17.

[63] James G. Speight, The Desulfurization of Heavy Oils and Residua, Marcel Dekker, Inc., 1981, Tables 1-1, 2-2, 2-3, 2-4 and p. 13 and James G. Speight, Synthetic Fuels Handbook: Properties, Process, and Performance, McGraw-Hill, 2008, Tables A.2, A.3, and A.4.

coker required to break them down into lighter products. These factors require increases in steam and heat input, both of which generate combustion emissions -- NO_x, SO_x, CO, VOCs, PM10, and PM2.5.

Further, if the crude includes a synthetic crude, SCO, for example, the material has been previously hydrotreated. Thus, the remaining contaminants (e.g., sulfur, nitrogen), while present in small amounts, are much more difficult to remove (due to their chemical form, buried in complex aromatics), requiring higher temperatures, more catalyst, and more hydrogen.[64]

The higher amounts of asphaltenes and resins generate more heavy feedstocks that require more severe processing than lighter feedstocks. The coker, for example, makes more coker distillate and gas oil that must be hydrotreated, compared to conventional heavy crudes. Similarly, the Crude Unit makes more atmospheric and vacuum gas oils that must be hydrotreated.[65] This increases emissions from these units, including fugitive VOC emissions from equipment leaks and combustion emissions from burning more fuel.

b. Hydrogen Deficient

Tar sands crudes are hydrogen deficient compared to heavy and conventional crude oils and thus require substantial hydrogen addition during refining, beyond that required to remove contaminants (sulfur, nitrogen, metals). This again means more combustion emissions from burning more fuel.

c. Higher Concentrations of Catalyst Contaminants

Tar sands bitumens contain about 1.5 times more sulfur, nitrogen, oxygen, nickel and vanadium than typical heavy crudes.[66] Thus, much more hydrogen per barrel of feed and higher temperatures would be required to remove the larger amounts of these poisons. These impurities are removed by reacting hydrogen with the crude fractions over a fixed catalyst bed at elevated temperature. The oil feed is mixed with substantial quantities of hydrogen either before or after it is preheated, generally to 500 F to 800 F. The amount of hydrogen required for a particular application depends on the hydrogen content of the feed and products and the amount of the contaminants to be removed. Hydrogen consumption is typically about 70 scf/bbl of feed per percent sulfur, about 320 scf/bbl feed per percent nitrogen, and 180 scf/bbl per percent oxygen removed.[67]

---

[64] See, for example, Brierley et al. 2006, p. 8 ("The sulfur and nitrogen species left in the kerosene and diesel cuts are the most refractory, difficult-to-treat species that could not be removed in the upgrader's relatively high-pressure hydrotreaters."); Turini et al. 2011 p. 4.

[65] See, for example, Turini et al. 2011, p. 9.

[66] See, for example, USGS, 2007, Table 1.

[67] James H. Gary, Glenn E. Handwerk, and Mark J. Kaiser, Petroleum Refining: Technology and Economics, 5th Ed., CRC Press, 2007, p. 200 and A.M. Aitani, Processes to Enhance Refinery-Hydrogen Production, Int. J. Hydrogen Energy, v. 21, no. 4, pp. 267-271, 1996.

Canadian tar sands crudes generally have higher nitrogen content, 3,000 to >6,000 ppm[68] and specifically higher organic nitrogen content, particularly in the naphtha range, than other heavy crudes.[69] This nitrogen is mostly bound up in complex aromatic compounds that require a lot of hydrogen to remove. This affects emissions in five ways.

First, additional hydrotreating is required to remove them, which increases hydrogen and energy input. Second, they deactivate the cracking catalysts, which requires more energy and hence more emissions to achieve the same end result. Third, they increase the nitrogen content of the fuel gas fired in combustion sources, which increases NO_x emissions from all fired sources that use refinery fuel gas. Fourth, nitrogen in tar sands crudes is present in higher molecular weight compounds than in other heavy crudes and thus requires more hydrogen and energy to remove. Fifth, some of this nitrogen will be converted to ammonia and other chemically bound nitrogen compounds, such as pyridines and pyrroles. These become part of the fuel gas and could increase NO_x from fired sources. They further may be routed to the flares, where they would increase NO_x.

These types of chemical differences between the current crude slate and the new crude slate facilitated by the Crude by Rail Project were not addressed at all in the IS/MND. While the Refinery may currently be operating with its BAAQMD permits, and the subject increase would not exceed any existing permit limits, the existing permit limits is the wrong baseline for CEQA impact analyses.

However, some of these increased utility impacts were addressed in the VIP FEIR as of 2002. The VIP FEIR admitted that then-proposed changes in the crude slate would cause: (1) an increase in electricity demand of 23 MW; (2) an increase in natural gas consumption of 9.6 MMscf/day (VIP DEIR, pp. 2-3); (3) an increase in the firing rate of heaters and boilers of 400 MMBtu/hr (VIP DEIR, p. 3-47); (4) an increase in the hydrogen capacity of 30 MMscf/day (VIP DEIR, p. 3-39); and an increase in coker capacity of 5,000 BPD (VIP DEIR, p. 3-30). Mitigations were proposed in the VIP FEIR for these significant increases in utility demands. However, this decades old analysis has not been re-evaluated to determine if the current proposed change in crude slate would result in increased impacts within the framework of the VIP or if the changed regulatory framework requires more aggressive mitigation.

E. Does the VIP FEIR Mitigate The Impacts Of Refining Tar Sands Crudes?

The Valero Improvement Project is designed to process increased amounts of heavy sour crudes such as Canadian tar sands crudes. It identified some of the impacts of this proposed switch in crudes, including an increase in the amount of electricity that

---

[68] Murray R. Gray, Tutorial on Upgrading of Oil Sands Bitumen, University of Alberta, Available at: http://www.ualberta.ca/~gray/Links%20&%20Docs/Web%20Upgrading%20Tutorial.pdf.

[69] See, for example, James G. Speight, Synthetic Fuels Handbook: Properties, Process, and Performance, McGraw-Hill, 2008, Appendix A.

would be used (23 MW), an increase in the amount of natural gas that would be burned, and an increase in the amount of hydrogen that would be required. All of these increases in utilities also increase emissions and were mitigated to various degrees in the VIP FEIR as of a 1999 to 2001 baseline. However, this is not the correct baseline to evaluate the Crude by Rail Project. These increases in utilities, concomitant emission increases, and proposed VIP mitigations must be evaluated relative to the physical baseline at the time of the Crude by Rail Project environmental review, or 2009 to 2011.

1. The Impacts from VIP and Crude by Rail Project Must Be Considered Together

The VIP environmental analysis was performed over 10 years ago. Much has changed in the last 10 years, from the suite of tar sands products available in the market, to the transportation options (ship was considered feasible 10 years ago, today, rail is required), to the timing of implementation of the VIP, to the regulatory framework. Thus, a new, full, thorough analysis is required in conjunction to the proposed Crude by Rail Project. The impacts of importing unidentified crudes by rail cannot be reasonably evaluated without keying off of this prior analysis. Some examples follow.

The VIP FEIR, for example, assumes that the use of a higher percentage of sour crudes would mitigate increases in VOC emissions from increasing crude throughput. VIP RTC, p. IV-61. The reported increase in fugitive VOC emissions over the 3-year baseline 1999-2001 was only 3 ton/yr, which at the time was less than the CEQA significance threshold. VIP DEIR, Table 4.2; VIP Addendum, Table 2. However, this assumed heavier crudes would be refined under the VIP than were refined in the 1999-2001 baseline, which offset most of the increase in fugitive VOC emissions from a 25% increase in crude throughput under the VIP. These VOC emissions include large amounts of hazardous air pollutants, such as benzene, toluene and xylenes, that result in significant health impacts, including cancer.

However, the proposed Crude by Rail project asserts that the imported crudes could include up to 70,000 BPD of light, low density crudes. These crudes have a much higher vapor pressure than the crude slate contemplated in the VIP FEIR and would significantly increase VOC emissions from tanks, pumps, compressors, valves, and connectors throughout the Refinery compared to the scenario analyzed in the VIP FEIR. Further, the FEIR explicitly assumes that the imported heavy sour crudes would mitigate increases in VOC emissions. This assumption did not consider the fact that diluents are now widely used to blend with the crudes. Or that light shale crudes may be imported, which would not offset VOC increases. These diluents or shale crudes consist of light hydrocarbons, including large amounts of benzene, toluene and xylene, which would increase VOC emissions from tanks, pumps, compressors, valves, and connectors throughout the Refinery.

The BAAQMD CEQA significance threshold for VOCs is 15 ton/yr. Assuming 70,000 BPD of the crude throughput or 42% of the total, is light sweet crude, as now asserted in the Crude by Rail project, the VOC emissions would increase to more than 104 ton/yr (73x1.42=104) or by 31 ton/yr (104-73=31). This exceeds the BAAQMD

CEQA significance threshold by a factor of two and is a very significant unmitigated impact, triggering an EIR.

Actual increases could be much higher under any of the currently understood plausible scenarios, importing light sweet crude under the Crude by Rail Project, or importing diluent-blended DilBit under the VIP project. These increases in VOCs from importing a light sweet crude or a diluent blended tar sands crude would greatly exceed the 15 ton/yr VOC threshold as demonstrated above. Alternatively, assuming just the 25% increase in throughput under the VIP, based on light sweet crudes, the fugitive VOC emissions would increase from 73 ton/yr in the 1999 to 2001 baseline to 91.25 ton/yr (73x1.25 = 91.25), or by 18.25 ton/yr (91.25-73=18.25). Thus, fugitive VOC emissions are a significant undisclosed impact of the Crude by Rail Project, requiring an EIR. These increases were not considered in either the VIP FEIR or the IS/MND and are a significant unmitigated impact of the Project.

2. The Impacts from the VIP Project and the Crude By Rail Project Are Cumulatively Considerable

The VIP Project is still being constructed. The last portion of this project, the new Hydrogen Plant, will be under construction at the same time that the new rail terminal is being constructed. The Initial Study estimated that the daily average construction exhaust emissions from building the rail terminal would be 51.9 lb/day. IS, Table 3-1. The CEQA significance threshold is 54 lb/day.[70] The VIP FEIR did not calculate construction emissions, as this was not required at the time, an example of the change in regulatory framework. However, based on my experience calculating construction emissions for many projects, the NOx emissions from constructing the Hydrogen Plant would exceed 2.1 lb/day and thus NOx emissions from simultaneously constructing the Hydrogen Plant and the Crude by Rail project would be cumulatively significant.

3. The Regulatory Framework Has Changed

Ten years have passed since the environmental analysis was done for the VIP and the FEIR was certified. As the VIP FEIR was certified in 2003, and amended in 2007, the regulatory and informational framework within which the Project would be developed today has changed dramatically, rendering the 2002 analysis obsolete.

Since the VIP FEIR was certified in 2003, new scientific evidence about the potential adverse impacts of air pollutants has become available, and in response, new guidance has been published and several federal and state ambient air quality standards have been revised. These include:

[70] Staff-Recommended CEQA Threshold of Significance, Available at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Staff-Recommended%20and%20Existing%20CEQA%20Thresholds%20Table%2010-07-09.ashx?la=en.

- The 8-hour CA ozone standard was approved by the Air Resources Board on April 28, 2005 and became effective on May 17, 2006.
- The EPA lowered the 24-hour PM2.5 standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ in 2006. EPA designated the Bay Area as nonattainment of the PM2.5 standard on October 8, 2009.
- On June 2, 2010, the U.S. EPA established a new 1-hour SO_2 standard, effective August 23, 2010.
- The EPA promulgated a new 1-hour NO_2 standard of 0.1 ppm, effective January 22, 2010.
- The EPA issued the greenhouse gas tailoring rule in May 2010, which requires controls of GHG emissions not contemplated in the VIP FEIR.
- The California Air Resources Board has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure below which there are no adverse health effects determined.
- The EPA issued a final rule for a national lead standard, rolling 3-month average, on October 15, 2008.

Emissions must be reduced to assure that these new regulatory levels are not exceeded. Lead, for example, can be present in very high concentrations in fugitive dusts from coke storage, handling, and export, especially when heavy sour crudes are being processed. There is a long history of nuisance coke dust issues at this Refinery that impact residents. See, e.g., VIP DEIR, p. 4.2-14. The VIP would increase coke production and thus fugitive coke dust emissions with elevated lead levels. The proposed Crude by Rail Project also could increase coke production, depending upon the specific "North American-sourced crude" that it imports.[71] This possibility cannot be eliminated based on the record. The California Air Resources Board has concluded there is no safe threshold level of exposure for lead. Any amount poses significant health risks. Thus, the increase in coke fugitive emissions admitted in the VIP EIR and facilitated by the Crude by Rail Project are a significant public health impact under today's regulatory framework.

The VIP DEIR assumed health impacts from coke dust exposure would be mitigated by complying with the then-current PM10 and PM2.5 regulations. VIP DEIR, p. 4.8-14. However, these have been significantly lowered and an ambient air quality standard for lead has been promulgated. There has been no demonstration that the increase in lead-laden coke dust, that could reasonably be expect to result from the Crude to Rail Project, could comply with these new standards or that such compliance would mitigate lead health impacts, given the CARB's zero threshold finding.

[71] The VIP DEIR did not disclose the actual coke increase, but did acknowledge that it would increase coke exports over the dock by 12 ships per year and by rail of 5 rail cars per day. VIP DEIR, p. 3-52. The capacity of a coke ship and coke rail cars was not disclosed.

Similarly, very high concentrations of NO_2 are present in the exhaust emissions from diesel train engines that would be used at the newly proposed rail terminal. Based on my work at other rail loading terminals, these NO_2 emissions are routinely high enough to exceed the new 1-hour NO_2 standard. While annual NO_2 emissions may be offset of reducing ship imports, the ambient impacts would occur at different locations and times, exceeding the new 1-hour NO_2 standard. This was not considered in the IS/MND and is a significant impact that requires that an EIR be prepared. These emissions can and must be mitigated, for example by using an electronic positioning system,[72] rather than the locomotive engine, to move the cars through the unloading facility.

III. ACCIDENTAL RELEASES WILL INCREASE

The Benicia Refinery was built before current American Petroleum Institute (API) standards were developed to control corrosion and before piping manufacturers began producing carbon steel in compliance with current metallurgical codes. While some of Benicia's metallurgy was updated as part of the VIP, metallurgy used throughout much of the Refinery is likely not adequate to handle the unique chemical composition of tar sands crudes without significant upgrades. There is no assurance that required metallurgical upgrades would occur as they are very expensive and not required by any regulatory framework. Experience with changes in crude slate at the nearby Chevron Refinery in Richmond suggest required metallurgical upgrades are ignored, leading to catastrophic accidents.[73] The IS/MND is silent on corrosion issues and metallurgical conditions of the Refinery.

Both DilBit and SynBit crudes have high Total Acid Numbers (TAN), which indicates high organic acid content, typically naphthenic acids. These acids are known to cause corrosion at high temperatures, such as occur in many refining units, e.g., in the feed to cokers. As a rule-of-thumb, crude oils with a TAN number greater than 0.5 mgKOH/g[74] are considered to be potentially corrosive and indicates a level of concern. A TAN number greater than 1.0 mgKOH/g is considered to be very high. Canadian tar sands crudes are high TAN crudes. The DilBits, for example, range from 0.98 to 2.42 mgKOH/g.[75]

Sulfidation corrosion from elevated concentrations of sulfur compounds in some of the heavier distillation cuts is also a major concern, especially in the vacuum

---

[72] See, for example, Oregon Department of Environmental Quality, Standard Air Contaminant Discharge Permit, Coyote Island Terminal, LLC, July 24, 20120, p. 3, Condition 1.1.a (an electric powered positioning system for maneuvering railcars through the Railcar Unloading Building).

[73] U.S. Chemical Safety and Hazard Investigation Board, Interim Investigation Report, Chevron Richmond Refinery Fire, Chevron Richmond Refinery, Richmond, California, August 6, 2012, Draft for Public Release, April 15, 2013, Available at; http://www.csb.gov/chevron-refinery-fire/.

[74] The Total Acid Number measures the composition of acids in a crude. The TAN value is measured as the number of milligrams (mg) of potassium hydroxide (KOH) needed to neutralize the acids in one gram of oil.

[75] www.crudemonitor.ca.

distillation column, coker, and hydrotreater units. The specific suite of sulfur compounds may lead to increased corrosion. The IS/MND did not disclose either the specific suite of sulfur compounds or the TAN for the proposed crude imports.

A crude slate change could result in corrosion from, for example, the particular suite of sulfur compounds or naphthenic acid content, that leads to significant accidental releases, even if the crude slate is within the current design slate basis, due to compositional differences.

This recently occurred at the nearby Chevron Richmond Refinery. This refinery gradually changed crude slates, while staying within its established crude unit design basis for total weight percent sulfur of the blended feed to the crude unit. This is the scenario the IS/MND and VIP FEIR assume will mitigate all crude slate issues. However, the sulfur composition at Chevron Richmond significantly changed over time.[76] This change increased corrosion rates in the 4-sidecut line, which led to a catastrophic pipe failure in the #4 Crude Unit on August 6, 2012. This release sent 15,000 people from the surrounding area for medical treatment due to the release and created huge black clouds of pollution billowing across the Bay.

These types of accidents can be reasonably expected to result from incorporating tar sands crudes into the Benicia slate, even if the range of sulfur and gravity of the crudes remains the same, unless significant upgrades in metallurgy occur, as these crudes have a significant concentration of sulfur in the heavy components of the crude coupled with high TAN and high solids, which aggravate corrosion. The gas oil and vacuum resid piping, for example, may not be able to withstand naphthenic acid or sulfidation corrosion from tar sands crudes, leading to catastrophic releases.[77] Catastrophic releases of air pollution from these types of accidents were not considered in the IS/MND.

Refinery emissions released in upsets and malfunctions can, in some cases, be greater than total operational emissions recorded in formal inventories. For example, a recent investigation of 18 Texas oil refineries between 2003 and 2008 found that "upset events" were frequent, with some single upset events producing more toxic air pollution than what was reported to the federal Toxics Release Inventory database for the entire year.[78]

---

[76] US Chemical Safety and Hazard Investigation Board, 2013, p.34 ("While Chevron stayed under its established crude unit design basis for total wt. % sulfur of the blended feed to the crude unit, the sulfur composition significantly increased over time. This increase in sulfur composition likely increased corrosion rates in the 4-sidecut line.").

[77] See, for example, Turini and others, 2011.

[78] J. Ozymy and M.L. Jarrell, Upset over Air Pollution: Analyzing Upset Event Emissions at Petroleum Refineries, Review of Policy Research, v. 28, no. 4, 2011.

July 1, 2013

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Via Fax to
City of Benicia Community Development Department
Attn: Amy Million
250 East L Street
Benicia, CA 94510
Fax: (707) 747-1637

Re: Notice of Intent to Adopt a Mitigated Negative Declaration for the Valero Crude by Rail Project

Dear Ms. Million:

We, the undersigned, are writing to you on behalf of our organizations and our many thousands of members to express concern over the potential for grave environmental and public health impacts of the proposed Valero Crude by Rail Project, for which a proposed Mitigated Negative Declaration (MND) was issued on May 31st, 2013. The MND for this project is seriously deficient in its environmental analysis in many regards, including adverse impacts to air quality, public health, public safety, noise, general hazards and ecological risks, not only to residents of Benicia but also to the entire San Francisco Bay Area. At a minimum, a full Environmental Impact Review must be performed before this project can move forward.

The MND fails to address potentially significant air pollution and other impacts caused by refining additional amounts of lower quality crude oil—including from the Canadian tar sands—that could be facilitated by the project. Valero has been clear about its intentions to increase Western Canadian crude oil imports into its California refineries in remarks to investors, and independent market research confirms that the proposed Benicia facility is likely to facilitate imports of significant volumes of tar sands crude blends. The probability of the project facilitating additional, lower quality crude supplies and the resulting impacts on air quality and public health are not discussed or evaluated in the MND.

Refining increased volumes of the Western Canadian diluted bitumen products, which the proposed facility would make feasible, presents unique and significant air quality, public health, safety and ecological and water quality impacts. The following impacts would far exceed the impacts of conventional crude oil feedstocks:

1. The "diluent" used to make heavy "bitumen" or tar sands flow into and out of railcars contains highly volatile organic chemicals, including extremely toxic ones like benzene, at much higher concentrations than conventional crude oil; and is likely to be released during transport and refining.
2. The heavy bitumen component of the tar sands oil contains many toxic constituents including heavy metals such as lead at much higher concentrations than conventional crude oil and which are likely to be released during the refining process.
3. The heavy bitumen is also much more energy intensive to refine than conventional crude. Due to the composition of heavier, longer chain hydrocarbons, these denser crude oils require greater use of heaters, boilers, hydro-treating and cracking and greater hydrogen use, all of which creates greater emissions of smog- and soot-forming pollutants and toxic chemicals.
4. Dilbits are associated with greater levels of strong odors due to their composition including a variety of sulfur containing compounds, such as mercaptans, at higher levels.

5. Refining of heavy bitumen or tar sands leads to increased coke production, which in itself is a hazardous compound leading to storage and disposal issues including the potential for coke dust from storage piles to impact nearby residents, as has been documented near the Marathon refinery in Detroit, Michigan.
6. Dilbits are more corrosive than conventional crude oil, increasing the risk of refinery accidents similar to the August 6, 2012 fire at Chevron Richmond, for which lower quality crude oil was found to be a contributing factor.
7. Rail car spills of dilbit would be catastrophic to the fragile San Francisco Bay Delta. This is because the diluent – typically natural gas condensates acting as a solvent - helps the oil spread on surface waters. The diluent typically evaporates leaving the very heavy bitumen to sink, creating an exceptionally difficult and expensive clean-up. This was found to be the case in Kalamazoo, Michigan after a 2010 pipeline ruptured, releasing bitumen and causing well documented and widespread public health impacts and lasting contamination to this day (three years later).

The MND also fails to fully consider the noise impacts of this project, which will bring four 50-car trains to the refinery each day, with operations predominantly at night but potentially at all hours ("24 hours per day/7 days per week/365 days per year"). In addition to noise impacts, the additional half hour each day of blocked access due to trains crossing the Park Road intersection would be a nuisance and potentially a safety issue to the nearby community. A grade separation should be evaluated as potential mitigation. The analysis fails to consider the horns and noise of the four additional trains going through at-grade crossings, particularly at night when most of the activity is expected. Noise has been associated with many health impacts such as heart disease and stroke, as well as worsening children's mental health, concentration, and classroom behavior at school. An Environmental Impact Review must gauge existing levels of refinery noise and related communication interference, sleep interference or physiological responses; and predict future levels associated with the Project. Finally, we note that with respect to the level of rail service proposed here (4 50-car trains per day), the City of Benicia needs to demonstrate that it has the authority to impose and fully enforce such a limit consistently with federal law.

Due to all of the serious potential impacts from the Valero Crude by Rail project listed here, the lack of sufficient information to properly evaluate the project and the potential for serious and irreversible harm to the greater San Francisco Bay Area caused by the import of exceptionally toxic substances through this Project, we urge the City of Benicia to perform a thorough Environmental Impact Review evaluating these impacts and all appropriate mitigation options, before proceeding. The significant environmental impacts of this proposed project must be fully mitigated before it can be approved. We hereby reference the detailed and expert comments submitted by the Natural Resources Defense Council on July 1, 2013; and strongly urge your consideration of our concerns.

Sincerely,

Greg Karras, Senior Scientist
Communities for a Better Environment

Denny Larson, Executive Director
Global Community Monitor

Michael Marx, Director, Beyond Oil Campaign
Sierra Club

Edward A. Mainland, Co-Chair, Energy-Climate Committee
Sierra Club California

Michelle Myers, Director
Sierra Club San Francisco Bay Chapter

Victoria Brandon, Chair
Sierra Club Redwood Chapter

David W. Campbell, Secretary-Treasurer
United Steelworkers Local 675

David Schonbrunn, President
Transportation Solutions Defense and Education Fund (TRANSDEF)

Azibuike Akaba, Policy Analyst
Regional Asthma Management & Prevention (RAMP)

Jill Ratner, President
Rose Foundation for Communities and the Environment

Jess Dervin-Ackerman, Chair
350 Bay Area

LOCAL UNION 180

INTERNATIONAL BROTHERHOOD
OF ELECTRICAL WORKERS

SERVING NAPA AND SOLANO COUNTIES SINCE 1901

STAN NELSON
PRESIDENT

DAN BROADWATER
BUSINESS MANAGER

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Brad Kilger
Benicia City Manager
250 East L Street
Benicia, Ca. 94510

July 1, 2013

Dear Mr. Kilger,

My name is Dan Broadwater, Business Manager of IBEW Local 180. I represent over 600 Electricians in Napa and Solano Counties, many of which have worked off and on at the Benicia Valero Refinery. The projects associated with the VIP (Valero Improvement Projects) have benefited us all, workers as well as residents of Solano and Napa Counties. Fair wages, money spent by local construction workers, a safe work site and a community partner such as Valero makes it a win-win proposition. The Flue Gas Scrubber was an excellent example of the partnership between Valero Refinery Benicia and the construction workers of the Napa Solano Building and Construction Trades. It offered over a million hours at a safe worksite along with benefiting the environment. The Oil by Rail project, in my opinion will support our joint partnership with Valero and offer environmental benefits.

I urge your support and respectfully request my letter be forwarded this to the Planning Commission and City Council for approval of the Oil by Rail project.

Sincerely,

Dan R Broadwater

Dan Broadwater
Business Manager IBEW Local 180

720-B TECHNOLOGY WAY • NAPA, CALIFORNIA 94558 • TEL (707) 251-9180, FAX (707) 251-8040

Amy Million - Fwd: Re: Expansion of Valero Rail Delivery of Oil

RECEIVED
JUN 12 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: Brad Kilger
To: Amy Million
Date: 6/12/2013 12:21 PM
Subject: Fwd: Re: Expansion of Valero Rail Delivery of Oil

FYI

>>> "Sabina Yates" <redfoxred@earthlink.net> 6/12/2013 12:20 PM >>>
Dear Mr. Kilger. I sent the following letter to the Benicia Herald today. I would like a copy to be submitted in the Project's Mitigated Declarations Declaration, as the concerns of Benicia residents.

To the Editor:

I am writing in opposition to the expansion of rail delivery for oil to Valero Refinery from any source.

I'm writing as a frequent Amtrak passenger. So many times my husband and I have sat on a railroad siding on an Amtrak train because freight traffic has priority and preference over passenger trains. Sometimes the waiting and subsequent delay have been over two hours long. Our train arrivals in either
Portland, Oregon or Martinez, California have rarely been on time.

The impact on Amtrak passenger travel schedules should be considered in allowing an increase in Valero rail activity.
Refinery jobs and increased City revenue should not be the only considerations in non-questioning of this project.

Sincerely,
Sabina Yates (707) 746-6428
302 Bridgeview Ct.
Benicia, CA 94510
redfoxred@earthlink.net

Amy Million - Fwd: Valero Rail Project

From: Brad Kilger
To: Amy Million
Date: 6/19/2013 11:22 AM
Subject: Fwd: Valero Rail Project

RECEIVED
JUN 19 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

>>> Harry Newhall <hbn@speedwayprinting.com> 6/19/2013 9:36 AM >>>
Mr. Kilger:

It was suggested by Rodger Straw's article in the Benicia Herald that I contact you with my opinion on the Valero project. I support it whole heartedly. Any project that continues to help and make local business more successful should be supported. Obviously Mr. Straw and the Mayor do not like this proposal, but please do not be bullied by them. This is a good project for Benicia.

Harry Newhall
275 E L St.
Benicia CA, 94510

David R. Lockwood
495 Gray Court
Benicia, CA
94510

JUN 21 2013
CITY CLERK'S OFFICE

June 21, 2013

TO: Benicia City Council RE: Valero Rail Project

A big thumbs-up for this project. I believe:

> It will bring AMERICAN oil to the Valero Refinery; replacing foreign oil. Oil independence is crucial to our country's prosperity.
>
> Less pollution generated by the delivery vehicles. Trains will generate far less pollution than ships tied up at our piers for extended periods.
>
> American dollars will be used to pay American workers to deliver the crude oil to the refinery, not foreign shipping interests and their workers.

I believe Valero to be a very responsible entity to accomplish this project with the necessary safety factors considered to assure a safe and viable outcome for the company and that it will have a positive public impact.

I do hope the City of Benicia and the State of California will play the role of assisting Valero by quick permitting, etc. to allow this project to be completed as expeditiously as possible.

Respectfully

David R. Lockwood

PS: I further hope that the Union Pacific Railroad company will see this increased traffic as an opportunity to expand and improve its main line service performance (both passenger and freight) between Benicia and Sacramento. Maybe a little encouragement from you would help.

From: Susan Hutchinson <hutchss@comcast.net>
To: Brad Kilger <Brad.Kilger@ci.benicia.ca.us>
CC: <Amy.Million@ci.benicia.ca.us>
Date: 6/27/2013 10:46 AM
Subject: support of Valero Crude by Rail project

RECEIVED
JUN 27 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Dear Mr. Kilger,

As a retired administrator in Benicia Unified and a 30+ year resident of Benicia, I want to advise you of my support of the Valero Crude by Rail project. Valero is a huge supporter of our lovely town, our schools, and so many of the activities that make Benicia such a special place to live and work.

I hope that the Benicia Planning Commission will consider my voice and the voices of its constituency.

Thank you in advance.

Susan Hutchinson
354 W Seaview Dr
Benicia, CA 94510

RECEIVED
JUN 28 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy Million - Valero Crude by Rail Project

From: Tom Cepernich <tomc@beniciafab.com>
To: "Brad.Kilger@ci.benicia.ca.us" <Brad.Kilger@ci.benicia.ca.us>, "Amy.Mill...
Date: 6/28/2013 2:20 PM
Subject: Valero Crude by Rail Project
CC: Carmelo Santiago <carmelos@beniciafab.com>

Dear Brad Kilger and Amy Million

I am writing in support of the Valero Crude by Rail project that has been proposed to the City of Benicia for approval. Based on the project, as far as the information I have been able to gather, it seems it would be a win-win situation for the City of Benicia and Valero. Not only will it reduce emissions and reduce our reliance on foreign crude, it will create 30 full time jobs at the refinery for operation of the Crude by Rail system. Also, it will bring 120 skilled jobs to the project for the projected 6 month construction time. The ability to process lower cost crude will also make Valero more competitive in the marketplace.

As I'm sure you are aware, Benicia Fabrication and Machine has been located in the Industrial Park on East Channel Rd for 30 years and has enjoyed a great relationship with them and also with Exxon before them. Our company sees no problems with traffic or commute issues, even though our business operates from 6:00 AM to 1:00 AM on a normal basis to 24 hours a day when we are working around the clock to provide service to our customers during maintenance shutdowns or emergencies.
Benicia Fabrication and Machine urges the City of Benicia to approve this project, which will benefit the City and also its major business partner.

Thank you for your time,

Tom Cepernich
President
Benicia Fabrication and Machine Inc.
707-745-8111
tomc@beniciafab.com

Confidentiality Note: This e-mail, and any attachment to it, contains privileged and confidential information intended only for the use of the individual(s) or entity named on the e-mail. If the reader of this e-mail is not the intended recipient, or the employee or agent responsible for delivering it to the intended recipient, you are hereby notified that reading it is strictly prohibited. If you have received this e-mail in error, please immediately return it to the sender and delete it from your system. Thank you.

WRITTEN COMMENT #

Brad Kilger, City Manager
250 E. "L" St.
Benicia City Hall
Benicia, CA 94510

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Dear Mr. Kilger,

Valero is one of the biggest taxpayers in Benicia, as well as one of the most philanthropic businesses. I support Valero's request for a permit to build its rail car facility. We must do all we can to support our longstanding business who have seen this city through hard times.

I've said it many times to many people, but I'll say it again: "God Bless Valero!"

Very sincerely yours,

Ralph Aguirre

City Manager, Brad Kilger
Planning Commission Members
City Staff
Mayor and Council Members

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

June 30, 2013

Subject: Valero Crude by Rail Project Initial Study/Mitigated Negative Declaration

I am writing both as a citizen of Benicia, a Benicia Emergency Response Team member and as a sitting Commissioner on the Community Sustainability Commission.

I learned from the June 19th, 2013 Valero presentation to the Economic Development Board that this project would be a $50m investment that would eliminate 32 deliveries of oil per year by ship. Daily rail deliveries would replace an every five day scheduled ship delivery. A ship, I learned carries 500,000 barrels vs. 700 barrels per rail car. The mitigated effect on Greenhouse Gas Emissions would be a reduction of 3,905 metric tonnes per annum.

Subsequently I heard, but have not verified, that preliminary work has already begun on this project in the Industrial Park.

Risk Assessment:

What most concerns me from community sustainability and emergency response views is the lack of information on the calculated risk from moving so much crude oil by rail through critical natural habitat and our community. There are studies, probably more current than the University of Illinois at Urbana-Champaign "Environmental Risk Analysis of Chemicals Transported in Railroad Tank Cars,*" that indicate the probability of rail accidents based on rail miles traveled, type of tank car class and environmental characteristics. What are the calculated risks? What type of rail tanker car is being used? What is that car's probability for accident or derailment?

Table 2 Conditional Release Probabilities, given Derailment for Tank Cars used for Products of Interest

Car Class	Release Probability of a Derailed Tank Car	Car Class	Release Probability of a Derailed Tank Car
105A100W	11.44	111A100W6 - NI	10.45
105J100W -1/2 HS	9.17	111J100W3 -1/2 HS	26.67
105A300W	9.80	111A100ALW2 - NI	51.26
105J300W- 1/2 HS	8.26	111A60W7	10.05
105A500W	3.82	111A60ALW1 - NI	53.08
105J500W - 1/2 HS	3.16	111A60ALW2 - NI	51.26
111A100W1 – NI	34.07	111S60ALW1 – NI	53.08
111A100W2 – NI	32.32	111S60ALW2 – NI	51.26
111A100W3	28.99	114A340W - NI	14.24
111A100W5 - NI	32.32	211A100W1 - NI	34.07

Tar Sands

While it was stated that the crude oil being sent to Benicia would be from North America, predominantly the U.S. Midwest, I am most concern that the blended crude that is imported could have output from the highly controversial tar sand projects in Canada. This process is highly energy and water costly producing extremely high rates of GHG emissions in our fragile Earth atmospheric envelope. What verifiable guarantee will Valero provide to assure us that output from tar sands will not be processed in Benicia?

Emergency Response

Another concern is community safety. As rail cars will be transported and unloaded between the hours of 8PM and 5AM, how well equipped is Valero and Benicia to provide immediate alert/notification and protection of residents on the Valero side of Benicia?

Environmental Degradation

What is the environmental effect of 100 or more daily rail tank cars in stirring particulate matter into the air?

Environmental Impact

What Environmental Impact Reports have been prepared with the agencies responsible for Air, Land and Water quality?

Thank you,

Constance M. Beutel, EdD
1501 Shannon Ct
Benicia, CA 94510

References:

*Environmental Risk Analysis of Chemicals Transported

in Railroad Tank Cars
http://ict.uiuc.edu/railroad/cee/pdf/Anand%20et%20al%202005%20IHHA137.pdf

June 29,2013

To Whom it may concern:

Please approve Valero's request for a permit to build an unloading rack at the refinery. This project will allow the refinery to bring in crude by rail and reduce emissions. This is a win-win project for business and the environment.

Thank You,

S. J. Fracisco

Sylvia J. Fracisco

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy Million - Fwd: Trainloads of potential pollution, and more climate killing energy

From: Brad Kilger
To: Amy Million
Date: 6/28/2013 8:48 PM
Subject: Fwd: Trainloads of potential pollution, and more climate killing energy

>>> <nancyfcarey@earthlink.net> 06/28/13 2:53 PM >>>
Dear Mr. Kilger,

This is an email from a concerned Benician weighing in on the very negative idea of Valero bringing to Benicia trainloads of poor quality crude oil, especially if it could come from the nasty tar-sands of Canada. For all the same reasons Obama should put the kabosh on the proposed XL pipeline across our heartland, we in Benicia should reject train cars full of the same hazardous stuff.

Aside from the environmental risks of transportation, we in Benicia have been promoting a "green, alternative, and sustainable" philosophy in this community for years. When evaluating this proposal, let's keep that in mind instead of permitting or promoting more polluting sources of fuel.

The NRDC has compelling information about this idea as you will hear on July 1st, if you have not already read their info on this topic.

Thank you for your attention to this.

Sincerely,

Nancy Carey

nancyfcarey@earthlink.net

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy Million - Fwd: Oil Shipments by Rail

From: Brad Kilger
To: Amy Million
Date: 6/29/2013 8:48 PM
Subject: Fwd: Oil Shipments by Rail

>>> Lawrence Fullington Jr <lfullingto@sbcglobal.net> 6/29/2013 6:15 PM >>>
I think the oil shipments to Benicia by rail are an excellent idea! This is by far the most efficient way to move product, and one of the safest. It would also help Benicia's major oil company and outstanding corporate citizen, to help ultimately supply gasoline to market at a a more reasonable price.
With most of our supply of crude coming from outside our shores, we are "cost vulnerable" at the mercy of other countries--some that hate us. It is important that we become as self sufficient as we can. This is a way to help do this! Larry Fullington

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

June 28, 2013

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy Million, Planning Dept.
City of Benicia
250 East L St.
Benicia ,CA 94510

Re: Valero Crude By Rail Project
Initial Study/Mitigated Negative Declaration
Use Permit Application 12PLN-00063

Dear Ms. Million:
Valero's Crude By Rail Project is a new method of crude delivery to the Benicia Refinery. After reviewing the documentation in the Initial Study/Mitigated Negative Declaration, I was pleased to see that the City and its consultant, ESA, did an exemplary job of the CEQA analysis.

The actual facility is inside the refinery's existing footprint, so this project seems to be "more of the same" in terms of what one expects inside an area zoned for commercial/industrial use.

What I garnered from the study was the crudes brought in by rail are similar to what the refinery has run since it opened in 1969. In addition, I see that the refinery cannot process more crude than its permit allows. So, I am satisfied that all environmental concerns have been addressed.

It is more difficult to extrapolate the "good news" value from the study – those things that benefit all Benicians. As I see it, the good news is:

- Fewer emissions to the atmosphere with delivery by rail
- Construction jobs for laborers
- New jobs (30) to operate the facility
- Continued economic benefit to the City of Benicia, Benicia Unified School District, Solano County, and the State of California.

I encourage others to read the full study, as I believe they will come to the same conclusions that led me to fully endorse the Crude By Rail project.

Very truly yours,

June 27, 2013

Mr. Rod Sherry, Chair
City of Benicia Planning Commission
250 E. L. Street
Benicia, CA 94510

Dear Mr. Sherry:

I was pleased to read in the Benicia Herald that Valero is proposing a project called "Crude By Rail" that will add new jobs in Benicia. According to the article, Valero is responsible for over 20% of the city's general fund budget. Adding new jobs and building a new project at the refinery can only benefit Benicia.

I urge you and your fellow Planning Commission members to vote in favor of Valero's request for a land use permit.

Regards,

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy Million - Fwd: no on oil sands crude

From: Brad Kilger
To: Amy Million
Date: 7/1/2013 9:14 AM
Subject: Fwd: no on oil sands crude

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

>>> "Bea Reynolds" <breycas@comcast.net> 7/1/2013 7:01 AM >>>
PLEASE! The proposal for Valero shipping crude into Benicia by rail would set up the probability of a disaster by immense proportions.

Benicia Suisun Marsh has all ready been highly impacted by the oil leaks from the various pipelines - (Kinder Morgan being one).and it has just barely begun to heal.

By building this rail spur.opening our beautiful and sensitive environment to the (potential) damage an oil spill is not good sense.and has no redeeming factors to Benicia and its residents.

Please! Stop the madness of big oil and corporations' proposal that will undoubtedly endanger our community; we don't need the liability. Valero has other refineries elsewhere.not here, please!

Soincerely,
Bea Reynolds
Safety Engineer/Consultant
PG&E Contractor Safety Management
707-372-3591 cell
breycas@comcast.net

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

June 29, 2013

Mr. Brad Kilger, City Manager
City of Benicia
250 East L St.
Benicia ,CA 94510

Dear Mr. Kilger,

In this time of economic uncertainty, it is important for the City of Benicia to support businesses that bring new jobs and a strong tax base to the City of Benicia and other local government entities, like BUSD and the County. Therefore, I am writing in support Valero's crude by rail project.

Since 2000, Valero has been a good neighbor, supporting schools, libraries, parks, special events and more. In particular, I am keenly aware of Valero's support of the Benicia Education Foundation (hundreds of thousands of dollars).

If the City is serious about economic development, it must support our existing businesses. Economic development is not just about recruiting new companies to come to Benicia; it is about retaining our existing businesses, like the refinery.

Sincerely yours,

Jim Rose

Tim Rose - President
CFM-SF, Inc.

Amy Million - Fwd: Valero refinery and Canadian tar sands crude

From: Brad Kilger
To: Amy Million
Date: 6/29/2013 9:51 AM
Subject: Fwd: Valero refinery and Canadian tar sands crude

>>> Plewis <pjlewis363@gmail.com> 6/27/2013 8:24 PM >>>
Dear Mr.Kilger:
Please do not approve the project to bring tar sands crude here by rail. A spill of this type of crude would be a disaster as it is virtually impossible to clean up. Do not trust any study paid for by Valero that says we have nothing to worry about.
The project would also have a very negative impact on climate change. Looking at what emissions will be produced only locally is the wrong perspective as climate change is a global issue. No one questions that producing gasoline from tar sands instead of regular crude creates more CO2 emissions. We in Benicia should not not allow any local businesses to participate in that process if we can prevent it.
I recommend you read Bill McKibben's "Eaarth" to bring home how serious the climate change problem truly is. The website 350.org also has links to some very good articles. If we do not act now the problem will soon become unsolvable.
Rick Slizeski
363 Seaview Drive

Sent from my iPad

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy Million - Fwd: new crude-by rail project

From: Brad Kilger
To: Amy Million
Date: 6/29/2013 9:11 AM
Subject: Fwd: new crude-by rail project

>>> Andy Smith & Pat Toth-Smith <pattothsmith@aol.com> 6/28/2013 10:55 PM >>>
Dear Brad Kilger, We are long time Benician residents who own a home on west K. We are against the crude by rail project and worry about the safety of our marshes and bay with the potential for derailment. We are also concerned that it would increase contamination of our water supply when unloading the crude. (The potential for spills that leak into our streams then to the reservoir is of great concern to us) We drink Benician water. Also the waiting on Park ave as the trains block the roadways will also be a big nuisance. Sincerely, Pat Toth-Smith and Andy Smith

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy Million - Valero Crude Rail Project

From: Don Stock <dons@overaa.com>
To: "Amy.Million@ci.benicia.ca.us" <Amy.Million@ci.benicia.ca.us>
Date: 6/29/2013 10:18 PM
Subject: Valero Crude Rail Project

To the City of Benicia,

As a Benicia resident for 24 years I fully support the Valero Crude Rail project. It will be safer for our environment, bring more jobs to our community, and increase the taxes to the city from Valero. We understand it will also reduce our dependence on foreign crudes. We believe this project is good for our community and us as residents. Valero has always been a good neighbor and we believe they should be supported in this project.

Respectfully, Don and Gail Stock
145 Chelsea Hills Dr
Benicia, Ca 94510
707 747-6354

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Janice Thomas
P.O. Box 2225
Benicia CA
94510
707
746-6758

July 1 2013

Rail Project.

I have every confidence that Valero Refinery will run a safe operation.

We've had problems in the Suisun marsh but I don't believe it has anything to do with the Refinery.

In their Waste Water Treatment Plant they run above the standards set by California

It is getting more and more difficult to operate in California.

If this project fails I am afraid Valero will leave Benicia

There is a safe way to do this.

Janeen Thomas

MARILYN J. BARDET
333 East K Street, Benicia CA 94510
707-745-9094 mjbardet@comcast.net

June 30, 2013

City Manager Brad Kilger,
Planning Commissioners: Chair Sherry, Oakes, Smith, Grossman, Spraque, Dean and Young
Mayor Patterson, Vice Mayor Campbell & Councilmembers Hughs, Schwartzman & Strawbridge
City of Benicia, 250 East L Street, Benicia CA 94510

SUBJECT: Valero Crude-By-Rail Project Initial Study/Mitigated Negative Declaration

Dear Mr. Kilger, Planning Commission Chairman Sherry, Planning Commissioners, Community Development staff, and Mayor Patterson and Councilmembers:

My comments overall reject the City's determination that a Mitigated Negative Declaration {MND] is a sufficient level of environmental review of Valero's Crude-by-Rail Project as described and discussed in ESA's Initial Study and Environmental Checklist. With regard to determining whether a more thorough environmental review is necessary, CEQA Guidelines §15064 describe the conditions under which an Initial Study is called for, and when an EIR is determined to be required:

> *"Must A Lead Agency Prepare an Initial Study?*
> - *If the need for an EIR is unclear, the lead agency must prepare an initial study.*
> - *If the lead agency can determine an EIR will be required, an initial study is not required."*

It follows from the fact that an Initial Study was prepared that the City-as-lead-agent was *at the very least unclear, if not confused*, about whether a full EIR was necessary to review the proposed rail project.

We need clarity. There are too many missing discussions in the Initial Study and too many unanswered questions. My hope, and the hope of many, is that you will agree that sufficient, thus, more specific description, evidence and evaluation of potentially significant negative impacts are needed to enable the public to understand *"the whole of the project,"* as required under CEQA. Mitigation measures that would reduce or eliminate the severity of those environmental effects must be designed and submitted *at the time of the environmental review*. The mitigation measures must address the proposed Project's operations *over the course of the Project's lifetime*.

My comments give examples of the regrettable limitations of the Initial Study's Project Description and reject the conclusions of the Checklist. The Initial Study's limited findings suggest that there would be no further concerns than those already exposed by its review, and that the burden of a comprehensive investigation of any other foreseeable and potentially significant adverse impacts should not be necessary. I disagree.

The City's sign-off on an MND on May 31, 2013, by the former Community Development Director, is perhaps owing to the many constraints on staff's time in reviewing the Study. This is understandable, but not acceptable: the MND basically echoes the Initial Study's findings without evidence of independent questioning and further scrutiny. A reader should not have to read between the lines of the Initial Study to

discover the extent of the environmental ramifications of the Project, nor what further discussion is necessary.

Valero's Project would replace equivalent deliveries of crude by ship, and would be the second refinery rail project in the Bay Area. According to online news reports, Phillips 66 (formerly Conoco-Phillips) in Rodeo currently imports crude by rail. This fact was not discussed anywhere in the Initial Study or Environmental Checklist; yet learning this fact from other sources only underscores that we are not yet sufficiently informed by Valero, ESA or the City about the extent of the Project and its contributions to cumulative impacts: for example, the number of foreseeable crude-loaded trains that would be moving through Benicia and the Bay Area on Union Pacific's tracks. Other refineries in Contra Costa may be considering similar rail projects in the future (Tesoro's Golden Eagle, in Martinez). We therefore have no real idea, based on accurate estimates, of the potentially significant and even catastrophic impacts that could occur, given the foreseeably intensified use of Union Pacific's tracks for transporting crude and other hazardous materials. <u>It is required under CEQA to identify and address potential cumulative negative impacts of other similar large-scale projects that would be concurrent or that are planned for the future in the region</u>.

The importation of new "North-American-sourced crudes" – the vague, unqualified term used throughout the Initial Study – is not discussed with regard to the Phillips 66 crude-by-rail operation or other Bay Area refineries' future plans for crude-by-rail projects; nor, for that matter, the cumulative adverse impacts that are foreseeable wherein other CC County refineries, which are now already processing a variety of sour crude types, might also be planning to import by rail, in the near future, and/or by whatever *indirect* means, more heavy "North-American-sourced crudes," especially from Alberta Canada's tar sands. (Chevron Refinery, Richmond).

Valero has declared publicly (at CAP meeting and recent Economic Development Board meeting) that they will not be importing "tar sand crude" and their explanation has been that bitumen has to be transported in heated railcars and would have special off-loading conditions. If this is truly the case, why is there no discussion in the Study that would reflect Valero's commitment and explanation? And if they have made a "spoken" commitment to Benicia residents, why is this not committed in writing? Perhaps because they would not be importing "pure bitumen," which they assume, to their advantage, that members of the public mean when they refer to "tar sands" crude. Neither Valero nor the Initial Study have discussed a "diluted bitumen" blend or "dilbit" such as "Western Canada Select." (see my Comments).

Importing crude by rail using existing RR routes is a relatively recent phenomena now pushed by the oil industry to access various sources of heavy crude types that are being mined from shale formations in North Dakota and elsewhere in the Midwest, in California's Central Valley, and also from the vast network of open pit mining operations in Alberta's tar sands. If we're to grasp and assess "the whole" of the Valero rail project, we must not only ask Valero to be forthcoming about local and regional environmental ramifications of switching to rail as the method of importing crude, but also about the heavy crude types that would be imported under the proposed Project to be processed in Benicia. Getting access to "North American-sourced crudes" explains Valero's switch from ship to rail, and their desire to have had the Crude-by-Rail Project on time and on track for operation by late 2013 or early 2014, (from the Project construction timeline outlined in the Study. See comments).

Over the last 15 years, I've reviewed project applications, initial studies and draft EIR's, and have always tried my best to inquire into the details and facts of a proposed project and to imagine their

foreseeable effects for Benicia: the Koch Industries' "Coke Dome" project for the Port; the Tourtelot military cleanup for Southampton's residential build-out; the Valero Improvement Project [VIP]; Valero's EIR Addendum for VIP; several Seeno project draft EIRs; and also the draft EIR for the Arsenal Specific Plan. These projects envisioned land-use changes and/or long-range consequences for the community over project life-spans of 25 years and beyond. Of those mentioned, only the Tourtelot Restoration Project and Valero's VIP have gone forward successfully, much to everyone's credit.

As a member of the Good Neighbor Steering Committee [GNSC] for 13 years, and as a continuing member and former chair of Valero's Community Advisory Panel, I've worked hard with others to learn about the refinery, its VIP upgrades and local impacts. Representing the GNSC, I also currently serve as a non-voting member on the Community Sustainability Commission. I recognize the global effects of burning fossil fuels – the increasing, higher levels of atmospheric CO2 pumped into our atmosphere by human activities that contribute to global warming and climate changes. There is a growing local, regional and national consensus that we must conserve non-renewable resources, conserve energy and water, and transform our economy into a more sustainable one by working toward creation of reliable, alternative energy systems that do not put global climate further at risk for even more rapid, unprecedented changes.

Challenges made to Valero with regard potential impacts of their VIP and its later additional upgrades were aimed to ensure that their technical improvements would reduce water and energy use, reduce significant "criteria" emissions, and comply with the intent and spirit of AB32, the California Global Warming Solutions Act. The Project also must conform to the Benicia General Plan whose overarching goal is "sustainable development" [General Plan, page 22]. This governing goal explicitly declares the widening and rippling effects of whatever we do here in Benicia – how we conduct business and live our lives. The Benicia Climate Action Plan sets local strategies for modifying and changing our habits to create a more sustainable community.

As part of the VIP's permitting requirements, Valero was required to install a scrubber that ultimately replaced its main stack and has proven to greatly reduce ozone precursor gases – a benefit to our local community and the regional air basin. But now we must look forward and exercise our critical faculties to assess Valero's new Crude-by-Rail Project with its deep and wide ramifications that are local, regional and global.

Thank you for your consideration of my comments. I am glad to join you in the Project's review.

Marilyn Bardet

COMMENTS:

1. General observations regarding the limited scope of review of the Initial Study and Environmental Checklist's Evaluation of Environmental Impacts:

The MND, signed off on May 31, 2013, by the former Community Development Director, summarizes the findings of the City-as-lead-agent:

> *"The City of Benicia finds that although the proposed project could have a significant effect on the environment there will not be a significant effect in this case because mitigation measures have been added to the project that avoid or reduce all impacts to a less than significant level."*

The introduction to the Checklist, "Evaluation of Projects" [p II-1] outlines a number of CEQA criteria for evaluating impacts of a project. Criteria #2 states: ***"All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts."***

In reviewing ESA's Initial Study ["Study"], the City apparently found no foreseeable problems or impacts that were *not* addressed in the Study and the Environmental Checklist ["Checklist"]. The City's review apparently concurred *to the letter* with ESA's narrow Project Description and their assessments of impacts. The Checklist mainly focuses on impacts that would occur *during the Project's construction phases*. The Study does not describe the life-span of the Project, nor, thus, the foreseeable *and cumulative* potential significant negative impacts *over time* to Air Quality, Biological Resources; Geology/Soils; Greenhouse Gas Emissions; Hazards and Hazardous Materials; Hydrology and Water Quality; Land Use Planning; Noise; and Transportation and Traffic. (See further comments for examples). It would be the job of an EIR to fully explore each of the CEQA areas of concern. There is minimal discussion, (seemingly meant to reassure the reader), about the *actual operations* of the Project.

According to the limited Project Description, Project operations would occur almost exclusively at the rail rack off-loading facility, located on Valero property east of the storage tanks. Scant, cursory description is provided about Union Pacific's role and involvement – running Valero-bound, Valero-owned, crude oil loaded railcars. Which corporation will be managing the crude-loaded trains with regard to scheduling, and considering *all trains* running on Union Pacific tracks? There is little or no evidence given to substantiate claims that there would be no significant off-site impacts that could not be mitigated. Mitigation Measure TRAN-1 is an example of an extremely limited view of possible impacts from trains traveling in and out of Valero property and beyond. There is no discussion of potentially *catastrophic* impacts – the potential "off site" impacts – that could foreseeably occur given where the Project's trains would be traveling, conveying "North American-sourced crudes" through miles of sensitive ecological areas.

The Project Description, therefore, seems to piece-meal the Project, as if the Project operations were limited to Valero property, and as if, somehow, they were not extended to the "off-site property" owned by Union Pacific – the RR tracks extending for miles to be used in the transport of crude to Valero's off-loading racks. Further, there is no adequate account of the potential effects over the lifetime of the Project of processing the various "North American-sourced crudes" projected to be imported by rail and processed in Benicia over years or decades.

The Project's construction phase was slated to begin in early 2013 and be completed in late 2013, thus operational by late 2013 or early 2014 [Appendix A1." Air Permit Application. BAAQMD Overview 1.2, p. 1.]. From Valero's time-table for construction and operations' startup, the reader might assume that Valero had counted on the City to recommend its MND, and that therefore, the company, in planning its Project timetable, was not expecting that further environmental review would be required, or, that any other delay would hold up construction.

The Planning Commission hearing is scheduled for July 11; thus, the Project's construction startup date has long passed. Is the delay in reviewing the Project owing to the City's scheduling of the environmental review? Or, is there any *technical* reason for the delay on Valero's part? Although the BAAQMD Air Permit Application [Overview 1.2, p. 1.] reiterates Valero's assertion that no modifications to the refinery processing equipment would need to be made for the Project to proceed, is there any planned VIP technical upgrade that hasn't been completed that would be *required* to be completed and operational in order for the Project to be permitted? Has the Coker Unit expansion project that was scheduled to be completed in March 2013, indeed been completed? [VIP EIR Addendum, Table 2.5.1.1 "Project Schedule: Expand CKR, Light Ends, Silos..."]. I could find no mention in the Study of whether there would be increased production of residual coke from the processing of any of the "North American-sourced crudes" that might be imported – the bitumen-based crude (a diluted bitumen or "dilbit") produced from Alberta Canada's tar sands. (See related comments under #9, "Mandatory Findings of Significance.")

Regarding the Initial Study and Environmental Checklist on global warming effects: The Bay Conservation and Development Commission [BCDC] must be involved in evaluating potential impacts to the Suisun Marsh of the Crude-by-Rail Project. BCDC has issued public reports that present evidence-based modeling of the projected sea level rise that would inevitably affect San Francisco Bay and the Carquinez Strait. BCDC's publicly available map of shoreline areas that would be affected by sea level rise show the effects on Benicia's marsh and floodplain environs over the next 25 - 50 years through the end of the century. The Study and Checklist should reference and discuss the implications of the BCDC map as related to the Union Pacific rail routes through the Suisun Marsh, which is projected to be more prone to greater seasonal flooding over the next decades – the probable lifespan of the Project? – increasing the intensity and number of winter rain storms, whose effects may be made more severe by high tides in the Strait and earlier snow melt. The Union Pacific tracks are visible along a long stretch of Goodyear Rd., within Benicia's city limit. The gravel railbed appears to be elevated approx. 18" - 24" above the marsh. The railbed itself was not flooded during the February, 2011 storm event that occurred along the length of Benicia's marsh surrounding the tracks. In the storm's immediate aftermath, I took pictures capturing the train tracks leading from the Industrial Park through the marsh, and specifically where flooding and pooling of the marsh around the tracks had most severely occurred. One of the only small service roads that crosses the tracks (not far from Organic Solutions, a company along Goodyear Rd.) was completely submerged except where it briefly crossed the tracks; therefore it was impassable to vehicular traffic, including emergency vehicles. A sign was posted at the dirt road's junction with Goodyear Rd that said "Flooded.") Trains carrying crude could conceivably be threatened if there was any erosion or disturbance of the gravel rail bed and tracks. Trains

could be held up, (where? side-lined?), potentially stalled or derailed, with spills of crude oil. Description and analysis of potential significant impacts that might flow from such a *credible* worst case scenario are missing from the Study.

How would crude-loaded railcars be accessed in the case of a flood in Suisun Marsh if there were a train accident and spill of crude? What would be the emergency response plan? What would be the cleanup method? For diluted bitumen? The Initial Study doesn't provide answers.

3. AIR QUALITY IMPACTS:
[Initial Study; Environmental Checklist: 3. Air Quality p. II-10]

Mitigation Measure Air-1, *"added to the project*:" Air-1 references existing Bay Area Air Quality Management District's [BAAQMD] protocols and policies that are meant to protect against dust and diesel emissions during construction phases of development projects. It also refers to "2010 CAP" which is a recent Air District plan. It bears quoting from the Study's *minimal description* of the 2010 CAP. The thresholds for judging significance of air impacts are said by the Study not to be exceeded by the Project. It is not stated whether the air impacts evaluated are ones owing *only* to construction phases.

[From the Environmental Checklist – p. II-10]

> *"The 2010 CAP serves as a multi-pollutant air quality plan to protect public health and the climate." . . ."The 2010 CAP's control strategy includes revised and updated, and new measures in the three traditional control measure categories, including stationary source measures, mobile source measures, and transportation control measures. In addition, the 2010 CAP identifies two new categories of control measures, including land use and local impact measures, and energy and climate measures." . . . . "BAAQMD recommends that the agency approving a project where an air quality plan consistency determination is required analyze the project with respect to the following*

questions: 1) does the project support the primary goals of the air quality plan?; 2) does the project include applicable control measures from the air quality plan?; and 3) does the project disrupt or hinder implementation of any 2010 CAP control measures? If all the questions are included in the affirmative, BAAQMD considers the project consistent with air quality plans prepared for the Bay Area (BAAQMD,2012)."

Apparently, ESA expected the public to know what BAAQMD's "control strategies" and "new measures" are, but this is an *unfair* expectation. The Appendix does not include a pdf of the actual CAP 2010 document, or any other explanatory material to help our understanding of the Air District's regulatory guidelines for judging "thresholds" for emissions impacts, etc. The reader should not have to hunt for documentation on the BAAQMD's (nearly inscrutable) website. The reader reviewing the above quoted text can therefore have no idea whether the ESA in drafting the Initial Study, or the City in recommending the MND, accurately analyzed the Project *with respect to the questions the Air District recommended be raised*, as stated in the above quote. Accordingly, the adequacy of Mitigation Measure AIR-1 is highly suspect in this case. For example: there is no description or analysis of local air quality impacts to sensitive receptors who are employees in the industrial park, thus of persons who might be affected by cumulative emissions from *increased daily emissions* from all sources within the refinery, including the Rail Project.

Regarding emissions expected during operation of the Project:
[Environmental Checklist p.II-13]

Under item 3c, the proposed Project's emissions are evaluated relative to BAAQMD's thresholds for "attainment" for the Bay Area air basin that are protective of human health. Project emissions (including diesel, VOC's and Particulate Matter - PM10 and PM2.5) are contributors to smog production. "Net emissions reductions" that are accounted for in the Study, *if they are reliable*, are calculated using statistical averaging to arrive at a figure that would represent a finding of "attainment" or "non-attainment" of federal and state standards for general smog conditions *within the region as a whole*. Accordingly, it is not explained by the Study that *local* emissions impacts *cannot* be assumed to be reduced by evaluations made using BAAQMD calculations that assess emissions impacts to the *whole air basin*.

". . . . New stationary sources at the Refinery would include unloading rack and pipeline, which would result in fugitive emissions of ROG. The project would also include a change in service to existing Tank 1776 to allow it to store crude oil; however, because there would be no change in the amount of crude oil stored at the Refinery, there would be no net increase in tank-related storage mass emissions relative to baseline conditions. Overall, the proposed Project would result in reduced air emissions compared to the existing operations because delivering crude oil by rail car results in less emissions with the BAAQMD compared to delivering crude oil by marine vessel. See Table 3-2 for a summary of net emissions reductions that would be associated with the Project."

". . . .Regardless, long-term operations of the proposed Project would result in a beneficial impact to air quality in the BAAQMD."

The final sentence in the evaluation reads like a statement of religious belief in the *"beneficial impact to air quality to the BAAQMD* [the Bay Area Air Basin]" that would be brought about by the advantages of the Project, mainly, replacing ship transport by train transport. There is no account of *local* air quality impacts from long-term Project operations, including cumulative impacts of exposure risks to

the Benicia community from existing and future-anticipated refinery toxic emissions (including from accidental releases with "spiking" of emissions, leaks, fires, etc.) in addition to Project-related emissions.

Under item 3d, the Study recommends that the lead agent (City of Benicia) evaluate the *"incremental toxic air contaminant (TAC) exposure risk to all sensitive receptors within a 1,000-foot radius of a project's fenceline."* The summary sentences in the discussion are as follows:

[Checklist: Air Quality, 3d, p. II-14].

> *"Long-term operations associated with the Project would generate TAC emissions from locomotive idling, locomotive transit, locomotive switching and from fugitive equipment and routine Tank 1776 leaks. The Applicant provided a screening level health risk assessment, as summarized in Table 3-3 which modeled the following sources using the ISCST3 air dispersion model: . . . [Table 3-3: Maximum Cancer and Noncancer Risk]." . . .*
>
> *"The closest sensitive receptors to the proposed Project would be residences off Lansing Circle, approximately 2,700 feet northwest of the proposed Project site. There are no sensitive receptors within 1,000 feet of the proposed Project components."*

Lansing Circle is a residential cul-du-sac located in the northeastern corner of the Water's End development that overlooks the refinery processing block, which is just south and east of the cited street, alleged to be the nearest location of "sensitive receptors" to the proposed Project railcar off-loading racks. There is no analysis in the Study or Checklist of emissions from the Project that would affect, for example, sensitive receptors – employees – working in businesses near the Union Pacific tracks and/or near the refinery's off-loading racks.

The air emissions dispersal modeling referred to in the quote cited above is inadequate to address how toxic, volatile emissions can travel given different wind conditions, winds' seasonal patterns and the topography of the area. The "wind rose" pictured in Figure 4.2-2 and Figure 4.2-3, on pages 44 and 45, in the Valero VIP EIR's "Response to Comments" document should be included in the Appendix. Cumulative exposures to refinery emissions over time may present "non-cancer risks" to sensitive receptors – for example, *Benicia residents who are also employees of the industrial park.* It is well known that chronic bronchitis and asthma are aggravated and/or triggered by diesel exhaust emissions and other refinery/industrial processing operations (particulate matter - PM10 and PM2.5; VOCs, black carbon, and other Toxic Air Contaminants). Cumulative and chronic health impacts should be discussed and analyzed for receptors within residential areas nearest the refinery fencelines and also for those employees in the industrial park. Other contributing sources of air pollution must be considered in evaluating health effects that are related to potential significant *cumulative emissions* – air pollution conditions that can be chronic over time or "spiked" (acute) during releases, fires, etc – that would impact sensitive receptors in the community. (Contributors to cumulative air impacts from sources of PM 10 and PM 2.5 include freeway emissions, diesel emissions from ships and Valero's coke trains, soot from fireplaces, pollen, and TAC emissions from other existing industrial polluters in the area.) To evaluate cumulative air emissions, other similar large-scale development projects that are proposed and planned for the area must be included in the calculations of air emission impacts in addition to Project-associated air emissions over time.

Further, cumulative air emissions from additional trains coming from CC County refineries (Phillips 66 and very possibly other refineries in the future) should be calculated as contributing to total cumulative Air Quality impacts, since Benicia, for most of the year, is downwind of Phillips 66, and Union Pacific's rails run through CC County and into Benicia and continue north and eastward.

Regarding odors, Item 3e [Checklist, Air Quality, p. II-15]. This item discusses whether there would be "objectionable odors" that might affect "a substantial number of people." The limited discussion of both potential impacts from construction phase and operations is as follows:

> *"Diesel equipment used to construct the project may emit objectionable odors associated with combustion of diesel fuel. However, these emissions would be temporary and intermittent in nature, thus odor impacts associated with diesel combustion during construction activities would be less than significant. There would be no change expected in the existing operational odors resulting from implementation of the proposed Project. This impact would be less than significant."*

Diesel fumes are considered by most people as highly noxious and offensive to smell, let alone that diesel exhaust fumes are toxic and can cause respiratory distress in sensitive receptors, *especially if the air is still and emissions are* <u>*not dispersed*</u>, as during weeks in winter when a cold damp fog sits on the ground and there is no wind. The Study's discussion shows little concern about four train trips daily entering and leaving the industrial park, 365 days a year, that would create "unpleasant odors." Locomotive exhaust would add cumulatively to the daily odors emanating from the refinery's processing block, tank lids, and other sources (asphalt plant) that can be noticed and smelled "off site" in the industrial park southeast and east of the refinery. The Checklist's assumptions do not take into account the numbers of people working in the vicinity of the Project.

<u>Further missing from the Study's discussion of odors and emissions impacts</u>: westerly winds carry toxic gases and their odors eastward from the refinery processing block and would similarly waft emissions from the Project. According to calculations derived from the wind rose published in the VIP EIR "Response to Comments," [cited above; Figures 4.2-2 and 4.2-3] <u>approximately twenty percent (20%) of the of the year, mostly during late fall and winter months, the winds change direction and often die down, causing negative "off site" odors and air quality impacts to Benicia's residential neighborhoods</u> west and south of the refinery but <u>also in the surrounding industrial park</u> northeast, east and south of the refinery fencelines.

Cumulative adverse impacts from odors emanating from the Project should be calculated as potential *additional* effects from *toxic emissions from all sources, under favorable and unfavorable wind conditions*, and, *should be discussed as related to health risks to sensitive receptors in both the industrial park and residential neighborhoods*.

The following comments are intended to lend contextual breadth and depth from a local perspective to the Study's evaluation of Air Quality impacts and are pertinent to my rejection of the Initial Study's Environmental Checklist of Air Quality impacts and the alleged sufficiency of Mitigation Measure Air-1, the Study's lack of analysis of cumulative emissions impacts and concern for health of local sensitive receptors. The comments also discuss the problem of analysis of local ambient air quality. These observations regard BAAQMD's role and public mandate under the federal Clean Air Act.

BAAQMD's mandate under the federal Clean Air Act is, as the Air District repeatedly advises, to ensure the general safety of the Bay Area's air basin *as a whole* for human health. Accordingly, as a department of CAL-EPA, the Air District monitors the Bay Area air basin to ensure that the region meets "attainment" standards – safe thresholds set by federal and state regulation for smog-producing gases – e.g. ozone precursor gases including nitrogen oxides, sulfur dioxides, volatile organic compounds [VOC's http://

iaspub.epa.gov/sor_internet/registry/termreg/searchandretrieve/termsandacronyms/search.do], greenhouse gases and particulate matter (PM10 and PM2.5). The Air District monitors polluting industries' emissions and quantifies them, using statistical averaging, to calculate the cumulative negative impacts to the air basin *as a whole*, thus to report to state (and federal) EPA regarding non-compliance with "attainment" goals for the region. However, it is little understood that The Air District has generally **not** seen it as their particular responsibility to be concerned or involved with monitoring ambient air quality with respect to human health in *local* neighborhoods and communities *living in close proximity* to a major polluting industry, such as a refinery or chemical plant. Local communities' desires to have monitoring stations installed within neighborhoods affected by refinery or other polluting industrial operations (with the purpose to better understand exposure risks, to accurately monitor for emission "spikes" in real time during accidental releases, etc.), have been mostly dismissed over the years as *not part of the general mission of BAAQMD*, and this is an ongoing frustration and active dispute with the Air District by the concerned communities of Richmond and Rodeo/Crockett, and also by concerned Benicians. A spectacular failure of the Air District to track "off site" emissions in real time during the Chevron Refinery fire in August 2012 is a prime example of the District's lack of preparedness or interest (or mandate as public servants?) to address *local emissions impacts* that may affect ambient air quality and thus human health in the vicinity of a major polluting industry, especially during time of accidental releases, fires or explosions.

Right now, in Benicia, various air-monitors that were purchased *for the benefit of the community* under specific terms of a Settlement Agreement negotiated in 2008 between Valero and the Good Neighbor Steering Committee have been unplugged and the trailer housing them closed up and stored on Valero's property, thus remaining inactive until further notice. Since the equipment's initial installation above Tennys Drive, a public access website has yet to be fully completed. (Participants in its development are Argos Scientific, the Good Neighbor Steering Committee and Valero.) The question hanging over the intended independent program is one of ownership. The City has refused to take ownership of the equipment on the community's behalf for what was intended to be a permanent, independent, educational Benicia Community Air Monitoring Program ["BCAMP"] to sample and analyze ambient air quality in real time and make data available to the public via a public access website. This equipment was meant to be flexibly used, including for mobile monitoring during accidents, monitoring air at school sites, and for such purposeful uses by Benicia High School's Green Academy science students.

It is a fact that the Air District has also shown little interest in the Benicia community's attempt to establish the local air-monitoring program as discussed here. It is unfortunate that the City of Benicia has not wanted to take responsibility for the monitors – equipment purchased for $200,000 by the 2008 Settlement Agreement, which also provided support ($50,000) for two years of maintenance and data analysis by an independent contractor (Argos Scientific). *Funding for an on-going program is not the point here*. It is disturbing that the City would reject ownership of the very tools to be useful for local ambient air monitoring on any given day, yet sign off on an MND for the Project, expecting the public to believe that the City has given the Initial Study its foremost attention with care to Air Quality impacts, with due consideration to protecting the public's health from potential negative "off-site" cumulative emissions effects of the Project, thus the refinery's *total cumulativ*e *emissions impacts* on the local community.

4. Biological Resources, [Checklist, p. II-19]. Mitigation Measure BIO-1: concerns Project construction activities during *"nesting season, Feb. 15 through Aug 31."* If construction occurs during the nesting season, the Study states: *"a biologist experienced in conducting nesting bird surveys shall survey*

the Project area and all accessible areas within 500 feet." The account goes on to briefly describe how nests would be protected during construction. Has the Department of Fish and Wildlife been contacted to review the Project?

The problem is, the Project is so narrowly defined that it appears to be limited to the immediate area surrounding the off-loading racks on Valero property.

For example, in item 4c, the following CEQA question is posed: *"Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption or other means?*

The answer given presumes that "the Project" would only materially exist on Valero property, when logically, *by extension, and common sense*, it also exists along Union Pacific's tracks, upon which trains would be carrying crude through significant stretches of protected marsh areas with seasonal pools and wetlands and through river flood plains. The Delta Plan envisions Suisun Marsh as an area for restoration, where certain endangered fish species and plants could be at risk from spills. And although the Project would only add a small amount of new track on Valero property, it is not clear in the Study or Checklist whether potentially significant impacts owing to Valero's crude-loaded railcars traveling through sensitive ecologic areas on existing Union Pacific tracks would actually "count" as being potentially generated *as a result of the Project*, albeit such impacts are foreseeable, and *should* be discussed as a "credible worst case scenario" associated to Project operations. This begs a question about the limited Project Description and what it leaves out: there is no discussion of Union Pacific's rail routes by which crude-loaded railcars would travel, and whether those RR routes are to be considered *part of the Project as a whole*.

5. Mitigation measure GEO-1 [Checklist. Geology & Soils, p. II-29]:

Mitigation GEO-1 is *promised* to be provided, presumably at a later date, which violates CEQA's requirement that mitigation measures be planned and submitted at the time of a project's review.

GEO-1 raises the question of seismic risks to the area of the Project including possible liquifaction. GEO-1 does not discuss what would possibly happen if a severe earthquake occurs when a train is traveling within Benicia along the marsh where subsidence of rails could occur or rail misalignment, or in the case when railcars are off-loading crude at the racks. Given the active seismic area of the Project, this is a "credible worst case scenario" that is not envisioned in the Checklist's discussion of potentially significant seismic impacts that could indirectly affect the safety of Project operations and increase hazard risks, and also, potentially affect sensitive marsh and wetlands near Union Pacific's tracks.

6. Greenhouse Gas Emissions [Checklist: Greenhouse Gas Emissions. p. II -34,35]

The Study's discussion and Checklist is short on the subject of GHG emissions: according to the Checklist, construction GHG would not have a significant impact, *"directly or indirectly."* The Checklist states that BAAQMD does not identify a *"construction threshold of significance"* for GHG; however, the Air District does *"identify a quantitative threshold for annual operations of 1,100 metric tons of carbon dioxide equivalent (CO2e)."* The Checklist states that this is a conservative estimate, since *"for stationary source projects, the quantitative threshold is 10,000 metric tons of CO2e per year."* BAAQMD's threshold of 1,100 metric tons of CO2e per year for non-stationary sources is applied in analysis of the construction-related Project emissions.

Thus, for operational contributions to GHG, the Project is given a "pass:"

> *"Project operations would result in a net reduction of GHG emissions over existing conditions (see Table 8-2) as the overall capacity of the Refinery would be unchanged, but there would be less crude*

oil deliveries by marine vessels that have higher emissions compared to deliveries of crude oil by rail transit. The proposed Project would reduce GHG emissions by up to approximately 3,543 metric tons of CO2e per year compared to existing conditions. Therefore, implementation of the Project would represent a beneficial impact."

The problem in evaluating GHG contributions is that, again, the Project appears to be so narrowly defined as if it were to exist materially only within Valero's property, and not extended through its train movements over miles. Are GHG emissions to be accounted for as Valero railcars, both loaded with crude or "emptied", are moving within Benicia limits? What about leakage of gases from railcars? What about trains moving through other cities and unincorporated areas – e.g., out and beyond Benicia's city limits? Where does the Project begin and end? Under CEQA, the Crude-by-Rail Project must be understood and evaluated in its entirety, "as a whole." (Please see my further comments on the need to identify, describe and evaluate "the whole of the Project.") There can be no doubt that total GHG emissions from crude oil processing and including the proposed rail Project operations would be even greater if assessments took in GHG emissions from hydraulic fracking and tars sands mining operations as well as long-distance rail transport of crudes – operations that, *by logical extension*, are the essential *raison d'etre* of the Project.

Ultimately, we must know about the extent to which Valero seeks to meet AB32 GHG reduction targets, and how they will achieve those state and federal goals for 2020.

7. Regarding Hazards and Hazardous Materials: [Checklist 8; p. II-37];

Valero's rail project is slated to be completed in 2014. The Study is without benefit of any reporting of crude-by-rail local/regional/national experiences; thus there is no documentation of the kinds of impacts we might expect over the life-time of the project. Yet, there are growing numbers of articles, (see Google news, click on email alerts, and type in "railroad, crude oil") about crude-by-rail transport happening across the country. Available information about other experiences with crude-by-rail transport into refineries, or the transport by rail of other hazardous materials, in the Bay Area and beyond, should be cited and discussed in order that the public be aided to recognize and meaningfully anticipate problems and potentially significant negative impacts. The highly relevant topic of foreseeable, unpredictable necessary adjustments or changes in train schedules by Union Pacific, considering the number of trains of all kinds including passenger trains that would be passing through CC County and Benicia, is not discussed.

Risks of Union Pacific RR transport of crude oil: What kinds of accidents could happen while trains are traveling? Would there by switching of tracks and change of locomotive engines at any place enroute from the loaded trains point of origin that may be occasion for accidents? What is the safety record of Union Pacific generally as a hauler of hazardous materials in California and elsewhere? Has Union Pacific been a carrier of crude for Phillips 66 or Tesoro (in Washington)? If so, what has been their experience and safety record transporting crude oil? What, if any, are federal policies and regulations that *specifically* govern transport of crude oil by rail? What would be Union Pacific's plans be in the case of stalled trains, derailment and/or failed railcar or uncoupling, etc.? What are "credible worst case scenarios" that are foreseeable hauling crude by rail? What about the *un*expected, therefore *un*anticipated "black swans" – accidents that could be catastrophic in impact? What are the City's emergency measures in the case of catastrophic releases (or fires, explosions) that could require evacuation of parts of the industrial park near Union Pacific tracks? What would the effect of adding Valero's crude-loaded trains to the over-all number of passenger and commercial train trips traveled daily on Union Pacific routes

passing through Benicia and cities "up county" and beyond? What kinds of equipment failures could occur at the off-loading racks on Valero property? What about any potential for side-lining of crude-loaded rail cars? Or problems that could occur with scheduling of crude train arrivals and departures that could interfere with schedule for coke trains that travel to and from the refinery to the coke silos and ships at the Port of Benicia?

What are Valero's risk management plans associated to the Project?

[Study: Project Description, p. I-9]

"The new rail car unloading facilities would include liquid spill containment. The rack would be sloped inward toward the centerline of the rack. A roadside curb would be provided east of the tracks near the fenceline to further contain any minor spills and leaks.". . ."

"Part of the existing containment berm for the tank field would be removed and a new concrete berm would be constructed approximately 12 feet west of the existing earthen berm. The resulting containment capacity would continue to meet or exceed minimum regulatory containment requirements."

Is the containment berm, which is described as "*exceeding* ***minimum*** [my emphasis] *regulatory containment requirements"* capable to control a major spill involving more crude released than *"minor spills and leaks?"* What would routine daily risk management involve? What emergency response would be involved in the case of an overflow of the berm, (which, if seen in a larger context, would seem the size of a kid's swimming pool)?

Discussion of "off-site" potential hazards are not considered except as portrayed in Mitigation Measure TRAN-2 of the Checklist, (see comments below on Transportation and Traffic), wherein an accident is envisioned that could occur at the intersection of the RR tracks and Park Road. TRAN-2 is thus narrowly limited in scope. The lack of any descriptive analysis of potential off-site hazards represents to this reader an extreme, obfuscatory oversight of the Project Description, especially given that there is no evidence given of the performance record of Union Pacific, and the national record to date of accidents involving crude-loaded trains.

8. Transportation and Traffic [Checklist; p. II-62 - 69]

With regard to performance and operational risks: under CEQA, a discussion of credible worst-case scenarios posed by a project must be considered. There will likely be a number of businesses in the industrial park that will want to comment on this issue considering that trains will be passing four times daily to and from Valero through the industrial park and crossing Park Road. Estimates are given with regard the likelihood of accidents at Park Rd. The Checklist's answer to the question "Would the project result in inadequate emergency access?" acknowledges that

"According to the 2012 emergency response data provided by the fire department, an average of about two emergency incidents a month occurred along the industrial areas of Park Road and Bayshore Road. The probability of an emergency incident occurring at the same time as a proposed Project train crossing is low. It is unlikely that the Project would cause the average emergency vehicle response time to increase to over 7 minutes for the Park Road and Bayshore Road industrial areas."

The Mitigation Measure TRAN-2 is designed to ensure that the City of Benicia Fire Department coordinates with Valero, and (presumably) other emergency services or county agencies

> *". . . to prepare an action plan in the event that an emergency occurs during a Project train crossing. The action plan would provide methods of adequately informing the Fire Department of the expected train crossing schedule and alternate routes to access the Park road and Bayshore Rd. industrial areas during the event that a train crosses Park Road."*

CEQA requires that a mitigation measure must actually have a plan prepared and delivered to the lead agency at the time of the environmental review. The public must be able to review the mitigation plan. Thus, a mitigation plan cannot be promised and submitted at a later date, as suggested by the strange wording of TRAN-2, which makes it sound like an emergency response plan would be designed (only) *"in the event that an emergency occurs."* This notion of casual response planning is how the the Kalamazoo River spill in 2010 of "diluted bitumen" was horrendously mismanaged. (See Comment #10)

> [Study: Project Description, p. I-11]
> *"A train with 200 feet of locomotive and 50 railcars in length would take about 7.3 minutes to cross Park Road at a speed of 5 mph. The at-grade crossing traffic controls provide a 30-second buffer time before and after each train crossing on Park Road. Each 50-railcar train movement is estimated to block traffic on Park Road for approximately 8.3 minutes. Operations would occur 24 hours per day/ 7 days per week/365 days per year."*

Would there be need for signaling at Park Road to warn cars and trucks routinely traveling in the Industrial Park of a slow-moving approaching train? Which businesses would be most affected by the Project's use of the Union Pacific tracks through the area? (Traffic, Noise). What is the City's responsibility for traffic risk management in the Industrial Park? What recourse would businesses in the area have that use Park Rd. in the case where trains may be delayed, stalled or stopped on tracks? What "alternate route" plan for vehicles and trucks has been designed?

9. Mandatory Findings of Significance: [Checklist 18; p.11 - 74]

Item 18a

addresses whether the Project would degrade the quality of the environment, substantially reduce habitat of wildlife species, fish, biota etc. No significant impact is imagined. The Checklist of mandatory Findings of Significance apparently does not attempt to envision "off site" toxic spills or releases that could potentially degrade a sensitive ecologic area in the case of a severe, unexpected accident involving a crude-loaded train. Again, the Project is defined in such a way as seeming *not* to include the twice daily crude-loaded trains, each with 50 railcars destined for the Benicia refinery and traveling on Union Pacific tracks "off-site" through ecologically sensitive areas, nor account for potential significant impacts involving hazardous, toxic crude oil spilled into the Suisun Marsh or other such biologically diverse areas (wetlands, vernal pools, etc) in the Delta floodplain through which Union Pacific tracks extend.

A credible worst case scenario would be a train derailment, with leak or spill into the Suisun Marsh during the winter months when seasonal flooding occurs and vernal pools are created, and/or, during nesting season for birds, the Suisun Marsh being part of the Pacific Flyway. Since no accident or spill is discussed as a potential impact scenario, the Checklist doesn't provide any mitigation measure or

emergency plan for cleanup and recovery of a spill-site that would have to be sensitive to biota and wildlife.

It has been claimed by Valero publicly that the railcars that would be used are built with double walls, such that punctures to the cars would be next-to-impossible in the case of a derailment. That is a statement of *ideal conditions*. What about the foreseeable possibility of a crude-loaded train colliding with another Union Pacific train traveling at high speed – a "black swan" event? In any case, there is no visual representation in the Initial Study that shows the design features of a railcar built to carry crude oil safely. Are there special valves for off-loading that are safeguarded against accidental releases? Any special connectors for pipes used in loading and off-loading crude? What safety features are there to ensure that spills cannot occur in the case of train collision at usual traveling speeds off-site in the marsh area?

Emergency planning for a potential accident involving crude-loaded railcars cannot be routine. For example: Mitigation Measure TRAN-2 alludes to an *existing* emergency response plan in the limited case of an accident the Study does discuss– an accident envisioned at Park Road, where a crude-loaded train is crossing the road traveling at 5 mph toward the proposed off-loading rail rack on Valero property. The *existing* response plan referred to, (the "plan" is not described in full nor provided in the Appendix) is said to involve Benicia's and Valero's fire departments, and county officials involved with hazmat and public health risks – accordingly, the usual protocol in the case of any accident at the refinery with potential off-site consequences.

However, in the case of an off-site possible spill in Suisun Marsh of a sour crude blend that contains a diluted bitumen called "dilbit" – (bitumen being the actual product/substance extracted from mining Alberta, Canada's tar sands) – there is currently no known method, practiced by EPA, to safely recover bitumen that doesn't cause further damage and destruction to the environment. A case in point: the tragic, still unresolved Enbridge Energy pipeline spill in Michigan, July 2010, involving an Alberta tar sands "dilbit," which poured into a stream that flowed into the Kalamazoo River. Kalamazoo River oil spill - Wikipedia. The Initial Study does not describe bitumen, nor identify it as a particular "problem" constituent of a "North American-sourced crude" type. Bitumen must be described. It is a heavy, thick, viscous, gooey, tacky, highly acidic, corrosive tar-like substance that cannot move through pipelines or be transported in railcars without having other lighter petroleum based products added to it. When spilled on the ground or in a stream or riverbed, the bitumen has been found to separate from the other lighter, more liquid petroleum-based additives and sink down into whatever material it is spilled into. The volatile compounds themselves become a toxic gas. So, while those "dilutants" disperse in air, (releasing toxic air contaminants and GHG) the heavy sulfur and lead-laden toxic bitumen sinks into the biologically alive and stoney matrix of a riverbed, streambed, pool, marsh, wetland or floodplain, remaining stuck to gravel and rocks and embedded in soil structures. The only cleanup strategy for removing dilute bitumen that had been considered in the Kalamazoo spill was dredging the river bottom – an obviously highly destructive procedure that would further degrade, strip and ruin the 25 - 35 mile-long affected spill area in the river and floodplain. To date, the river and its river bank, its biota, rocks, soils and fish spawning areas remain impacted, subject of a $765 million dollar cleanup effort (as of summer 2012) that still has not been resolved. Reporting on the spill's cause, "NPR reported that "NTSB investigators determined that the six-foot gash in the pipe was caused by a flaw in the outside lining which allowed the pipe to crack and corrode."

Item 18b

addresses the question of whether the Project would have impacts *"that are individually limited, but cumulatively considerable."* The meaning of *"cumulatively considerable"* is given as

> *". . . incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."*

With respect to calculating cumulative air impacts and potential effects to the local environment and our Bay Area region with its many special ecologic areas: There is no mention in the Initial Study of the fact that Phillips 66 is now importing crude by rail, and that other Bay Area refineries may be jumping on board to build rail facilities for importing "North American-sourced crudes." It would be most interesting to know whether Phillips 66's rail project was permitted with an MND signed off by Contra Costa County or if an EIR was required. [Rodeo and Crocket are unincorporated communities]. Was the City of Benicia alerted to the Phillips 66 project at the time of its environmental review for its rail project? And concomitantly, has the City of Benicia, as lead agent, notified surrounding cities and unincorporated areas to let them know about the review of the Valero's Crude-by-Rail Project and to invite their comments?

CEQA requires that cumulative effects of a Project be evaluated that would potentially cause significant adverse impacts to air quality, water, biota and sensitive habitat. The number of trains carrying crude oil into Bay Area refineries is likely to increase because of the new movement in the industry to access "North American-sourced crudes," for which Union Pacific rails and the refineries' rail off-loading facilities would serve. If this is the case, and there is projected to be more crude-loaded train traffic on Union Pacific routes through the Bay Area, the Initial Study lacks any discussion of current and future similar crude-by-rail projects in Contra Costa County that would increase the level of risk of accidents and damage to sensitive ecologic areas through which increased numbers of crude-loaded trains would inevitably pass.

The question of responsibility for "off site" environmental impacts is not dealt with in the Initial Study but deserves to be considered. The crude-loaded trains would be traveling many miles to get to Benicia. Would Union Pacific, as a corporation, account for the "vehicle miles traveled" of Valero's trains? Which corporate entity would be ultimately responsible to report VMT with respect to AB32, the California Global Warming Solutions Act? Calculations of VMT for Valero's train travel in miles would provide quantified evidence of a crucial transportation cost to the environment of transporting crude by rail; but this subject is not part of the Study's evaluation of GHG contributions of the Project. Nowhere is any mention of AB32 in the Initial Study or Environmental Checklist. Accordingly, there is no respect demonstrated in the environmental review of the intent and spirit of AB32. Where are the origin(s) of the loaded trains? What are the train routes that will be traveled by Union Pacific trains carrying crude to Benicia? How many highly sensitive ecologic areas would Valero's and other refineries' crude-loaded trains pass through? What would the operational risks at the trains' *loading* ends that could impact Air Quality and Biological Resources at that location? Whatever facts exist are hidden from the public by the Initial Study.

10. There is much deserved concern in Benicia, and beyond in the Bay Area, about the issue of what crude types would be imported by railcars to Benicia. There is growing public concern that tar sands "diluted bitumen" is planned to be among those "North American-sourced crudes" transported to Benicia and other Bay Area refineries by rail.

The primary reason for Valero's rail project in the first place is to be able to access certain crude types *"that have recently become available"* in North America. [Overview - I-1]. The 100 railcars per day that would contain sour crude blends with specific chemical properties and densities. These crude types, destined to be refined as part of Valero's daily processing "mix", are *specific* products being transported for processing, so must indeed be considered intrinsic to the Project. Certainly, the essential reason for proposing and implementing the Project is to be able to import the various *"North American-sourced crudes"* that heretofore have been *inaccessible* to Valero by other means of transport (pipeline and marine vessel). Without this reason, the Project could not be characterized as needing to exist.

Among the heavy "North American-sourced crudes," some, if not all, have presumably been "off limits" for Valero's Benicia refinery because of lack of feasible access; for even if the Keystone XL Pipeline were to be approved, Valero Benicia would not be accessing the particular tar sands "dilbits" (diluted bitumen) at the end of the Keystone pipeline's route. Rail transport from the midwest and Canada would serve to provide that access. <u>In other words, without rail transport, there would be little opportunity, economically speaking, for Valero to import certain North American crude blends into Benicia, including tar sands blends from Alberta Canada. This issue was not discussed in the Initial Study</u>. The general descriptive term "North American-sourced crude" implicitly suggests "proprietary information" that is not, *by corporate insistence*, to be disclosed. Regulatory agencies participate in protecting company "trade secrets." The Project Description basically tells the reader, "trust Valero's word:" that it will make little or no difference where the "North American-sourced crudes" actually come from or what their chemical composition consists of.

[Study; Project Description, p. I-2]

> *"The Refinery does not anticipate a need to change the existing Refinery operations or process equipment, nor would emissions from Refinery operations change (with the exception of the storage tank service and rail unloading emissions) as a result of accepting and refining the proposed North American-sourced crudes."*
>
> AND,
>
> [Study, Project Description, I-6]
>
> *"The North American-sourced crude oil gravity is expected to range from 20 to 43.5^{o} API, so it would be similar or somewhat lighter than some of the current constituent crude oils used in blending. The North American-sourced crude oil sulfur content would range from 0.06 to 3.1 by weight percent, <u>but on average</u>* [my emphasis] *would be similar to that of the current constituent crude oil used in blending. The North American-sourced crude oils are expected to replace crude oils of similar gravity and sulfur content that are currently brought in by ship. The Refinery's crude oil feedstock is currently blended to achieve Refinery feedstock specifications, and the North American-sourced crude oils would be blended in the same manner. Since the North-American sourced crude oils would replace crude oils with similar properties, it is anticipated that the Refinery would continue to operate within its existing specifications for crude oil gravity and sulfur content range."*

<u>The public has a right to know more about higher levels of sulfur and other constituents such as lead that the Study studiously avoids being clear about, especially alluding to "on average" comparisons with currently processed sour crude types.</u> The obfuscation is dramatic. Obviously, the Study hits a sensitive nerve: there is no account of the corporation's reasons for non-disclosure, nor acknowledgement of "trade secrets." The most extensive reference in the Study to the types of crude to be imported is given as

"North American-sourced crudes that have recently become available" [Study: Overview, p I-1]. This is hardly informational. On the contrary, *what it doesn't say* represents the Initial Study's enormous data gap. The *only mention* in the MND of the crude to be imported by rail into Benicia is entombed in the following sentence in the MND's introduction:

> *"The crude oil to be transported by rail cars is expected to be of similar quality compared to existing crude oil imported by marine vessel."*

The Study does not say what specific types of "North American-sourced crudes" are intended to be imported to Benicia and where they would be coming from. This omission is purposeful and morally wrong, especially given the context of global warming and climate change caused by human activities and the increased GHG emissions represented by "the whole of the Project." The Project Description gives no account of those actual sources, e.g., *actual locations where trains would be loaded with types of crude oil* (shale oil, "tight oil", tar sands bitumen/dilbit). The Description gives only generalities about crude mixtures in feedstocks and similarities of "North American-sourced crudes" to currently imported and processed sour crude types; thus, basic information required to evaluate potential negative effects of the "Project as a whole" is *wholly* lacking!

The Study's Overview [p.I-1.2] asks the public to accept generalities and comparisons about the range of qualities of acidity and density of "blended crude oil slate" regularly processed. The description wants to assure the reader that nothing possibly could be different, nor needs changing as a result of adding a percentage of the newly accessible "North American-sourced crudes" to the feedstock mix of crudes processed daily. Where is the actual evidence and data to support the Initial Study's conclusions and assumptions about "benefits" to Air Quality, or that contribution to Greenhouse Gases will be minimal during the Project's operations over time? Again, the Project Description doesn't account for the intended lifespan of the Crude-by-Rail Project, nor its extensions, reaching out by rail far and wide.

[Initial Study, Overview, p I-1,2] :

> *"The quality of crude oil varies by oil well locations and reservoir formations; therefore, the quality of crude oil received from the same source may vary over time. Refineries are designed and equipped to process crude oil of a specific quality that is broadly defined by a range of gravity and sulfur content." . . . .*
>
> *"A blended crude slate is comprised of multiple individual crudes that when combined provide a crude mix that refinery hardware is designed to process. The proposed North American-source crudes will be a constituent in the Refinery's blended crude oil slate.". . . ."The Refinery's various crude oil feedstocks are currently blended to achieve Refinery feedstock specifications, and the North American-sourced crude oils would be blended in the same manner. Since the North American-sourced crude oils would be replacing crude oils* [that have been imported by marine vessel] *with similar properties, it is anticipated that the Refinery would continue to operate within its existing specifications for crude oil gravity and sulfur content range.*
>
> *The Refinery does not anticipate a need to change the existing Refinery operations or process equipment, nor would emissions from Refinery operations change (with the exception of the storage tank service and rail unloading emissions) as a result of accepting and refine the proposed North American-sourced crudes."*

Why be concerned? The MND seems to say, “don’t be.”

We have known since the Valero Improvement Project was introduced to the community in 2002-03 that Valero would be retooling/upgrading the refinery to be able to accommodate a greater variety of heavy sour crudes. These were explained to be more corrosive (because of higher sulfur content) and also more productive of certain emissions; but the Valero Improvement Project would make technical improvements to account for the requirement to reduce increased sulfur emissions and other toxic air contaminants associated to processing more types of sour crudes and sour crude feedstock blends. It is my understanding, from conversations over the years with Valero regarding VIP, that early on after purchase of the refinery from Exxon, Valero foresaw that the corporation – the largest independent refiner in the U.S. – would be more dependent on purchasing sour crudes on the open market, after their initial 10-year contract with Exxon expired that had allowed Valero to continue to process a great percentage of Alaskan sweet, light crude (that had been extracted from Exxon’s own fields near Prudhoe Bay). And since the Benicia refinery had originally been designed to process Alaskan sweet crude, the VIP Project was essential to Valero’s intention to import more types of sour crudes.

The higher levels of sulfur in sour crudes also contributes to a growing risk of corrosion, which was the presenting cause of what became a catastrophic leak and fire at Chevron’s Richmond Refinery in August, 2012. The refining industries’ increased processing of more sour and heavier crude types represents a potential cumulative risk to safety of local communities, local air quality and public health.

> “*The North American-sourced crude oils are expected to replace crude oils of similar gravity and sulfur content currently brought in by ship.”* [Study: Overview, p. I-2]
> *“Thus, the proposed Project could reduce marine vessel deliveries by up to 25,550,000 bbl per year. Based on a 3-year baseline period from December 10, 2009 through December 9, 2012, annual marine vessel deliveries could be reduced by up to 81 percent. Crude delivered by rail would not displace crude delivered to the Refinery by pipeline.”* (Study: Overview, p. I-6]

The first sentence quoted does not claim *absolutely* that “North American-sourced crude oils” would replace crude oils of similar gravity and sulfur content as those crudes imported by ship; it simply says that Valero has the *expectation* that the crude oil types imported by rail will be *comparatively similar* to those sour crudes now being imported by marine vessels. The meaning of the second sentence, about advantages of replacing ships with trains, which would cause a reduction in total annual diesel emissions, may be taken at face value as a “good.” However, such value statements should be contextualized in the larger frame of total emissions calculated for the Project; thus, such a “good” must be factored as part of the the refinery’s *total emissions over time* that are owing to the processing of more sour crudes with greater sulfur content, metals such as lead, and other toxic air contaminants present, for example, in highly corrosive, acidic diluted bitumen, to make the point clear.

Cumulative potentially significant negative impacts to air quality and an account of *cumulative* GHG emissions that are related to the specific “North American-sourced crudes” planned to be imported must be described and discussed in sufficient detail with data to support claims in the context of the projected life-span of the Valero Project and other existing and planned Bay Area rail projects as well as other existing and planned large-scale industrial developments: therefore, to evaluate the cumulative impacts from all existing emissions sources within the vicinity of the Project, so that emissions contributed by specific “North American-sourced crudes” can be understood in full context of cumulative risk.

Accordingly, if Valero's crude feedstock may, by virtue of permitting the Crude-by-Rail Project, regularly have as part of its mix a percentage of those tar sand dibits, this must raise the potential for significant and catastrophic foreseeable environmental effects of diluted bitumen (dilbit) if and when spilled. Without details of the chemical makeup of tar sands blends as well as other crude types imported by rail, the public cannot judge the toxicity and extent of potential environmentally significant impacts, and the difficulty, *if not impossibility* of cleaning up after a spill, say, in the Suisun Marsh or Sacramento River floodplain or Carquinez Strait or other such sensitive interior landscape through which Union Pacific tracks pass.

So I ask: if Alberta's tar sands bitumen blends are intended to be transported by rail to Benicia, then, with as little information as provided by ESA's Initial Study, how can the public accept a finding of *no potential significant impact to the environment anticipated that cannot be mitigated*?

Enbridge Resisting Final Clean-Up of Its Michigan Oil Spill | InsideClimate News. See also The Exxon Oil Spill in Mayflower, Ark.: Slide Show of Annotated Photographs and Maps | InsideClimate News

One only has to "think Kalamazoo."

11. Under the rubric of the full intent of AB32, the Project should be discussed and evaluated with regard to the vision for a sustainable economy that AB32 upholds – an economy and way of life that doesn't continue to destroy the environment and the atmospheric conditions that make life on earth livable. I am talking about how I believe this Project represents the status quo and a level of desperation in the industry to continue to pursue the mining for crudes of every type, in every possible place of "reserves" in North America, to reap the benefits near term, in the case we are reviewing here, of what the industry would like to consider an "inexhaustible supply of crude" that would be consumed indefinitely into the future.

Twenty-five percent (25%) of America's "oil" is now coming from Alberta's vast network of tar sands mining operations, Alberta Energy: Facts and Statistics , by means of a highly energy intensive and water-demanding open pit mining operation to extract bitumen – a tar-like substance which is not an oil, but which is naturally occurring in deep sand formations. It is heavy, highly acidic and so thick it must be washed out of the sand deposits by extraordinary amounts of hot water under pressure, using tons of natural gas to supply the energy to heat the water, and thus contributing to massive GHG emissions. The bitumen itself is too dense and heavy to be pumped through a pipeline without being made "lighter." To get the consistency required for pipelines or unheated railcars, the raw bitumen must be diluted with other lighter more liquid petroleum products.

To my knowledge, BAAQMD has not described the heavy crude "blended" types that have been created from the bitumen extracted from Alberta tar sands. Although the Initial Study doesn't give it a name, or any specifics, easy research online tells that the Canadian government is price-supporting Alberta tar sands' "crude blend," which is called "Western Canada Select," to compete against "West Texas Intermediate", the light sweet crude used historically as the pricing benchmark in the industry. Bitumen may contain metals –high lead levels – besides its high concentration of sulfur. Has the Air District made public whatever it knows about the processing of "Western Canada Select?" We need to know from the Air District or other experts if this particular blend would be imported to Benicia and whether it would cause emissions that might meet or exceed "thresholds of significance."

Wikipedia entry on WCS

Cenovus Marketing page for WCS

CrudeMonitor.ca technical profile for WCS

In the absence of more information from Valero, the public has the burden of trying to imagine the consequences of a 10 - 50 year life-span of the project. Again, there's no indication in the Initial Study of the Project lifespan.

12. [Initial Study: Overview p I-5]

"The Refinery is limited by its BAAQMD permit (condition 20820, part 50) to processing crude oil at a feed rate of 180,000 barrels per day on a maximum daily basis and 165,000 barrels per day on an annual average basis."

Thus, we must try to understand how the community might be impacted on any given day when the processing "feed rate" is at its maximum capacity permitted, of 180,000 barrels per day, as compared to how those impacts might be seen in the context of an annual average permitted feed rate of 165,000 barrels per day. To add to the complexity of estimating and evaluating emissions impacts, we have to consider the possible increased health risks from processing diluted bitumen blends if and when they are added to the feedstock to be processed a*t its maximum capacity* on any given day.

13. There are no facts mentioned in the Study about other Bay Area importers of tar sands crude blends, yet getting the facts is essential to assessing the claims in the MND with regard to potential cumulative air quality impacts of the project and the possibility especially of dilbit-loaded trains involved in accidents.

> *"The crude-by-rail spike has also led to more U.S. railway oil spills -- 14 from 2007-09 to 158 between 2010-12, according to the Pipeline and Hazardous Materials Safety Administration. In a recent International Energy Agency report based on U.S. Department of Transportation data, the risk of a train spill was six times greater than a pipeline incident between 2004 and 2012. . . . On March 27, a train derailed in Minnesota, spilling 15,000 gallons of Canadian tar sands crude."*
> Canadian tar sands crude heads to refineries, Benicia's Valero may be on list - Vallejo Times Herald

14. FINALLY, IN CONCLUSION:

Under CEQA, a thorough environmental review, a full EIR, should enable the public and stakeholders to understand the "whole of Valero's Crude-by-Rail Project" and its ramifications and thereby to fairly judge, based on sufficient evidence and scientific information, the long-term, potentially significant and cumulative environmental impacts that would affect our local community, our local and regional lands and waters. CEQA would also require, in a full EIR, a thorough discussion of "Alternatives" to the Project, including the option of "No Project", in order to more fully capture the contexts in which the proposed Project should be judged.

There is considerable concern across the region and nation for the ultimate impact of increasing GHG emissions from the processing of more varieties of dirty crudes for which the Valero Crude-By-Rail project is designed to enable. Although the Initial Study is 190 pages, and contains statistics and charts about GHG emissions *during construction phases*, there are very important concerns and questions regarding the long-term consequences for global warming and climate change if we as a nation continue to support the kind of environmentally destructive mining processes which could allow "business as usual" to be pursued for years to come, for the economic benefit in the short-run, since ultimately – in not

so many years ahead – fifty? – we can mine ourselves out of crude oil, wherever reserves are located in North America that are technically made "easy to get at" now.

But what about the ethics, considering the future of our children and their children? Extracting, refining and indefinitely burning Alberta's tar sands "dilute bitumen" is not sustainable, if we want to maintain civilization and the semblance of a temperate climate for humans and other living members of our "more-than-human-world." This is the conclusion reached by the preeminent earth scientist and former director of NASA's Goddard Institute, Dr. James Hansen.

There is no reference anywhere in the Initial Study to *any* literature on the subject of global warming and the impacts of continuing extraction and burning of fossil fuels. This is a significant omission. I hereby reference Dr. Hansen's trenchant book "Storms of My Grandchildren," and Canadian author, Andrew Mikiforuk's widely acclaimed and quoted "Tar Sands: Dirty Oil and the Future of a Continent."

The dangers represented by the *total, extreme environmental costs* of importing diluted bitumen from Alberta tar sands should be factored into evaluation of Valero's proposed Project with respect for state and national goals for reducing GHG: the destruction and disappearance of thousands of square miles of pristine northern boreal forest, which serves as a carbon sink for the world; the excessive daily demand for fresh water and energy (natural gas) to extract bitumen from the sand; the miles of toxic lakes formed from the waste water after extraction; the degradation of regional and local air quality at the locations of the vast network of tar sands open pit mines (and hydraulic fracturing mining operations) and in communities with refineries processing the heavy crudes in their midst; degradation of rivers' sensitive ecologies where spills and accidents leave their permanent imprint; the accelerating rate of the melt of permafrost, ice sheets and glaciers around the globe; the continuing, dangerously accelerating rise, in a short time of recent decades, of CO2 in the atmosphere to 400 ppm, which is beyond what atmospheric scientists consider the "safe" threshold, at 350 ppm for human civilization. We thus continue to contribute to climate change in the quest to burn more and more fossil fuels, and THIS should be raised as a moral imperative, an ethical, environmental issue of the Valero Crude-by-Rail venture, since the Project would materially support "business as usual", (as evidently railroaded by the MND). This is a cruel fact that looms over the "whole of the Project" under review. Gross environmental costs are still considered "externalities" when evaluating projects, so they are not accounted for in the review of Valero's proposed rail project. The brief discussion in the Initial Study regarding reductions of GHG during construction phases minimizes the whole larger question.

So, where does the "chain of custody" stop? From oil fields, tar sand mines, and fracking sites in shale oil country, to refinery to consumers – we're all in this, allegedly trying to see our way to a sustainable economy and way of life that would depend for basic energy and transport on alternatives to fossil fuels. Pipe dream? We the people, burning fossil fuels, are part of the "chain of responsibility." We can no longer say that what any one person does, or any one company or industry does, doesn't matter. To protect communities at risk, we who have an industrial giant in our midst, need to raise our questions and be reasonably considered sane and responsible for doing so.

The long-range, dangerous environmental effects of encouraging further mining operations in Alberta's tar sands, or at fracking sites in shale formations around the country; the encouragement for continuing "business as usual" by use of rail transport that makes "North American-sourced crudes" readily accessible and available to refiners, thus, bringing these sour crudes for processing here in the Bay Area: for all of these reasons and more, the Initial Study and MND for the Valero Crude-by-Rail Project represents a failure of responsibility to address the extent and reasonable concern of the public, for protection of the environment generally, and the health and safety of our community and the planet our children will inherit.

In my view, for all of my questions and reasons stated, the MND that would permit the proposed Valero Crude-by-Rail Project must be rejected by the Planning Commission, and a full Environmental Impact Report be required.

* * *

APPENDIX:

CEQA GUIDELINES §15064.4. Determining the Significance of Impacts from Greenhouse Gas Emissions.
(a) The determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency consistent with the provisions in section 15064. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, todescribe, calculate or estimate the amount of greenhouse gas emissions resulting from a project.A lead agency shall have discretion to determine, in the context of a particular project, whether to:

(1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use. The lead agency has discretion to select the model or methodology it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; and/or

(2) Rely on a qualitative analysis or performance based standards.

(b) A lead agency should consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

(1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;

(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.

(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

Note: Authority cited: Sections 21083, 21083.05, Public Resources Code. Reference: Sections 21001, 21002, 21003, 21065, 21068, 21080, 21082, 21082.1, 21082.2, 21083.05, 21100, Pub. Resources Code; Eureka Citizens for Responsible Govt. v. City of Eureka (2007) 147 Cal.App.4th 357; *Mejia v. City of Los Angeles* (2005) 130 Cal.App.4th 322; *Protect the HistoricAmador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099; *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98; *Berkeley Keep Jets Over the Bay Com. v. Board of Port Comm*. (2001) 91 Cal.App.4th 1344; and *City of Irvine v. Irvine Citizens Against Overdevelopment* (1994) 25 Cal.App.4th 868.

Brad Kilger, City Manager
250 E. "L" St.
Benicia City Hall
Benicia, CA 94510

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

6-28-13

Dear Mr. Kilger,

Valero is one of the biggest taxpayers in Benicia, as well as one of the most philanthropic businesses. I support Valero's request for permit to build its rail car facility. We must do all we can to support our longstanding business who have seen this city through hard times.

I've said it many times to many people, but I'll say it again: "God Bless Valero!"

Very sincerely yours,

[Roger Green]
F & P Engraving
Benicia, CA 94510

Amy Million - Fwd: Valero crude oil transport and processing project

From: Brad Kilger
To: Amy Million
Date: 7/1/2013 9:36 AM
Subject: Fwd: Valero crude oil transport and processing project

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

>>> jkjerome <jkjerome@aol.com> 7/1/2013 2:00 AM >>>

To: Brad Kilger, City Manager, Benicia

From: Jerome Page, 1250 West L St Benicia

I write about the proposal to transmit to and process tar sands crude at the Valero refinery. I have spent a considerable period studying and writing about the perils and dangers of global warming. Clearly one of the most perilous avenues to this danger is representated by tar sands mining and processing. I am shocked and find it appalling that Benicia could possibly become a conduit and facilitator for this environmental disaster. Anyone with the faintest acquaintance with the research on CO2 buildup, on tar sands crude and on the history of human environmental error when profit is at issue should similarly be in shock at this prospect. It is absolutely crucial that there be a full and complete environmental study of this disastrous rail transport and processing project with adequate opportunity for both the public and relevant environmental research experts to comment. Anything less would represent an absolute failure of public responsibility.

PONDER ENVIRONMENTAL SERVICES, INC.

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Dear City of Benicia Planning Commission Members:

I am writing in support of the Valero Crude by Rail project that has been proposed to the City of Benicia for approval. Based on the project, as far as the information I have been able to gather, it seems it would be a win-win situation for the City of Benicia and Valero. Not only will it reduce emissions and reduce our reliance on foreign crude, it will create 30 full time jobs at the refinery for operation of the Crude by Rail system. Also, it will bring 120 skilled jobs to the project for the projected 6 month construction time. The ability to process lower cost crude will also make Valero more competitive in the marketplace.

Ponder Environmental Services, Inc. (PES), is a leader in vacuum truck services, waste transportation, storage tank cleaning, tank degassing, vapor control, roll off services, hazardous waste cleanup, steam cleaning / pressure washing and confined space rescue. We recently moved into the old Dolan's Lumber Yard location at 4563 East Second Street. As a neighbor to Valero and a member of the Benicia Industrial Park Association PES urges the City of Benicia to approve this project, which will benefit the City, the Benicia Industrial Park, and also its major business partners.

Thank you,

Jim Ponder, President
Ponder Environmental Services, Inc.

Roger D. Straw

766 West J Street • Benicia, CA 94510
(707) 373-6826 • rogrmail@gmail.com

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

June 30, 2013

City Manager Brad Kilger
Planning Commissioners Sherry, Oakes, Smith, Grossman, Sprague, Dean and Young
Mayor Patterson, Vice Mayor Campbell, Councilmembers Hughes, Schwartzman, Strawbridge
c/o City of Benicia
250 East L Street
Benicia, CA 94510

RE: Valero Crude-By-Rail Project and Benicia's Notice of Intent to Adopt a Mitigated Negative Declaration

Dear Mr. Kilger, Commissioners, Mayor Patterson and Councilmembers:

I have taken time to study our former Community Development Director's Notice of Intent to Adopt a Negative Mitigated Declaration, Valero's Application and ESA's Initial Study. I write today to oppose Valero's project and to encourage the Planning Commission and Council to reject the Mitigated Negative Declaration. The MND and Initial Study are clearly inadequate preparation for a project such as this, leaving many serious issues unexplored. In addition, this process has given the public little opportunity for study and input in review of this project.

Although I have spent considerable time studying the documents and placing them in a wider context, my comments here are meant only as a brief – yet heartfelt and thoughtful – summary. Please see my two-page Comments following this letter.

In short: I urge the Planning Commission at its meeting on July 11 to deny the Use Permit and to reject the Mitigated Negative Declaration. There are so many unresolved, unexplored and highly significant environmental effects, that Valero's Crude-By-Rail Project should go forward only after a full EIR study.

Thank you.

Roger D. Straw

Overview – Planning in a Wider Context

Vision - Planning is a future-oriented thing. Our best planning is *visionary*, and aimed toward a future that improves our overall condition. The Planning Commission must always be asking, "What kind of Benicia do we want to see in a decade, or fifty or a hundred years from now?" and, "How does this application move us toward the future envisioned in Benicia's General Plan?"

Context - Context is critical. Benicia and Valero do not exist in isolation. At this time in history, the world is transitioning from fossil fuel driven economies to economies powered by alternative technologies. The decisions we make together (Benicia and Valero) cannot be short-term decisions, focusing on investments that will pay off in the short run, but long-term decisions, investments that will prepare for a different kind of world – and that will lead the way for other communities to prepare for that unfolding reality.

Need for a Public Process

CEQA / EIR - Valero's Application, Mitigated Negative Declaration and Initial Study must undergo a thorough CEQA review, calling for a full EIR. It was premature of the City's former Community Development Director to recommend approval of a Use Permit and adoption of a Mitigated Negative Declaration based unquestioningly on the accompanying ESA Initial Study prepared for the City and paid for by Valero.

A Public Hearing - The hearing before the Planning Commission on July 11, 2013 is the first – and perhaps the ONLY chance the public will have to question and raise public concerns about this project. An EIR would greatly increase the City's chances for avoiding huge and costly mistakes, mistakes that could be huge and costly for not only Benicia, but for Valero, the region and indeed the world.

Specific Questions and Concerns

- **Rail spills and accidents** – Many Benicia residents have deep concerns about public health and safety and environmental impacts associated with potential crude oil spills and accidents along rail routes, including the protected waters of the Suisun Marsh and areas beyond Valero's rather shallow protective berm. The Initial Study does not weigh the *wider context* of a possible oil spill, contaminating the protected waters of our Suisun Marsh or the places of business in Benicia's Industrial Park. Rail spills have increased dramatically in the U.S. as crude-by-rail shipping has grown in recent years. A pipeline spill of diluted bitumen near Kalamazoo, Michigan caused an unimagined, unprepared-for nightmare, with chemical separation of the blended crude that led to evaporation of harmful chemicals and, even worse, the sinking of heavy tar-like globs of crude that have been near-impossible – even at great expense (reportedly over $750 million so far) – to clean up in a watery environment. Unique and unparalleled emergency planning for a new kind of spill should be included as a mitigation after

a thorough EIR investigation. The emergency plan should extend beyond Benicia through the Suisun Marsh and including rail lines throughout Solano County. Costs for such an expensive clean-up should also be predicted, and funding sources identified.

- **Refinery accidents** - Valero, the scientific community and the public know a lot more about refining of "sour" crude than we did when Valero was approved in 2002-03 for upgrades that allow for its current processing of such heavy crudes. The massive explosion at Chevron in Richmond in 2012 has alerted Benicia citizens to the damaging corrosive effects of heavy crude on refinery pipes and equipment. These corrosion concerns will now expand to include rail cars and equipment. This unfolding knowledge should be explored in a full EIR, with careful plans and appropriate mitigations.
- **Potential for increase in crude processing** - Although Valero states that it *currently* does not plan to increase its supply of crude oil, the project creates a *potential* for substantial increase in the supply of heavy, dirty diluted bitumen from North American locations over time. How can the public know what the effects will be 10 or 50 years from now?
- **An open door to tar-sands crude** - This project would *position* Valero, should it choose to do so, to import diluted bitumen from the tar-sands pit mines in Alberta. The Initial Study designates "crude blends," but does not spell out the types of blends or the commercial suppliers or their sources. Questions put to refinery personnel are inconclusive, if not evasive. The City and its partner corporation have a moral obligation and global responsibility to assure Benicia citizens and the world that opening this door will NOT at some future date result in support for a Canadian-government-supported industry that is stripping the Alberta boreal forests, endangering wildlife and human health there, and contributing at an alarming rate to global warming.
- **Air quality** - There is great potential for an increase in air pollutants despite Valero's claim that emissions will remain at current levels. Benicia needs a full EIR to fully investigate this issue. A full EIR will examine the project in light of AB32, which governs industrial pollutants, sets goals for reductions in greenhouse gases, and lays out a vision for a sustainable economy. *(Note that nowhere in the Initial Study is California's AB32 even mentioned.)* An EIR would also much more strenuously measure the project against Benicia's General Plan, and a full EIR would carefully study how and whether this project contributes to and undercuts Benicia's goals for reduction of greenhouse gases. *(Benicia's Climate Action Plan is mentioned on p. 60 of the Initial Study.)*
- **Traffic** - There will be increased traffic delays due to increased rail traffic (two 100-car trains per day). The public needs to hear from Industrial Park owners and workers whose business could be inconvenienced and profits diminished. Also, EMS and emergency vehicle access to the Industrial Park could be affected, causing very real safety concerns. These factors need greater study and additional mitigation strategies.

Thank you for this opportunity to work with you on planning for Benicia's future and a prosperous, safe and sustainable Valero.

Roger Straw
766 West J Street, Benicia
(707) 373-6826
rogrmail@gmail.com

347 Goldenslopes Court
Benicia, CA 94510
707-745-4675

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Community Development Director
City of Benicia
250 East L Street
Benicia, CA 94510

June 30, 2013

Re: Mitigated Negative Declaration proposed for the Valero Crude by Rail project.

Dear Sir/Madam:

The following are comments on the subject document, organized by topic.

Assumptions for Air Pollutant and Greenhouse Gas Emissions

Air pollutant and greenhouse gas emissions (GHG) emissions were estimated by ERM, a consultant to Valero, the Applicant. A review of these estimates suggests that ERM assumes the crude transported by rail originates at the Union Pacific Railroad yard in Roseville, and the crude transported by tanker originates two miles west of the Golden Gate Bridge. These assumptions may not be appropriate for an adequate analysis of potential impacts from air pollutant and GHG emissions.

- What is the justification for these assumed origins?
- Why didn't the comparison analysis assume the actual origin in North America of the crude transported by rail with the actual origin in North America of the crude transported by rail?
- If the origin of the crude varies, then shouldn't origins that support a worse-case analysis be considered?

Greenhouse gas emissions indirectly generated by the Proposed Project

The Environmental Checklist includes the question – *Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?* The analysis only evaluates GHG emissions generated by the equipment used during the construction phase and by the vehicles used for transport of crude oil. Indirect GHG emissions are not evaluated in the Mitigated Negative Declaration. One potential indirect source of GHG emissions are those generated by extracting the crude oil that will be transported to the refinery. The proposed Project will provide infrastructure to enable the refinery to receive tar sands crude from Alberta Canada, which requires methods of extraction that generate GHG emissions far in excess of the extraction methods used for other crude oil available to the refinery.

- Should the Mitigated Negative Declaration compare the GHG emissions produced by extraction methods for the crude oil currently transported by marine vessels with the

emissions produced by extraction methods for tar sands crude from Alberta, Canada, and a likely worse-case scenario enabled by the proposed Project?

Assumptions for Queue Storage on Park Road

Table 16-1 of the Mitigated Negative Declaration describes existing at-grade rail operations. Average crossing duration on weekdays at the Park Road crossing is listed as 2 minutes 50 seconds. Each train delivery of the proposed Project would block traffic on Park Road for 8.3 minutes.

The Mitigated Negative Declaration finds the queues on the east side of the track at Park Road would generally be contained within the Park Road segment between the tracks and industrial Way. This document speculates that the segment of Park Road between the at-grade railroad crossing and Industrial Way provides a two-way left-turn lane which could be utilized as a queue storage lane by some drivers waiting on westbound Park Road for the train to clear.

- Does this analysis rely on drivers queuing in the two-way left-turn lane?
- Would the City or the *California Manual of Uniform Traffic Control Devices* support this use of the two-way left-turn lane?

The above comments are offered to support a complete and adequate environmental review of the proposed Project.

Sincerely,

Steven L. Goetz

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 1, 2013

Mary Frances Kelly Poh

643 Windsor Drive
Benicia, CA 94510
Phone: 707-745-5461
Mfpoh@pacbell.net

City Manager Brad Kilger
Planning Commissioners Sherry, Oakes, Smith, Grossman, Sprague, Dean and Young
Mayor Patterson, Vice Mayor Campbell, Councilmembers Hughes, Schwartzman and Strawbridge

C/O City of Benicia, 250 East L Street
Benicia, CA 94510

Dear Mr. Kilger, Commissioners, Mayor Patterson and Councilmembers,

I would like to raise questions and concerns regarding Valero's Application and ESA's Initial Study and to oppose the adoption of a Mitigated Negative Declaration because I simply don't think this is a sufficient review of this project.

For twenty years I represented the citizens of District Two on the Solano County Emergency Medical Care Committee. I am by profession a Registered Nurse but I sat in a public seat. I participated in developing the EMS Manual and the agreements which lead to the Countywide EMS system. I am also a member of the California Native Plant Society and Vice President of the Willis L Jepson Chapter of CNPS. This chapter is based here in Benicia and covers all of Solano County but I am not speaking for CNPS.

There are others in the community who are much more knowledgeable about EIR's and CEQA than I am. Due to my experience working with the County Agencies, such as the Office of Emergency Services and Emergency Medical Services, I know there are County requirements that are not referenced in this document. There is a discussion about the Benicia Fire Departments response times but there is nothing about notifying the County if there is a spill or an untoward event and the requirements for this notification. Additionally how does Valero interact with the Union Pacific Rail Road and the County if problems occur? What agreements does Valero have with these other entities? Don't these need to be spelled out before a project is approved? When does the specific emergency response plan need to be attached to the approval document? It is my understanding that the documents would need to be provided if an EIR is prepared. Have these County Agencies been contacted and are they in agreement with and support whatever procedures that have been developed? Once again a full EIR would carefully delineate what other County Agencies and Regional Agencies would need to be notified and respond to untoward events and the necessary agreements between Valero and the agencies would be attached.

In the section entitled Biological Resources there is reference to the impact construction would have on nesting birds. But what happens to the endangered plants such as Soft Bird's Beak (Cordylanthus mollis ssp. mollis)? Soft

Bird's Beak is a federally listed endangered species and listed as a 1B.2 in the CNPS Inventory of Rare and Endangered Plants. In 2004 90% of the existing sites of this plant were located in Solano County. It is an annual herb that is limited to California alone. It lives in Coastal Salt Marsh, and wetland-riparian communities. Seeds found in its fruiting bodies are food for birds. It usually blooms in April and May. This makes it harder to find later in the year when a plant survey is done. Has the Suisun Resource Conservation District been contacted regarding marsh plants and animals and their habitat needs, which will be disrupted by construction and the ongoing train traffic, not counting what would happen to them if there was a fuel spill? The document is lacking, like so many others, by only considering animals and not the things that the animals eat or need for their habitat. There is no discussion of the effects of an oil spill on the endangered plants and animals. Could they even survive a small spill? A Full EIR would list all species impacted and suggest mitigations.

This project will impact the Suisun Delta and the marsh. I don't feel that it is appropriate for Valero to shift all its responsibility for protecting the marsh to Union Pacific which will be pulling and delivering rail cars that are owned by Valero. It is for these reasons that I feel that a complete Environmental Impact Report needs to be required.

Sincerely,

Mary Frances Kelly Poh

Mary Frances Kelly Poh

City of Benicia,
Community Development Dept.

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

7-1-2013

Valero Crude By Rail Project.

Comments on the Mitigated Negative Declaration.

I believe this document has inaccurate and or incomplete data and needs revision and/or additional mitigation measures.

I am concerned about several aspects of the proposed project.
Attached are comments on an item-by-item presentation.
Several of the items are of a less than significant nature, such as under Biological Resources and Hydrology and Water Quality, but should be revised.

The major concern with the MND is with the traffic impact.
The Refinery was designed and permitted to receive the majority of it's crude from ships and barges. Valero has pipelines from Two (2) locations on the waterfront to its tank farm, and uses rail to ship finished products only.

The applicant did not indicate any alternative proposals that would allow access to this "New" source of crude, such as Barges from the PNW, or locating the train car unloading racks along the waterfront adjacent to their existing pipelines.

The industrial park grew around the refinery and has adapted to the local surface traffic as pipelines within the park move most of the refineries material.
The proposed project will allow Valero to bring in almost half of its daily crude by a new source, rail.
The addition of 2 50-car trains per day thru the Industrial Park will cause major traffic delays, mainly along Bayshore Rd, at the 680 Bayshore off ramp and at Park Rd.
The greatest issue is the fact that the applicant can accommodate 50 crude cars in their facility at one time and the second 50-car train will be moved at the convenience of UPRR.
The MND does not have a "Switching Plan", from UPRR, that outlines the first and subsequent crude trains. The applicant is not restricted to moving these trains during daytime hour, except during the noon hour. There already is significant and regular train traffic at this time so it's an empty promise.

The mitigations for traffic impact, TRAN-1 will not improve or negate the additional rail traffic.
Measure TRAN-2 is inaccurate, as it does not discuss emergency services to businesses that could be completely blocked by rail traffic along Bayshore Rd.

Valero crude by rail project.

Comments in regards to the MND of May 2013

The Initial Study/ Mitigated Negative Declaration in inadequate and or inaccurate in the following areas.

1 In Part 11. Environmental Checklist,
1. Aesthetics and 10. Land use and Land Use Planning.
The proposed project will cause increased visual barriers and divide a community by requiring greatly increased Rail Road traffic in the adjacent neighborhood, outside the Valero property.

3. Air Quality.
The discussion on Air Quality is incomplete and or inaccurate. It used emission numbers based on one locomotive per train when the operation plan states that two or more engines will be used. The engines are assumed to be running for two hour per train although the unloading process will take 8 to 10 hours.
There is no restriction on locomotive engine idle time, and it assumes that there will not be any switching of trains into rail sidings in the Park.
The report also discusses diesel emissions from construction activities, noting that they may be objectionable but fails to give the same review to train sources.

4. Biological Resources,
The initial study incorrectly states that certain species are not considered to be in Sulfur Spring Creek due to a Tidal Gate at its mouth. This is incorrect, there is no tidal gate at that location and the structure that was constructed By the US Army in the early '40s has been removed.

9. Hydrology and Water Quality.
Assumption of the Sulfur Springs flood plane, see #4 above.
There is no description of spill containment at the unloading rack and the facility is less than 60' from Sulfur Springs Creek.

16. Transportation and Traffic.
Lack of "Switching Plan" from UPRR for the second 50 car train.
No discussion of train movement across Park Rd, thru Valero to the Industrial Way rail sidings/yard. This is the only place in the park, (and surrounding area), that could accommodate a 50 car unit train.
Additional Park Rd closures would be required to move these trains into the Valero facilities.
The applicant has simplified/change the plans by eliminating the "Y Connecter" and the western end of line track connecters that facilitate engine movement.
The "Y" could have been utilized to move trains from the Industrial way yard into the refinery without crossing Park Rd.

Additional suggested minimum mitigations

Limit the crude trains to 50 cars per day until an acceptable switching plan is prepared.
Signs warning of stopped traffic on the N680 Bayshore Rd off ramp.
Change the off ramp to 2 lanes with a right hand turn lane.
Add traffic delayed signage at Park and Industrial.

Sincerely

Ed Ruszel
2980 Bayshore Rd

RUSZEL
WOODWORKS

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 1, 2013

TO: City of Benicia
Community Development Department

FROM: Jack Ruszel

RE: Mitigated Negative Declaration - Valero Crude By Rail Project

I have several issues concerning the stated project that have been either ignored or dismissively minimized.

#1 - I take objection to the statement in the initial study p. II-62 "Generally, people who drive through industrial areas served by at-grade railroad crossings have a higher tolerance of delay associated with daily at-grade rail activity that is not on a set schedule compared to delays that are not in the vicinity of an at-grade crossing."

I believe acceptance of this non-objective statement sets the tone of this Declaration. Rather than "higher tolerance, you should use the words, "no other choice." It appears that the city has issued a mitigated Negative Declaration based on a less than objective study. There appears to be an attitude of "quick – get this done, before anyone asks too many questions." I may be wrong, but that's what it looks like to me.

#2 - The at-grade crossing on park road is already a serious traffic issue. The City of Benicia and Caltrans should be taking this up as an urgent issue before the separate discussion of doubling the current rail crossings. In the past 2 years I have gotten stuck on the Bayshore Rd. exit numerous times. On a couple occasions traffic was already at a dead stop at the top of the exit. This is a deadly situation. I sat in my car praying that a truck coming off I-680 would not smash me under the trucks in front of me.

The Initial study states on p. II-66 "Project train crossings...could back (traffic) onto Bayshore rd. and affect the operations of the I-680 ramp-terminal intersections, but would not extend on to the I-680 mainline."

This statement is based on a 1 week study of rail operations.

2980 Bayshore Road · Benicia, California 94510 · Phone 707-745-6979 · Fax 707-745-2793 ·
e-mail: jruszel@ruszelwoodworks.com

From my 30 years of daily observations of the railroad operations along Bayshore Rd, I know that there is an ebb and flow of rail volume and timing that causes me to seriously question the validity of a declaration that uses such a short time window to extrapolate numbers that are used to make decisions of a potentially life-threatening nature.

To accept such a quick snapshot of rail traffic in this study has me wondering if the city could be putting itself in danger of being criminally negligent.

#3 - There are at least 7 Businesses on the east side of Bayshore Rd. south of Park rd. There are over 200 people who work here on "the wrong side of the tracks." Our Businesses are already affected by numerous at-grade crossings. The impact of rail traffic blocking access to these businesses has a real and monetary effect on these businesses. Doubling the amount of traffic blocking access is not even brought up as an issue in this study.

Although Valero is a big business here in Benicia, they are not the only business. I expect the City of Benicia to protect the interests of all. To accept a study that excludes some of their most affected neighbors is incredibly short-sighted of the city.

#4 - Mitigation Measure TRAN-2 addresses the issue of emergency response teams access around the Park Rd. crossing. There is not even an acknowledgement of the 200 plus people who could be trapped behind a very long train crossing or sitting, blocking our driveways. Again, this issue has serious safety repercussions, yet the city is accepting this Mitigated Negative Declaration, without even addressing the issue.

If the citizens of this city are to be able to support our civic leaders in accepting a plan of this scale, we need to know that all the impacts and potential impacts have been studied well. I feel at this time that has not happened.

I look forward to reviewing a serious study which addresses these issues, and helps to keep Benicia the kind of city we want to do business in.

Respectfully,

Jack Ruszel

2980 Bayshore Road · Benicia, California 94510 · Phone 707-745-6979 · Fax 707-745-2793 ·
e-mail: jruszel@ruszelwoodworks.com

Amy Million - Fwd: Valero Rail Update proposal

From: Brad Kilger
To: Amy Million
Date: 7/1/2013 5:55 PM
Subject: Fwd: Valero Rail Update proposal

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

>>> Jon Van Landschoot <jonvanland@yahoo.com> 7/1/2013 3:28 PM >>>
Hi Brad,

My big concern is the environmental danger of a spill involving the Tar Sands that might be brought into our town.

As a Sustainability Community , with a significant environmental focus, the Tar Sands option doesn't fit !

I recently heard that Valero does not have plans to bring in the Tar Sands , just more of the same crude it currently refines.

If you will , is that Valero's current position ?

your chum,
jon van

RECEIVED
JUL 01 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Kathy Kerridge
771 West I Street
Benicia, CA 94510

July 1, 2013

Dear Planning Commissioners, Mayor Patterson, City Council and Brad Kilger,

I am writing to urge you to reject the MND on the Valero Crude- by –Rail Project and to require a full Environmental Impact Report

CEQA requires that there be an evaluation of all foreseeable cumulative contributions to negative impacts including air quality, public health, local and regional sensitive ecology (land and water), traffic/transportation, and global warming. The initial study and negative declaration does none of that. As the study explains "all environmental evaluation must take into account the whole action involved including offsite as well as onsite, cumulative as well as project level, indirect as well as direct, and construction as well as operational impacts." The possible impacts of an oil spill in the Suisun Marsh, or any other waterway in California is not mentioned. The cumulative effect of not just increased rail for Valero but for all the other refineries in the area is not mentioned. Yet this is foreseeable. Maybe 25 cars will have little impact, 100 more, but what if we start having 500 rail cars a day coming through a sensitive wetland that flows to the Bay?

The biological mitigation only looked at on site mitigations that would be implemented at the project site. There was no discussion of offsite mitigations, despite the fact that these rail cars will be going through sensitive habitats off site as well. Have other agencies been notified about this such as the Suisun Resource Conservation District and the Department of Fish and Wildlife?

The derailment of a train carrying the herbicide, metam sodium, in Dunsmuir in 1991 shows what an environmental disaster can happen when a rail car derails. This derailment killed everything for 38 miles of the Upper Sacramento River. This same area was the site of a derailment on 6-13-2013. The Dunsmuir spill can provide valuable lessons. In Dunsmuir the train operators had no idea what they were dealing with and raised no warning that there was a toxic spill. The same thing happened in the Kalamazoo, Michigan pipeline burst where not only did the local people have no idea what was in the pipeline, but the company ignored their own warning signals, increased the pumping of oil and never gave a thought to contacting the local authorities. This pipeline was carrying diluted bitumen from the Canadian Tar Sands. This cleanup is in its third year and is still incomplete. It has cost $809 million dollars so far. Are our safety plans adequate? Has an emergency response plan been prepared for a crude oil spill being imported by rail in sensitive areas? Do we even know what will be in these rail cars? These are off site concerns that must be responded to. The initial study acknowledges that there are hazards of shipping by rail, but concludes that those are offset by the hazards of shipping by boat. That is not an adequate analysis. The analysis should be what are the hazards of shipping by rail and how can they be mitigated.

Will this expansion lead to bringing in crude oil from the tar sands of Canada? Valero has stated and the initial study says that the crude brought in will be similar to what they are already processing. Will that always be so? Are they bringing in oil that is from the tar sands that has been blended prior to being shipped? Oil from the tar sands are a toxic stew when transported. They don't react in a spill in the way

that traditional crude does. If Valero is not importing tar sands diluted bitumen blend now, will it do so in the future?

The initial project claims that there will be no need to modify the refinery to be able to process the new North American crude variety since VIP upgrades have been accomplished. Would Valero have to modify the refinery to accept dilute bitumen crude blends? Would the processing of diluted bitumen increase certain kinds of emissions and what would they be? The community would want additional notification if this happened.

The Alberta Tar Sands is an environmental disaster. Not only is it extremely energy intensive in the way the oil is produced; it is also destroying vast tracts of forest and using immense quantities of fresh water. The oil that is produced has to be heated and mixed with some very toxic chemicals in order to be shipped. When it spills these chemicals evaporate and a toxic cloud is released. The resultant heavy tar does not float to the top of water to be scooped up, but rather sinks to the bottom. It is more corrosive than lighter crude. This corrosive crude is so dangerous that British Columbia will not allow a pipeline to be built through their province to the ocean. The greenhouse gas emissions from the production of these oils are much greater than normal oil production. Will this project lead to this being brought in? What would the greenhouse gas emissions be like if that were considered? These are potential cumulative, off site impacts that must be considered.

Under section 18 "Mandatory Finding of Significance" of the initial report all finding were less than significant either with or without mitigation. The only reason for this is the failure of the initial report to look beyond the narrow scope of the project, which was treated only as a construction project. There is no analysis of offsite problems with rail transport of hazardous materials, no in depth analysis of what would happen with an offsite derailment or spill in sensitive environments and no analysis of the broader impact of increased GGH emissions that would happen if there was the importation of diluted bitumen from the Canadian Tar Sands.

For all of these reasons a complete Environmental Impact Report should be required.

Sincerely,

Kathy Kerridge

Kathy Kerridge

STATE OF CALIFORNIA

EDMUND G. BROWN JR., *Governor*

PUBLIC UTILITIES COMMISSION
320 WEST 4TH STREET, SUITE 500
LOS ANGELES, CA 90013
(213) 576-7083

RECEIVED
JUL 02 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 2, 2013

Charlie Knox
City of Benicia
250 E. L Street
Benicia, California 94510

Dear Mr. Knox:

Re: SCH# 2013052074; Valero Crude Oil by Rail Project, Valero Benicia Refinery DMND

The California Public Utilities Commission (Commission) has jurisdiction over the safety of highway-rail crossings (crossings) in California. The California Public Utilities Code requires the Commission approval for construction or alteration of crossings and grants the Commission exclusive power on design, alteration, and/or closure of crossings in California. The Commission's Rail Crossings Engineering Section (RCES) has received a copy of the *draft Mitigated Negative Declaration (Land Use Permit Application)* from the State Clearinghouse for the proposed Valero Crude by Rail Project. The City of Benicia (City) is the lead agency.

According to the Land Use Permit Application, Valero Benicia Refinery proposes to construct two (2) offloading rail spurs, a parallel engine runaround track and a "wye connector" track on the refinery property to allow receipt of rail cars at the offloading racks. The traffic associated with the project would be two freight trains per day. These proposed tracks will be connected to the existing Union Pacific Railroad (UPRR) tracks.

The proposed project would affect the existing at-grade highway-rail crossing at Park Road (CPUC # 001-37.32-C) and near Bayshore Road. The potential project impacts on the existing and proposed at-grade crossings along the tracks which serve or are near the Valero Benicia Refinery should be identified, discussed and evaluated for necessary safety improvements and mitigations. This includes considering traffic queuing, weaving, emergency service response, pedestrian circulation patterns or destinations with respect to railroad right-of-way, and compliance with the Americans with Disabilities Act. Mitigation measures to consider include, but are not limited to, the planning for grade separations for major thoroughfares, improvements to existing at-grade highway-rail crossings due to increase in traffic volumes and continuous vandal resistant fencing or other appropriate barriers to limit the access of trespassers onto the railroad right-of-way. All identified crossings shall also comply with the requirements of California Manual on Uniform Traffic Control Devices.

The new tracks shall be constructed in accordance with the Commission General Order (GO) Nos. 26-D (Clearance on railroads and street railroads as to side and overhead structures, parallel tracks and crossings), 72-B (Construction and maintenance – standard

types of pavement construction at railroad grade crossings) and 75-D (Warning devices for at-grade railroad crossings).

Construction of a new public crossing or modification of an existing public crossing requires authorization from the Commission, through the formal application or the General Order (GO) 88-B request processes, respectively. Prior to submission of a formal application or GO 88-B request, the City should arrange a diagnostic meeting with RCES and UPRR to discuss relevant safety issues and requirements for the Commission's authorization. While construction of private crossings may not need the Commission's authorization, compliance with the Commission's GO 26-D (Clearances on Railroads and Street Railroads as to Side and Overhead Structures, Parallel Tracks and Crossings) and GO 75-B (Regulations Governing Standards for Warning Devices for At-Grade Highway-Rail Crossing) standards are still required. RCES representatives are available for consultation on crossing safety matters. See the link for more information: http://www.cpuc.ca.gov/PUC/safety/Rail/Crossings/index.htm.

If you have any questions in this matter, please contact Ken Chiang at (213) 576-7076, yen.chiang@cpuc.ca.gov, or Daniellia Fristoe at (916) 928-2108, dvm@cpuc.ca.gov.

Sincerely,

Ken Chiang, P.E.
Utilities Engineer
Rail Crossings Engineering Section
Safety and Enforcement Division

C: State Clearinghouse
Daniellia Fristoe

CEMENT MASONS LOCAL 400

810 W. STADIUM
SACRAMENTO, CA 95834

SAN JOSE, CA 95125
2102 ALMADEN RD
SUITE 118
(408) 266-9160

STOCKTON, CA 95205
2350 EAST MAIN ST
(209) 466-0602

VALLEJO, CA 94590
404 NEBRASKA ST
(707) 644-8423

CHICO / REDDING
818 WALL STREET
CHICO, CA 95928
(530) 342-7872

RECEIVED
JUL 02 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 2, 2013

City of Benicia Community Development Department
Ms. Amy Million
250 East L Street
Benicia, ca 94510

Dear Ms. Million,

The Cement Masons Local 400 is an active member of the Napa-Solano Building and Construction Trades Council. Our Council recently met with Valero to review the proposed Crude by Rail project at the Benicia Refinery. We believe this is a good project for our community and can provide continuing work opportunities for our members. We encourage your approval of the project.

Finally, we appreciate the effort Valero has taken to engage all the members of the Napa-Solano Building and Construction Trades Council on this job and we look forward to continuing our positive working relationship with Valero.

Respectfully,

Ben Espinoza
Senior Business Agent
Cement Masons Local 400

TELEPHONE (916) 565-0128 FAX (916) 565-0133 TOLL FREE 1-800-566-4002

Amy Million - Fwd: letter re Valero proposal

From: Brad Kilger
To: Amy Million
Date: 7/2/2013 11:44 AM
Subject: Fwd: letter re Valero proposal

RECEIVED
JUL 02 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

>>> SmithFamily <smithdandy@aol.com> 7/2/2013 9:56 AM >>>
Dear Brad,

I am writing out of concern for the Benicia Valero proposal for a rail terminal to bring crude to the refinery. I would like to know all we can about the possible environmental impacts of such a plan. Therefore, I do not believe a negative declaration is sufficient environmental review and strongly encourage that the city require an EIR for the project. One look at Valero's corporate bottom line tells you they can afford that much protection for Benicia residents.

Thanks for your time,

Dan Smith
365 Military East

SmithFamily
smithdandy@aol.com

IRON WORKERS LOCAL 378

UNION OFFICE OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFORCING

3120 Bayshore Road, Benicia CA 94510 | www.ironworkers378.org

P. (707) 746-6100 | F. (707) 746-0979

AFL-CIO

Robert J. Lux
President
Business Agent

Jeff McEuen
Business Manager
Financial Secretary-Treasurer

Jason Gallia
Business Agent

RECEIVED
JUL 08 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 3, 2013

City of Benicia Community Development Department
Attn: Charlie Knox
250 East L Street
Benicia, CA 94510

Re: Valero Crude by Rail

Dear Mr. Knox:

I am writing on behalf of the Iron Workers Union Local No. 378 located at 3120 Bayshore Road in Benicia. Our Iron Workers Local 378 dispatches skilled craftworkers to projects throughout the Bay Area. Some of the area's most high-profile buildings, bridges, monuments, stadiums and sports arenas were built by Local 378 members of the International Association of Structural, Ornamental and Reinforcing Iron Workers.

As a Benicia Industrial Park business and one that may be directly impacted by Valero's proposed Crude by Rail project, we reviewed the Initial Study/Mitigated Negative Declaration Section 16, Transportation and Traffic with interest. We operate our 10,000 square foot Bayshore Road facility weekdays during daytime business hours. Apprentices attending their four year training program and most all Local 378 staff arrive between 6:00 a.m. and 8:00 a.m.

To date, we have had no concerns with railcar movements in front of our business. Since the Valero railcar movements will be outside commute hours, and initially only at night, the incremental impact on the Iron Workers Local 378 is expected to be insignificant. We recommend the City of Benicia Planning Commission approve the Use Permit for the Valero project.

Further, as an active member of the Napa-Solano Building and Construction Trades Council, we understand the benefits of projects like this to our working brothers and sisters and their families. Valero's commitment to resource their project with union craftworkers is commendable. These local construction jobs benefit us all.

Respectfully,

Jeff McEuen
Business Manager
Financial Secretary/Treasurer

JM:ym
Opeiu-29/afl-cio

Heat and Frost Insulators and Allied Workers Local Union No. 16

AFFILIATED WITH THE AFL-CIO AND BUILDING AND CONSTRUCTION TRADES DEPARTMENT

3801 PARK ROAD
BENICIA, CA 94510

(707) 748-1616
FAX (707) 748-1620
www.insulators16-wica.com

ENERGY CONSERVATION SPECIALISTS

RECEIVED
JUL 05 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 3, 2013

City of Benicia
Attn: Brad Kilger, City Manager
250 East L Street
Benicia, CA 94510

RE: Valero Crude By Rail

Dear Mr. Kilger:

I am writing as a Benicia Industrial Park business and a strong supporter of the proposed project at Valero to bring in crude by railcar.

Our office staff, members and apprentice trainees commute to and from our facility daily and do not encounter excessive delays from railcar crossings in and around the industrial park.

We are excited to see both the city and local businesses investing in these types of infrastructure projects that will ultimately bring more growth and business opportunities to our area. The newly repaved area on Park road has given this area a badly needed facelift and we believe the Crude by Rail is another step forward in revitalizing the Industrial Park area which will bring prosperity to the city.

Should you have any questions, or would like to discuss the issue further, please contact me at the number listed above. You are also welcome to stop by our office and training facilities.

Thank you for your time and consideration in this matter.

Respectfully,

Melvin L. Breshears
Business Manager

Zablocki Printing Co

Amy Million - Fw: Refinery

RECEIVED
JUL 08 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: Brad Kilger <bkilger@ci.benicia.ca.us>
To: Amy.Million@ci.benicia.ca.us
Date: 7/5/2013 3:10 PM
Subject: Fw: Refinery

Brad
Sent from my phone please excuse any typos

-----Original message-----

From: "sandra kozak <sandra_kozak@yahoo.com>" <sandra_kozak@yahoo.com>
To: Brad Kilger <Brad.Kilger@ci.benicia.ca.us>, sandra kozak <sandra_kozak@yahoo.com>
Sent: Fri, Jul 5, 2013 09:27:22 PDT
Subject: Refinery

Please do not allow the refinery to add more noise and polution to our neighborhoods. We already put up with too much noise from the jet engine and too much polution.

Please vote NO on any Valero expansion of any kind.

A group of concerned citizens.

Sandra Summerfield Kozak, M.S., ERYT-500
International Yoga Studies, Founding Director
Light Transitions Educational Materials, President

"*May the best life has to offer be yours within this day*"

www.internationalyogastudies.com
www.sandrakozak.com

Amy Million - Tesoro

RECEIVED
JUL 08 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: Amy Million
To: Amy Million
Date: 7/8/2013 7:43 AM
Subject: Tesoro

From: "Dnsjrs <dnsjrs@gmail.com>" <dnsjrs@gmail.com>
To: Brad Kilger <Brad.Kilger@ci.benicia.ca.us>
Sent: Sat, Jul 6, 2013 12:07:37 PDT
Subject: Tesoro

Brad,
I live in Vallejo, over the hill from Tesoro, but own several properties in Benicia. Since I am not sure I would have standing to talk at the planning meeting, I will express my concerns here.

Based on the comments in the Vallejo paper today, Your environmental review is flawed, there is no way to process heavy crude without more impact. Here are a few points.

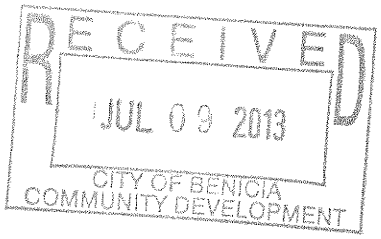
A. Crude by rail is common, but not without risk. The accident in Quebec, evacuating a thousand people after a crude derailment and fire is a grim reminder that you will be approving an XL Pipeline on wheels. Note, once rail is allowed, a far more likely scenario is Central Valley high sulphur crudes being imported as they are for Shell in Martinez
B. Ask Tesoro for crude assays for their current crude slate, the Canadian crude and any other crude they might bring in by rail. The heavy metals and sulphur have to be disposed of, stored on site or released as pollutants
C. Without a system wide upgrade of pollution equipment, air quality has to be impacted. The crude is not just processed in a new cracker / hydrotreater.
D. With a system wide upgrade, you should expect no less than a sulphur smell encompassing Benicia and Vallejo housing developments along Rose drive and Somerset. A drive by the Martinez Shell refinery will prove the point to anyone willing to make the drive.

This is the reality of a larger refinery footprint on our neighborhoods. It is naive to the point of questioning inappropriate collusion to have issued an environmental report not detailing the impacts known by anyone in the industry. There are days when I smell the refinery now and I do not want to see that get worse. Changing from light, sweet crude to heavy crude will affect my air quality and property value. I will be reviewing options for environmental monitoring prior to the upgrade to establish baseline and air quality changes for any future litigation.

Please do an environmental review that will at least free the city from sharing liability as what is being reported would appear to fail that test.
Thanks,
Dave Shipley

NATURAL RESOURCES DEFENSE COUNCIL

July 9, 2013



Via Fax to
City of Benicia Community Development Department
Attn: Amy Million
250 East L Street
Benicia, CA 94510
Fax: (707) 747-1637

Re: Notice of Intent to Adopt a Mitigated Negative Declaration for the Valero Crude by Rail Project

Dear Ms. Million:

Please find the attached supplement to NRDC's comments on the Notice of Intent to Adopt a Mitigated Negative Declaration for the Valero Crude by Rail Project. On July 7, 2013, a rail car carrying oil derailed and exploded in Quebec, Canada, killing at least thirteen people. This tragic event underscores the need for an evaluation of rail car accidents and spills in conjunction with the City of Benicia's approval of this project. At present, the Initial Study/Mitigated Negative Declaration completely fails to consider or mitigate the potential for these types of accidents. The potential for rail accidents and spills must be evaluated and mitigated before this project may lawfully proceed.

Sincerely,

Diane Bailey, Senior Scientist
dbailey@nrdc.org
415-875-6127

Elizabeth Forsyth, Attorney
eforsyth@nrdc.org
415-875-6162

The New York Times

July 8, 2013

Dangerous Conditions Impede Inquiry Into Quebec Crash

By IAN AUSTEN

OTTAWA — The Quebec town where runaway railroad tank cars filled with oil derailed and exploded over the weekend still did not know the full extent of the devastation on Monday as dangerous conditions limited the movements of investigators.

The provincial police said they had found eight more bodies in the town, Lac-Mégantic, on Monday, raising the death toll to 13 from the "ghost train" accident, as it has become known, which occurred early Saturday morning. The police also increased the estimate of the missing people, who are presumed to be dead, to 50.

While fires that raged for much of the weekend were largely under control by Monday, Sgt. Benoît Richard of the provincial police, known as Sûreté du Québec, said much of the site remained so dangerous that officers were able to enter only when accompanied by firefighters.

The accident's destructiveness also impeded efforts to recover bodies and investigate the cause of the crash. Aerial photos of the popular vacation town showed that much of its downtown had been reduced to little more than ash. Le Musi-Café, a bar near the rail line that was filled with patrons at the time of the derailment, had vanished under a pile of burned and crushed tank cars.

Forensic anthropologists were traveling to the town to assist with the recovery of remains, and the police were asking relatives for razors, hairbrushes and other items belonging to the missing that might provide DNA for identification.

Further delaying the recovery was a declaration of the accident site as a crime scene. Sergeant Richard said that factor had delayed the removal of the remains of the train as the police must document them and gather evidence.

News reports in Quebec indicated that the missing included parents who had been listening to a concert at Musi-Café but never returned to their young children. At least one musician who had been performing at the time of the wreck also was among those missing.

About 1,500 of the town's 6,000 residents were still unable to return to their homes on Monday, although officials said some might be allowed to return on Tuesday. At least 30 buildings were destroyed.

Police officers and politicians in Lac-Mégantic declined to answer questions about the cause of the derailment. The information void has been filled with sometimes-contradictory accounts.

Denis Lebel, the federal transport minister, said on Monday that the train's locomotive had passed a safety inspection in the Montreal area early on Friday, but he offered no further details.

The Montreal, Maine & Atlantic Railway, which owns the train line, said its engineer had parked the 72-car train late Friday near Nantes, a village about 7.5 miles from Lac-Mégantic, and had left it unattended. About 11:30 p.m., the volunteer Fire Department in Nantes put out a fire in the locomotive.

Patrick Lambert, the chief of the Nantes Fire Department, told reporters that his crew had shut down the locomotive after fighting the fire and had informed the railway about its action.

"The people from M.M.A. told us: 'That's great — the train is secure, there's no more fire, there's nothing anymore, there's no more danger,' " Mr. Lambert said. "We were given our leave, and we left."

But in interviews on Monday with the Canadian Broadcasting Corporation and Reuters, Edward Burkhardt, the chairman and chief executive of the railway's parent company, Rail World, appeared to blame the firefighters for causing the accident by shutting down the train.

Mr. Burkhardt said their action had meant that the train's brake system gradually lost air pressure, "and an hour or so after the locomotive was shut down, the train rolled away." He also faulted the Fire Department for not waking up the engineer, who was staying overnight at a hotel in Lac-Mégantic, and taking him to the scene.

Earlier, Mr. Burkhardt, who did not respond to several requests for comment, said the train had been properly secured. Further confusing his account is the fact that since the 19th century, railways in North America have used an air-braking system that applies, rather than releases, freight car brakes as a safety measure when it loses pressure.

The New York Times

July 7, 2013

Deadly Derailment in Quebec Underlines Oil Debate

By IAN AUSTEN

OTTAWA — The police said on Sunday that at least five people had died and 40 were missing after runaway railroad tank cars filled with oil derailed and exploded in a small Quebec town.

"We know there will be more deaths," Lt. Michel Brunet of Quebec's provincial police told reporters in Lac-Mégantic, where the fires continued to burn on Sunday.

The derailment and explosions, which took place around 1:15 a.m. on Saturday, underscored a debate in the effort to transport North America's oil across long distances: is it safer and less environmentally destructive to move huge quantities of crude oil by train or by pipeline?

Visiting the town on Sunday, Prime Minister Stephen Harper compared it to a "war zone."

The fires, which incinerated at least 30 buildings in the core of Lac-Mégantic, a tourist town of 6,000 people about 150 miles east of Montreal, limited the work of accident investigators, as well as attempts to search for survivors and the remains of victims.

In a statement, the Montreal, Maine and Atlantic Railway said the train had been parked outside Lac-Mégantic for the night with no crew members on board. Its locomotive had been shut down, "which may have resulted in the release of air brakes on the locomotive that was holding the train in place," the statement said.

The railway did not respond to further questions, but Reuters, quoting officials from the company, said the oil aboard the train had come from the Bakken oil fields of the Western United States.

The Bakken oil deposits, which are often drilled through hydrofracking, have become a major source of oil for the railroads to move because the deposits lack direct pipeline links. Canada's oil sands producers, frustrated by a lack of pipeline capacity, are also turning to trains to ship their products.

Their move to rail comes as the Obama administration continues to weigh an application for the Keystone XL pipeline, which would deliver synthetic crude oil and bitumen, an oil-containing substance, from Alberta to refineries on the Gulf Coast. An analysis of the pipeline plan for the State Department concluded that if the pipeline was rejected, oil sands producers would instead turn to railways for shipments to the United States.

Both the Canadian National Railway and the Canadian Pacific Railway have extensive rail networks into the United States and have been promoting what the industry often calls a "pipeline on rails" to serve the oil sands. Mark Hallman, a spokesman for Canadian National, said the railway moved 5,000 carloads of crude oil to the United States from Canada in 2011, increased that amount to 30,000 carloads in 2012 and "believes it has the scope to double this business in 2013."

Unlike pipeline proposals, however, the escalation of rail movements of oil, including light oil shipments from the Bakken fields as well as from similar unconventional, or tight, oil deposits in Canada, is not covered by any regular government or regulatory review.

"We have an explosion of tight oil production in Canada and the United States, and most of it is moving by train," said Anthony Swift, a lawyer with the Natural Resources Defense Council in Washington. "But this process has happened without due diligence."

Keith Stewart, a climate and energy campaigner with Greenpeace Canada who has examined the increased use of oil trains, criticized railways in Canada and the United States for continuing to use older oil tank cars that he said were found to be unsafe more than 20 years ago.

A 2009 report by the National Transportation Safety Board about a Canadian National derailment in Illinois called the design of those tank cars "inadequate" and found that it "made the cars subject to damage and catastrophic loss of hazardous materials." Television images suggested that the surviving tank cars on the Lac-Mégantic train were of the older design.

Mr. Hallman, the spokesman for Canadian National, did not respond to questions about the safety of tank cars or the consequences of the Lac-Mégantic derailment for rail oil shipments in general. However, he said, "this tragedy notwithstanding, movement of hazardous material by rail not only can be, but is being, handled safely in the vast majority of instances." Ed Greenberg, a spokesman for Canadian Pacific, declined to comment.

The comparative safety of railways over pipelines has been the subject of much debate. Speaking in New York in May, Mr. Harper emphasized that the rejection of the Keystone XL pipeline would lead to an increase in oil sands shipments by rail, which he called "more environmentally challenging" than pipelines.

"We have seen some major safety risks associated with the crude-by-rail regime," Mr. Swift, the lawyer, said.

But Edward Whittingham, the executive director of the Pembina Institute, an environmental group based in Calgary, Alberta, said there was not conclusive research weighing the safety of the two shipment methods.

"The best data I've seen indicates," he said, "depending on your perspective, both are pretty much as safe as each other, or both are equally unsafe. There's safety and environmental risks inherent in either approach."

Accidents involving pipelines, Mr. Whittingham said, can be more difficult to detect and can release greater amounts of oil. Rail accidents are more frequent but generally release less oil. The intensity of the explosions and fires at Lac-Mégantic, he said, came as a "big surprise" to him and other researchers, given that the tank cars had been carrying crude oil, rather than a more volatile form like gasoline.

While Mr. Whittingham hopes that it will not be the case, he anticipates that proponents of the Keystone XL pipeline will use the rail accident to push their case with the Obama administration.

Dow Jones Reprints: This copy is for your personal, non-commercial use only. To order presentation-ready copies for distribution to your colleagues, clients or customers, use the Order Reprints tool at the bottom of any article or visit www.djreprints.com

See a sample reprint in PDF format. Order a reprint of this article now

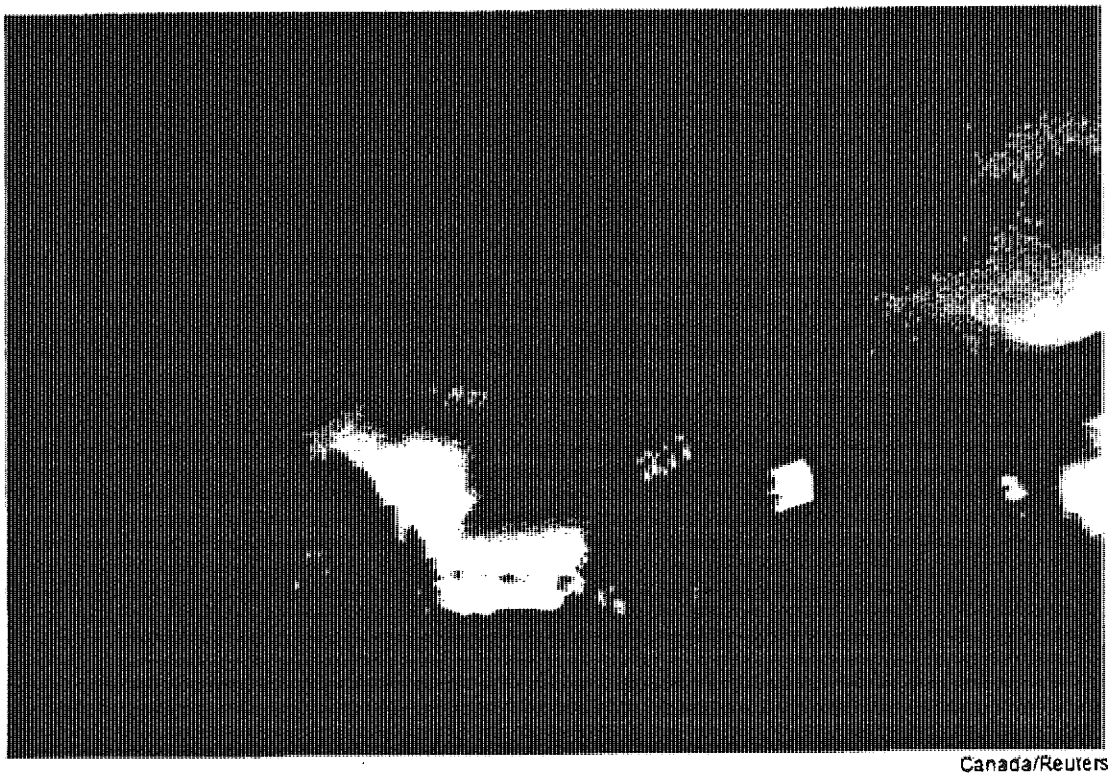
THE WALL STREET JOURNAL.
WSJ.com

CANADA NEWS | Updated July 7, 2013, 9:18 p.m. ET

Deadly Train Derailment Fuels Crude-by-Rail Concerns

Explosion of Runaway Train in Quebec Threatens to Ratchet Up Scrutiny of Shipments Amid Increased Oil Production

By CHESTER DAWSON and TOM FOWLER



Canada/Reuters

Fire rages shortly after a runaway train carrying crude exploded this weekend in Lac Megantic, Quebec, in this photo snapped Saturday by a resident. The accident follows a sharp jump in crude shipments by rail.

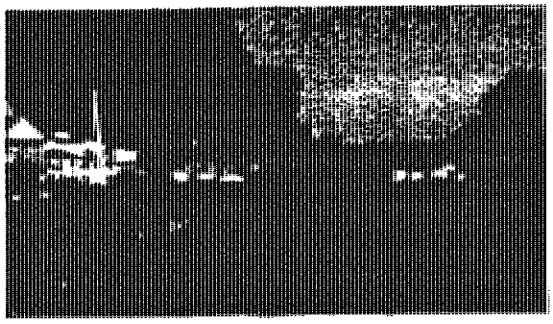
The deadly weekend explosion of a runaway crude-carrying train in Quebec threatens to ratchet up scrutiny of rising crude-by-rail shipments on both sides of the U.S.-Canada border, amid a boom in North American oil production.

Fire, Destruction in Derailment

In both countries, shipments of crude by rail have shot up sharply, as producers race to get all their new oil to market and as pipeline companies scramble to build new lines or

Christinne Muschi/Reuters

A firefighter worked Sunday where a train derailed and exploded a day earlier in Lac Megantic, Quebec, killing at least five people. Dozens are still missing.



WSJ's Carolyn King reports from the scene of the train derailment that caused a massive explosion in Lac Megantic, Quebec. Video: David George-Cosh via #WorldStream.

reconfigure old ones to handle the growing volumes. Meanwhile, uncertainty over several big pipeline projects—including approval delays for TransCanada Corp.'s Keystone XL, which would connect Western Canada's booming oil sands development to the Gulf Coast—have sent some oil companies looking to rail as a longer-term solution.

Canadian authorities have confirmed five deaths and estimate some 40 people are still missing after a runaway train carrying crude derailed early Saturday and exploded, demolishing a large swath of Lac Megantic, Quebec, including as many as 30 incinerated buildings. Investigators, citing the high death toll, have opened a criminal investigation. Canadian regulators have said they are concentrating their probe initially on the train, its braking system and the track.

In the U.S., shipments of crude by rail have gone from 9,500 carloads in 2008, the year widely seen as the beginning of the current oil boom, to 233,811 carloads in 2012, according to the Association of American Railroads. A carload is typically about 740 barrels.

About 16.6 million barrels of Canadian crude were shipped by rail to the U.S. in 2012, accounting for about 2% of Canadian crude exports, according to data from Canada's National Energy Board. But industry estimates say that could grow to as much as 73 million barrels in 2013 and nearly 110 million barrels by 2014.

Associated Press

Along with five deaths and an estimated 40 missing, authorities say this weekend's Quebec rail explosion incinerated as many as 30 buildings.

Canada, in particular, has been hit by a recent spate of high-profile accidents involving trains—several, but not all, of which have been carrying petroleum. Last month, a Canadian Pacific Railway Ltd. freight train carrying petroleum diluent derailed on a failing rail bridge amid record flooding in Calgary, Alberta.

That accident was the fifth derailment of a CP train in three months. The city's mayor publicly questioned whether the company, which is responsible for its own track and

bridge inspections, put profits ahead of safety. CP officials denied cutting corners on inspections and said the derailments aren't connected to any underlying trend.

But the accident early Saturday is on a whole different scale. The train's operator, Montreal Maine & Atlantic Railway Inc., a unit of privately held U.S. railroad operator Rail World Inc., said the runaway train was loaded with 72 carloads of crude bound from North Dakota to a refinery in New Brunswick.

Related Articles

40 Still Missing at Blast Site

Investigators Probe Quebec Rail Disaster

In Quebec, a Night Out Turns Into Nightmare

Authorities Can't Rule Out Foul Play in Quebec Town Train Blast 7/6/2013

It had been stopped during a crew rest outside town. The company said it inexplicably started to roll, unmanned, about 7 miles until derailing in Lac Megantic. The town has a population of about 6,000 and is some 22 miles from the U.S. border with Maine.

In a statement late Sunday, MM&A said an engineer inspected the train and ensured one of its locomotives was running and that its air brake was engaged. It said subsequent to that inspection, the locomotive was shut down, which may have released the brake. It didn't provide details but said it was cooperating with investigators.

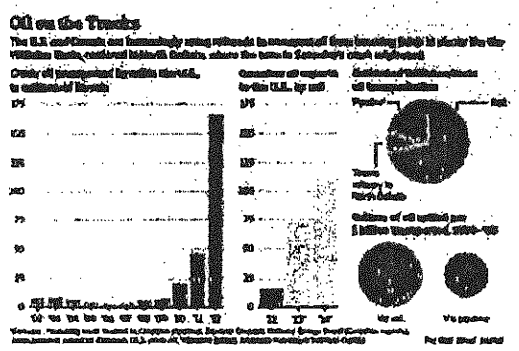
Rail accidents, particular large derailments involving fatalities and spills, are relatively rare. The North American rail industry's safety record has improved in recent decades.

But the number of incidents involving crude shipments has surged along with growth in North American oil production. Industry executives say the number of spills is still tiny compared with the amount of crude shipped.

"In the past decade, 95% of rail incidents involving crude oil were...nonaccident releases, and 70% of those incidents involved spills of less than 5 gallons," said Holly Arthur, a spokeswoman for the Association of American Railroads. The Railway Association of Canada said 99.9977% of all products shipped on the country's railroads arrive safely.

Most recent rail accidents involving crude have been small—such as the three gallons of oil that spilled from three derailed tanker cars in central Maine on their way to the same refinery in New Brunswick in March. But others, like the latest accident and a 357-barrel spill in Minnesota involving another CP train on its way to Chicago, have been more significant.

Crude shipments first started to make a noticeable difference to BNSF Railway Co., one big crude shipper, in 2008. At the time, it moved about 1.3 million barrels. In 2012 BNSF moved about 90 million barrels.



tktk

In Canada, CP hauled 53,500 carloads of crude last year, up from 13,000 in 2012 and just 500 in 2009. Meanwhile, Montreal-based Canadian National Railway Co. expects to double last year's 30,000 crude oil carloads this year.

Traditionally, railroads are less attractive to oil companies because of higher shipping costs compared with pipelines. But the rapid development of new oil fields, from West Canada through North Dakota and into West Texas in the past five years, has production outpacing pipeline construction, leading many producers and refiners to turn to rail, initially as a temporary fix.

But once seen as a temporary solution until new, permanent pipelines could be built, rail usage has proved to be so effective that many refiners have come to prefer the railroad.

Even though pipelines are generally less expensive and less prone to leaks and spills, rail offers refiners the ability to bring in crude from different locations at different prices, instead of being stuck with a single source of oil.

In fact, at least two pipeline projects—one to transport crude from North Dakota's Bakken shale to a storage hub in Oklahoma, and one to move West Texas oil to California—have been interrupted due to lack of interest from refiners already accessing rail shipments.

In Maine, crude has increasingly been shipped from Canada and the U.S. Midwest to an Irving Oil Ltd. refinery in Saint John, New Brunswick, raising worry there. Maine has seen crude by rail shipments soar in the past two years from 14,300 barrels in January 2012 to 1.1 million barrels in December, most of it from Canada.

The crude involved in this weekend's derailment and explosion in Lac Megantic was scheduled to traverse Maine on its way to the Irving Oil refinery.

The increased Canadian crude traffic has Maine spill-response officials working with railroads to find locations to stage spill cleanup equipment, and has led environmental groups to organize protests and lobby state lawmakers for restrictions.

Last month, six people were arrested in Fairfield, Maine, when they tried to block a train carrying crude bound from Canada to Saint John.

—Caroline Van Hasselt, Ángel González and Benjamin Lefebvre contributed to this article.

Write to Chester Dawson at chester.dawson@wsj.com and Tom Fowler at tom.fowler@wsj.com

A version of this article appeared July 7, 2013, on page A1 in the U.S. edition of The

NATURAL RESOURCES DEFENSE COUNCIL

July 9, 2013

Via Fax to
City of Benicia Community Development Department
Attn: Amy Million
250 East L Street
Benicia, CA 94510
Fax: (707) 747-1637

Re: Notice of Intent to Adopt a Mitigated Negative Declaration for the Valero Crude by Rail Project

Dear Ms. Million:

Please find the attached supplement to NRDC's comments on the Notice of Intent to Adopt a Mitigated Negative Declaration for the Valero Crude by Rail Project. On July 7, 2013, a rail car carrying oil derailed and exploded in Quebec, Canada, killing at least thirteen people. This tragic event underscores the need for an evaluation of rail car accidents and spills in conjunction with the City of Benicia's approval of this project. At present, the Initial Study/Mitigated Negative Declaration completely fails to consider or mitigate the potential for these types of accidents. The potential for rail accidents and spills must be evaluated and mitigated before this project may lawfully proceed.

Sincerely,

Diane Bailey, Senior Scientist
dbailey@nrdc.org
415-875-6127

Elizabeth Forsyth, Attorney
eforsyth@nrdc.org
415-875-6162

The New York Times

July 8, 2013

Dangerous Conditions Impede Inquiry Into Quebec Crash

By IAN AUSTEN

OTTAWA — The Quebec town where runaway railroad tank cars filled with oil derailed and exploded over the weekend still did not know the full extent of the devastation on Monday as dangerous conditions limited the movements of investigators.

The provincial police said they had found eight more bodies in the town, Lac-Mégantic, on Monday, raising the death toll to 13 from the "ghost train" accident, as it has become known, which occurred early Saturday morning. The police also increased the estimate of the missing people, who are presumed to be dead, to 50.

While fires that raged for much of the weekend were largely under control by Monday, Sgt. Benoît Richard of the provincial police, known as Sûreté du Québec, said much of the site remained so dangerous that officers were able to enter only when accompanied by firefighters.

The accident's destructiveness also impeded efforts to recover bodies and investigate the cause of the crash. Aerial photos of the popular vacation town showed that much of its downtown had been reduced to little more than ash. Le Musi-Café, a bar near the rail line that was filled with patrons at the time of the derailment, had vanished under a pile of burned and crushed tank cars.

Forensic anthropologists were traveling to the town to assist with the recovery of remains, and the police were asking relatives for razors, hairbrushes and other items belonging to the missing that might provide DNA for identification.

Mr. Burkhardt said their action had meant that the train's brake system gradually lost air pressure, "and an hour or so after the locomotive was shut down, the train rolled away." He also faulted the Fire Department for not waking up the engineer, who was staying overnight at a hotel in Lac-Mégantic, and taking him to the scene.

Earlier, Mr. Burkhardt, who did not respond to several requests for comment, said the train had been properly secured. Further confusing his account is the fact that since the 19th century, railways in North America have used an air-braking system that applies, rather than releases, freight car brakes as a safety measure when it loses pressure.

The New York Times

July 7, 2013

Deadly Derailment in Quebec Underlines Oil Debate

By IAN AUSTEN

OTTAWA — The police said on Sunday that at least five people had died and 40 were missing after runaway railroad tank cars filled with oil derailed and exploded in a small Quebec town.

"We know there will be more deaths," Lt. Michel Brunet of Quebec's provincial police told reporters in Lac-Mégantic, where the fires continued to burn on Sunday.

The derailment and explosions, which took place around 1:15 a.m. on Saturday, underscored a debate in the effort to transport North America's oil across long distances: is it safer and less environmentally destructive to move huge quantities of crude oil by train or by pipeline?

Visiting the town on Sunday, Prime Minister Stephen Harper compared it to a "war zone."

The fires, which incinerated at least 30 buildings in the core of Lac-Mégantic, a tourist town of 6,000 people about 150 miles east of Montreal, limited the work of accident investigators, as well as attempts to search for survivors and the remains of victims.

In a statement, the Montreal, Maine and Atlantic Railway said the train had been parked outside Lac-Mégantic for the night with no crew members on board. Its locomotive had been shut down, "which may have resulted in the release of air brakes on the locomotive that was holding the train in place," the statement said.

A 2009 report by the National Transportation Safety Board about a Canadian National derailment in Illinois called the design of those tank cars "inadequate" and found that it "made the cars subject to damage and catastrophic loss of hazardous materials." Television images suggested that the surviving tank cars on the Lac-Mégantic train were of the older design.

Mr. Hallman, the spokesman for Canadian National, did not respond to questions about the safety of tank cars or the consequences of the Lac-Mégantic derailment for rail oil shipments in general. However, he said, "this tragedy notwithstanding, movement of hazardous material by rail not only can be, but is being, handled safely in the vast majority of instances." Ed Greenberg, a spokesman for Canadian Pacific, declined to comment.

The comparative safety of railways over pipelines has been the subject of much debate. Speaking in New York in May, Mr. Harper emphasized that the rejection of the Keystone XL pipeline would lead to an increase in oil sands shipments by rail, which he called "more environmentally challenging" than pipelines.

"We have seen some major safety risks associated with the crude-by-rail regime," Mr. Swift, the lawyer, said.

But Edward Whittingham, the executive director of the Pembina Institute, an environmental group based in Calgary, Alberta, said there was not conclusive research weighing the safety of the two shipment methods.

"The best data I've seen indicates," he said, "depending on your perspective, both are pretty much as safe as each other, or both are equally unsafe. There's safety and environmental risks inherent in either approach."

Accidents involving pipelines, Mr. Whittingham said, can be more difficult to detect and can release greater amounts of oil. Rail accidents are more frequent but generally release less oil. The intensity of the explosions and fires at Lac-Mégantic, he said, came as a "big surprise" to him and other researchers, given that the tank cars had been carrying crude oil, rather than a more volatile form like gasoline.

Dow Jones Reprints: This copy is for your personal, non-commercial use only. To order presentation-ready copies for distribution to your colleagues, clients or customers, use the Order Reprints tool at the bottom of any article or visit www.djreprints.com

See a sample reprint in PDF format. Order a reprint of this article now

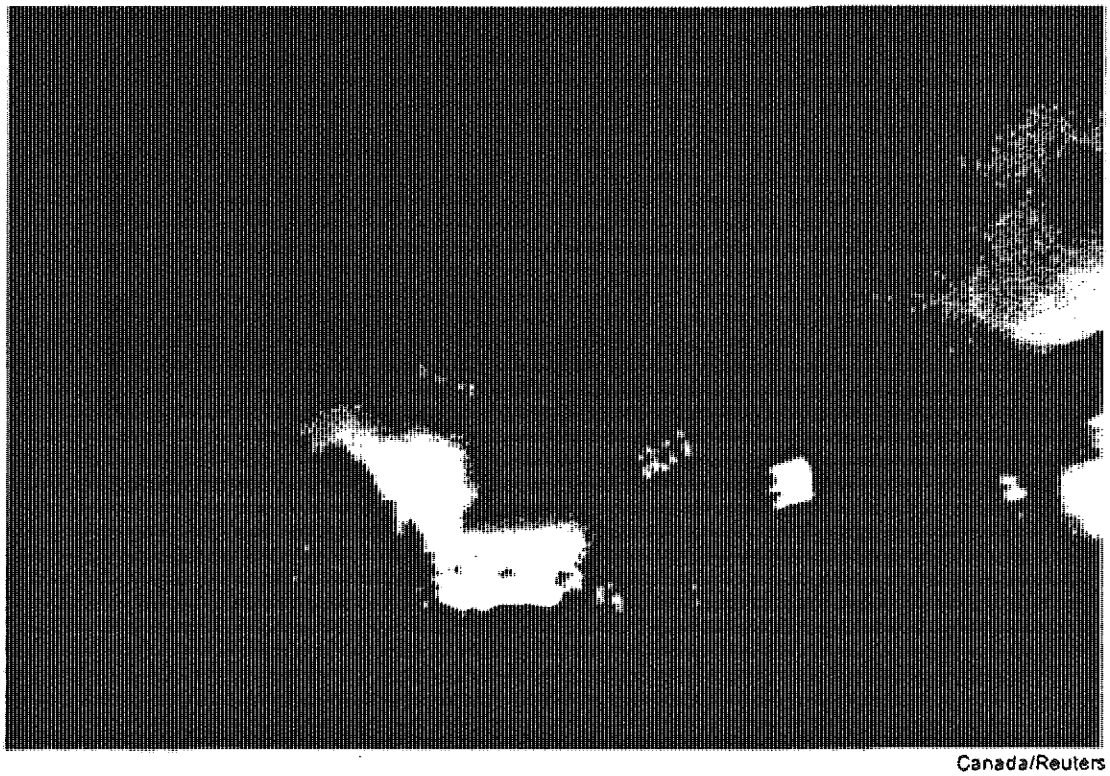
THE WALL STREET JOURNAL.
WSJ.com

CANADA NEWS | Updated July 7, 2013, 9:18 p.m. ET

Deadly Train Derailment Fuels Crude-by-Rail Concerns

Explosion of Runaway Train in Quebec Threatens to Ratchet Up Scrutiny of Shipments Amid Increased Oil Production

By CHESTER DAWSON and TOM FOWLER



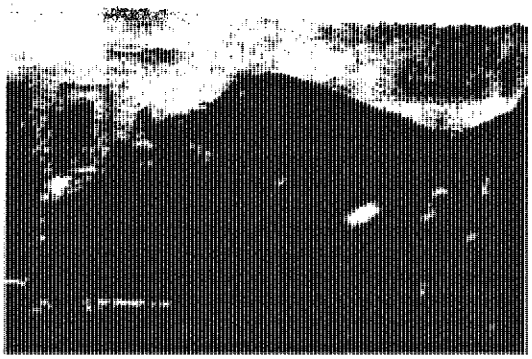
Canada/Reuters

Fire rages shortly after a runaway train carrying crude exploded this weekend in Lac Megantic, Quebec, in this photo snapped Saturday by a resident. The accident follows a sharp jump in crude shipments by rail.

The deadly weekend explosion of a runaway crude-carrying train in Quebec threatens to ratchet up scrutiny of rising crude-by-rail shipments on both sides of the U.S.-Canada border, amid a boom in North American oil production.

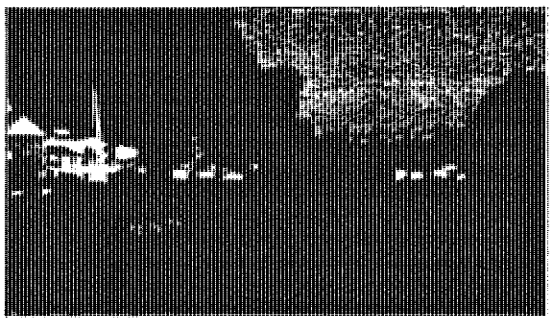
Fire, Destruction in Derailment

In both countries, shipments of crude by rail have shot up sharply, as producers race to get all their new oil to market and as pipeline companies scramble to build new lines or



Christinne Muschi/Reuters

A firefighter worked Sunday where a train derailed and exploded a day earlier in Lac Megantic, Quebec, killing at least five people. Dozens are still missing.



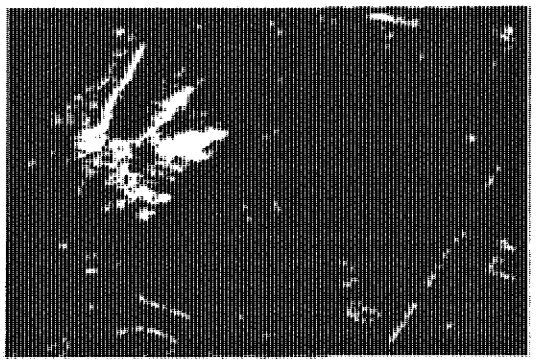
WSJ's Carolyn King reports from the scene of the train derailment that caused a massive explosion in Lac Megantic, Quebec. Video: David George-Cosh via #WorldStream.

reconfigure old ones to handle the growing volumes. Meanwhile, uncertainty over several big pipeline projects—including approval delays for TransCanada Corp.'s Keystone XL, which would connect Western Canada's booming oil sands development to the Gulf Coast—have sent some oil companies looking to rail as a longer-term solution.

Canadian authorities have confirmed five deaths and estimate some 40 people are still missing after a runaway train carrying crude derailed early Saturday and exploded, demolishing a large swath of Lac Megantic, Quebec, including as many as 30 incinerated buildings. Investigators, citing the high death toll, have opened a criminal investigation. Canadian regulators have said they are concentrating their probe initially on the train, its braking system and the track.

In the U.S., shipments of crude by rail have gone from 9,500 carloads in 2008, the year widely seen as the beginning of the current oil boom, to 233,811 carloads in 2012, according to the Association of American Railroads. A carload is typically about 740 barrels.

About 16.6 million barrels of Canadian crude were shipped by rail to the U.S. in 2012, accounting for about 2% of Canadian crude exports, according to data from Canada's National Energy Board. But industry estimates say that could grow to as much as 73 million barrels in 2013 and nearly 110 million barrels by 2014.



Associated Press

Along with five deaths and an estimated 40 missing, authorities say this weekend's Quebec rail explosion incinerated as many as 30 buildings.

Canada, in particular, has been hit by a recent spate of high-profile accidents involving trains—several, but not all, of which have been carrying petroleum. Last month, a Canadian Pacific Railway Ltd. freight train carrying petroleum diluent derailed on a failing rail bridge amid record flooding in Calgary, Alberta.

That accident was the fifth derailment of a CP train in three months. The city's mayor publicly questioned whether the company, which is responsible for its own track and

bridge inspections, put profits ahead of safety. CP officials denied cutting corners on inspections and said the derailments aren't connected to any underlying trend.

But the accident early Saturday is on a whole different scale. The train's operator, Montreal Maine & Atlantic Railway Inc., a unit of privately held U.S. railroad operator Rail World Inc., said the runaway train was loaded with 72 carloads of crude bound from North Dakota to a refinery in New Brunswick.

Related Articles

- 40 Still Missing at Blast Site
- Investigators Probe Quebec Rail Disaster
- In Quebec, a Night Out Turns Into Nightmare
- Authorities Can't Rule Out Foul Play in Quebec Town Train Blast 7/6/2013

It had been stopped during a crew rest outside town. The company said it inexplicably started to roll, unmanned, about 7 miles until derailing in Lac Megantic. The town has a population of about 6,000 and is some 22 miles from the U.S. border with Maine.

In a statement late Sunday, MM&A said an engineer inspected the train and ensured one of its locomotives was running and that its air brake was engaged. It said subsequent to that inspection, the locomotive was shut down, which may have released the brake. It didn't provide details but said it was cooperating with investigators.

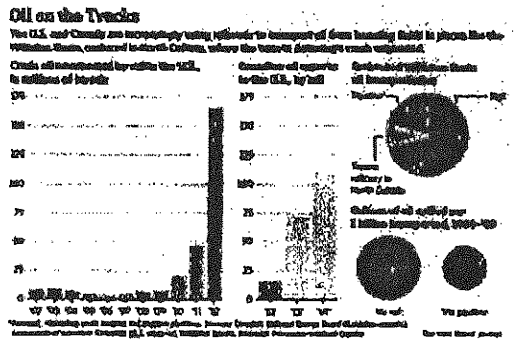
Rail accidents, particular large derailments involving fatalities and spills, are relatively rare. The North American rail industry's safety record has improved in recent decades.

But the number of incidents involving crude shipments has surged along with growth in North American oil production. Industry executives say the number of spills is still tiny compared with the amount of crude shipped.

"In the past decade, 95% of rail incidents involving crude oil were...nonaccident releases, and 70% of those incidents involved spills of less than 5 gallons," said Holly Arthur, a spokeswoman for the Association of American Railroads. The Railway Association of Canada said 99.9977% of all products shipped on the country's railroads arrive safely.

Most recent rail accidents involving crude have been small—such as the three gallons of oil that spilled from three derailed tanker cars in central Maine on their way to the same refinery in New Brunswick in March. But others, like the latest accident and a 357-barrel spill in Minnesota involving another CP train on its way to Chicago, have been more significant.

Crude shipments first started to make a noticeable difference to BNSF Railway Co., one big crude shipper, in 2008. At the time, it moved about 1.3 million barrels. In 2012 BNSF moved about 90 million barrels.



tktk

In Canada, CP hauled 53,500 carloads of crude last year, up from 13,000 in 2012 and just 500 in 2009. Meanwhile, Montreal-based Canadian National Railway Co. expects to double last year's 30,000 crude oil carloads this year.

Traditionally, railroads are less attractive to oil companies because of higher shipping costs compared with pipelines. But the rapid development of new oil fields, from West Canada through North Dakota and into West Texas in the past five years, has production outpacing pipeline construction, leading many producers and refiners to turn to rail, initially as a temporary fix.

But once seen as a temporary solution until new, permanent pipelines could be built, rail usage has proved to be so effective that many refiners have come to prefer the railroad.

Even though pipelines are generally less expensive and less prone to leaks and spills, rail offers refiners the ability to bring in crude from different locations at different prices, instead of being stuck with a single source of oil.

In fact, at least two pipeline projects—one to transport crude from North Dakota's Bakken shale to a storage hub in Oklahoma, and one to move West Texas oil to California—have been interrupted due to lack of interest from refiners already accessing rail shipments.

In Maine, crude has increasingly been shipped from Canada and the U.S. Midwest to an Irving Oil Ltd. refinery in Saint John, New Brunswick, raising worry there. Maine has seen crude by rail shipments soar in the past two years from 14,300 barrels in January 2012 to 1.1 million barrels in December, most of it from Canada.

The crude involved in this weekend's derailment and explosion in Lac Megantic was scheduled to traverse Maine on its way to the Irving Oil refinery.

The increased Canadian crude traffic has Maine spill-response officials working with railroads to find locations to stage spill cleanup equipment, and has led environmental groups to organize protests and lobby state lawmakers for restrictions.

Last month, six people were arrested in Fairfield, Maine, when they tried to block a train carrying crude bound from Canada to Saint John.

—Caroline Van Hasselt, Ángel González and Benjamin Lefebvre contributed to this article.

Write to Chester Dawson at chester.dawson@wsj.com and Tom Fowler at tom.fowler@wsj.com

A version of this article appeared July 7, 2013, on page A1 in the U.S. edition of The

RECEIVED
JUL 10 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 10 , 2013

To:

Planning Commission: George Oakes, Sr.; Belinda Smith; Susan Cohen Grossman; Rod Sherry; Suzanne Sprague; Don Dean; Steve Young

Principal Planner, City of Benicia: Amy Million

In light of recent events, the Valero project to receive crude oil by rail through Benicia deserves close attention. The Mitigated Negative Declaration being considered is not rigorous nor detailed enough to allow this project to proceed without further scrutiny.

I have read the project application and the Mitigated Negative Declaration on the city's website. Valero states that there will be no substantive change in the type of oil brought to the Benicia refinery by rail compared to what is delivered by marine tanker, and therefore no change in emissions or environmental impacts. Despite these reassurances, questions have arisen in the community and beyond about whether this is actually the case.

Valero's Project Description states (section 1.3, Objectives and Benefits, and repeated in the city's Valero Crude by Rail Project Initial Study Project Description Overview): "The primary purpose of the Project is to allow Valero access to more North American sourced crudes that have recently become available." (emphasis mine)

There is no information given about exactly what kind of crude or specifically where it will come from, but this statement implies that it must refer to tar sands or shale crude. This brings a host of questions about increased emissions and dangers connected with this type of crude oil, the solvents used with it, and the way it is transported. Recent disasters have shown that these concerns are not at all far-fetched.

Please require a full Environmental Impact Review so that these potential effects can be addressed and mitigated if possible. The current Mitigated Negative Declaration is not sufficient.

Nancy Steele

41 Buena Vista

Benicia

RECEIVED
JUL 11 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: Plewis <pjlewis363@gmail.com>
Date: July 10, 2013, 7:54:22 PM PDT
To: "bkilger@ci.benicia.ca.us" <bkilger@ci.benicia.ca.us>
Subject: Opposition to Valero Crude by Rail Project

Dear Mr. Kilger
Having read the IS/MND and a number of the comments regarding the Valero Crude by Rail project, I write to you again to request you not approve the project. Dr. Phyllis Fox's analysis identified the major flaw in the IS/MND, specifically its failure to address in detail the chemical composition of the crude oil that will be imported by rail as compared to what is currently being brought in by ship. Without knowing both the specific source of the crude oil and its composition, it is impossible to properly assess the health and environmental risks to the community.
Disclosure of this information by Valero would allow the following issues to be thoroughly considered:
Would the community be at risk for increased rates of cancer?
Would the risk of respiratory ailments such as asthma increase?
Would an oil spill be harder (or impossible) to clean up?
Would there be a heightened risk of a refinery fire?
Would there be a risk of a disastrous fire similar to what recently occurred in Quebec?
Would the refinery emit more noxious fumes?
What GHG emissions will result when considering the full implications of the project?
What mitigation measures might be possible to address these issues?
The current IS/MND is a masterpiece of ambiguity and misdirection in avoiding identifying what type of crude will be processed by the refinery if rail shipments are allowed.
Please disapprove the IS/MND and require a full EIR. The health and safety of the community demand it.
Rick Slizeski

Sent from my iPad

PUBLIC COMMENT, FOR THE RECORD

RECEIVED
JUL 10 2013
CITY MANAGER'S OFFICE
CITY OF BENICIA

Date:

City Manager Brad Kilger
Planning Commissioners Sherry, Oakes, Smith, Grossman, Sprague, Dean and Young
Mayor Patterson, Vice Mayor Campbell, Councilmembers Hughes, Schwartzman, Strawbridge
c/o City of Benicia
250 East L Street
Benicia, CA 94510

RE: Valero Crude-By-Rail, Benicia's Notice of Intent to Adopt a Mitigated Negative Declaration

Dear Commissioners, Council Members and Staff:

There is little if any room for consideration of the moral component(s) of this issue.

Is Valero (or any refiner) to be trusted to place on equal par, the health and safety of Benicia residents? Or does Valero's right to ~~profit~~ profit trump everything?

My Name: Richard Freeman
My Address:
Phone: 925-323-6857
Email: rfree@sonic.net

Amy Million - Fw: Crude Oil Rail Terminal to Valero in Benicia

From: Brad Kilger <bkilger@ci.benicia.ca.us>
To: Amy.Million@ci.benicia.ca.us
Date: 7/11/2013 1:05 PM
Subject: Fw: Crude Oil Rail Terminal to Valero in Benicia

RECEIVED
JUL 1 1 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Brad
Sent from my phone please excuse any typos

-----Original message-----

From: Sabina Yates <redfoxred@earthlink.net>
To: Brad Kilger <Brad.Kilger@ci.benicia.ca.us>
Cc: Rod Sherry <rsherry@csa-engineers.com>, Belinda Smith <bsmitgo@hotmail.com>, Susan Cohen Grossman <susancg@pacbell.net>, Don Dean <donaldjdean@sbcglobal.net>
Sent: Thu, Jul 11, 2013 12:57:12 MST
Subject: Re: Crude Oil Rail Terminal to Valero in Benicia

Dear Mr. Kilger and Members of the Planning Commission:

I am very concerned about the neglect of many factors which are not addressed in the current "Initial Study" and "Mitigated Negative Declaration" which will affect and impact the citizens of Benicia.

Will the tanker cars carrying the heavy sour crude be regulated to prevent release of highly volatile
and corrosive DilBits? According to recent news reports, the Canadian public has long been bothered
about the older rail tank cars carrying the Canadian tar sands – which might have been a factor in the
Lac-Megantic disaster.

Will Valero be required to monitor the affects of corrosion as they switch to refining more sour crude?
Chevron in Richmond was negligent in their diligence of pipeline oversight (as was PG&E in San Bruno)
for cost-cutting.

I would urge the Planning Commission to deny the Use Permit and to reject the Mitigated Negative
Declaration. Benicia deserves a full CEQA/IRA study.

Sincerely,

Sabina Yates
302 Bridgeview Ct.
Benicia, CA 94510-2683
(707) 746-6428
redfoxred@earthlink.net

RECEIVED
JUL 1 1 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Dear Brad Kilger and Members of the Planning Commission:

I'm writing to ask for a full Environmental Impact Report on Valero's proposed Crude by Rail Project. The California Environmental Quality Act requires that "An EIR shall be prepared if there is substantial evidence that the project may have a significant effect on the environment." I'm convinced by my talk with an Industrial Park business owner, and the evidence being presented the Natural Resources Defense Council, the Sierra Club and others, that this is clearly the case.

As a resident, homeowner and husband, I think the stakes are too high to gamble that there will be no significant impacts on property values, and more importantly, the health of our community.

Let's get all the facts before the public before any decision is made on this project.

Thanks for your work on this.

Sincerely,

Larnie Fox

larniefox@gmail.com, 415.407.4823, 420 East I Street, Benicia, CA, 94510

Amy Million - Fwd: Re: Vallero's plans to transport crude oil by train

From: Brad Kilger
To: Amy Million
Date: 7/11/2013 4:50 PM
Subject: Fwd: Re: Vallero's plans to transport crude oil by train

RECEIVED
JUL 11 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

>>> nikki davis <nikkibdavis@sbcglobal.net> 7/11/2013 4:50 PM >>>
Hello,

My concern regarding this project is that the current review process is inadequate, and that the Planning Commission should require a full Environmental Impact Report (EIR).

If Valero goes ahead with it's plans, there might be a good chance you and I will experience greater health hazards, increased pollution of air, land and water, and potentially catastrophic emergencies.

Thank you for your consideration

Nikki Basch-Davis

Amy Million - Fwd: Re: Vallero's plans to transport crude oil by train

From: Brad Kilger
To: Amy Million
Date: 7/11/2013 4:50 PM
Subject: Fwd: Re: Vallero's plans to transport crude oil by train

RECEIVED
JUL 11 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

>>> nikki davis <nikkibdavis@sbcglobal.net> 7/11/2013 4:50 PM >>>
Hello,

My concern regarding this project is that the current review process is inadequate, and that the Planning Commission should require a full Environmental Impact Report (EIR).

If Valero goes ahead with it's plans, there might be a good chance you and I will experience greater health hazards, increased pollution of air, land and water, and potentially catastrophic emergencies.

Thank you for your consideration

Nikki Basch-Davis

RECEIVED
JUL 1 1 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Questions Posed at the Community Forum Regarding Valero Crude By Rail Project

Community Forum was sponsored by the Good Neighbor Steering Committee (GNSC)

Forum was attended by more than 70 community members. Forum was held at the Community Center on July 9, 2013. When people registered they were given an index card to write down their question(s) and then their questions were read to the assembled group and answered by Marilyn Bardet from the GNSC, Brant Olson and Diane Bailey from the National Resource Defense Council (NRDC)and Mary Frances Kelly-Poh from the GNSC. The questions were transcribed by Mary Frances Kelly-Poh.

1. How does dilbit compare to Kern and Monterey Shale crudes? North Slope Crude?
2. How much hydro-treating will be added to Valero current capabilities to a fleet HDS/HDN/HDM of dilbit?
3. What is the source of gas liquid diluents? Will these be recycled to tar-sands (*words illegible*) source necessitating return shipping to fields?
4. How does this project fit with proposed Monterey Shale hydro-fracking? How much additional capacity will CA have to build?
5. How much capacity does Valero expect to have to add to be able to do this and EIRs for this project include impacts expected by expansion?
6. How are risks to the Suisun Marsh (one of the country's largest estuaries) being addressed and what organization will be the lead in this concern?
7. Will not the Bay Area Air Resources Control Board hold Valero's emissions to at least no increase regardless of what type of crude they refine?
8. What security measures may be in place against vandals and terrorists all the rail lines?
9. How was Exxon-Mobil able to do a "No Fly Zone" in Arkansas after the oil spill? How is this possible?
10. Does this rail have anything to do with the Pacific Trade Pact with East Asia?
11. Does the port reconstruction occurring in Vallejo have any connection to Valero brining crude by rail to Benicia?
12. Can you please give us an idea of what influence the Benicia Commission will have? Can they completely reject this plan?
13. Is this just a softball solution? In other words are we really in danger of this plan going thru? Are we going to accept Valero at their word that all safety questions will be answered?
14. RE: ESA Are they an independent and reliable CEQA reporting group or are they a gas and oil mouthpiece?
15. UP says they have spent billions to improve tracks, etc. How much in California and West Coast?
16. If and when fracking happens in a significant way in the Monterey Shale, will this crude oil be refined at Valero and Chevron?

17. A story in Sunday's Wall Street Journal indicated crude by rail is more dangerous than marine or pipelines. Why would the planning staff recommend a Neg Dec?
18. What will happen to neighboring cities like Martinez and will these effects be addressed prior to decision making?
19. If there is a spill, what would happen to our property values?
20. Can you say more about the projected jobs created by this project, including temporary/permanent and types of occupations?
21. What about Murphy's Law—if it can happen, it will? IE Fire 15 dead Bracken spill in Quebec-now ETC?
22. What is the status of the GNSC Air Monitoring Station?
23. Where are the coke storage piles?
24. What is hazardous about petroleum coke?
25. Will the total allowable emissions of the refinery be increased in local or state or fed law because of this project?
26. Is the $40 discount on WCS crude before or after dilution?
27. What is the environmental risk of ship transport versus rail of crude oil?
28. What happened to property values in Mayflower Kansas after spill?
29. "Higher Risk of Accidents" please quantify emergency plans for dealing with spills. What are they?
30. Dust can be trapped. Can contracts enforce the use of appropriate traps?
31. Are there means to trap the lighter-lightest fraction that can be written into the permit contracts for Valero?.....speaking of limits here, of course.
32. I know that there are some very corrosion- resistant alloys developed for the more difficult crudes, can the use and maintenance of these alloys in equipment for heavy crudes (high S, etc) in all portions of and mixes of T.S. crudes processed?
33. Some of the population has a Ni specific allergy, just as 1 in 50 has a Be specific allergy and the reactions are serious.
34. It is unclear to me how far this has progressed? Wherever they are with- I am hearing you want to provoke and EIR-to what end? To slow it down? Prevent it? Force mitigations?
35. Have the citizens of Benicia considered reaching out to other similar communities and building a network of mutual aid and solidarity to address potential threats like this one? It seems that there is strength in numbers?
36. How does the NRDC become involved in particular environmental issues (in particular Benicia)?

Gina Eleccion - Dirty Crude by Train to Solano County

RECEIVED
JUL 11 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

From: Kim White <kelpietriton@gmail.com>
To: <bkilger@ci.benicia.ca.us>, <comdev@ci.benicia.ca.us>
Date: 7/11/2013 9:46 AM
Subject: Dirty Crude by Train to Solano County
Attachments: images.jpeg; Quebec-Canada-Oil-Train-Derailment.jpg

Dear Mr. Kilger, et al.,

Thousands of Vallejoans protected the region by fighting against the threat of a Liquefied Natural Gas Plant some years ago. We request that you do the same against this threat of tars sands heavy crude being brought into Benicia by rail. We do not want the increased danger or pollution so a few people at the top of the pyramid can make huge amounts of money.

We either get off fossil fuels or face mass extinction. Our task is to transform the carbon economy into something livable.

Attached are pictures of the recent crude oil train derailment in Canada.

Thank you for your assistance in this matter.

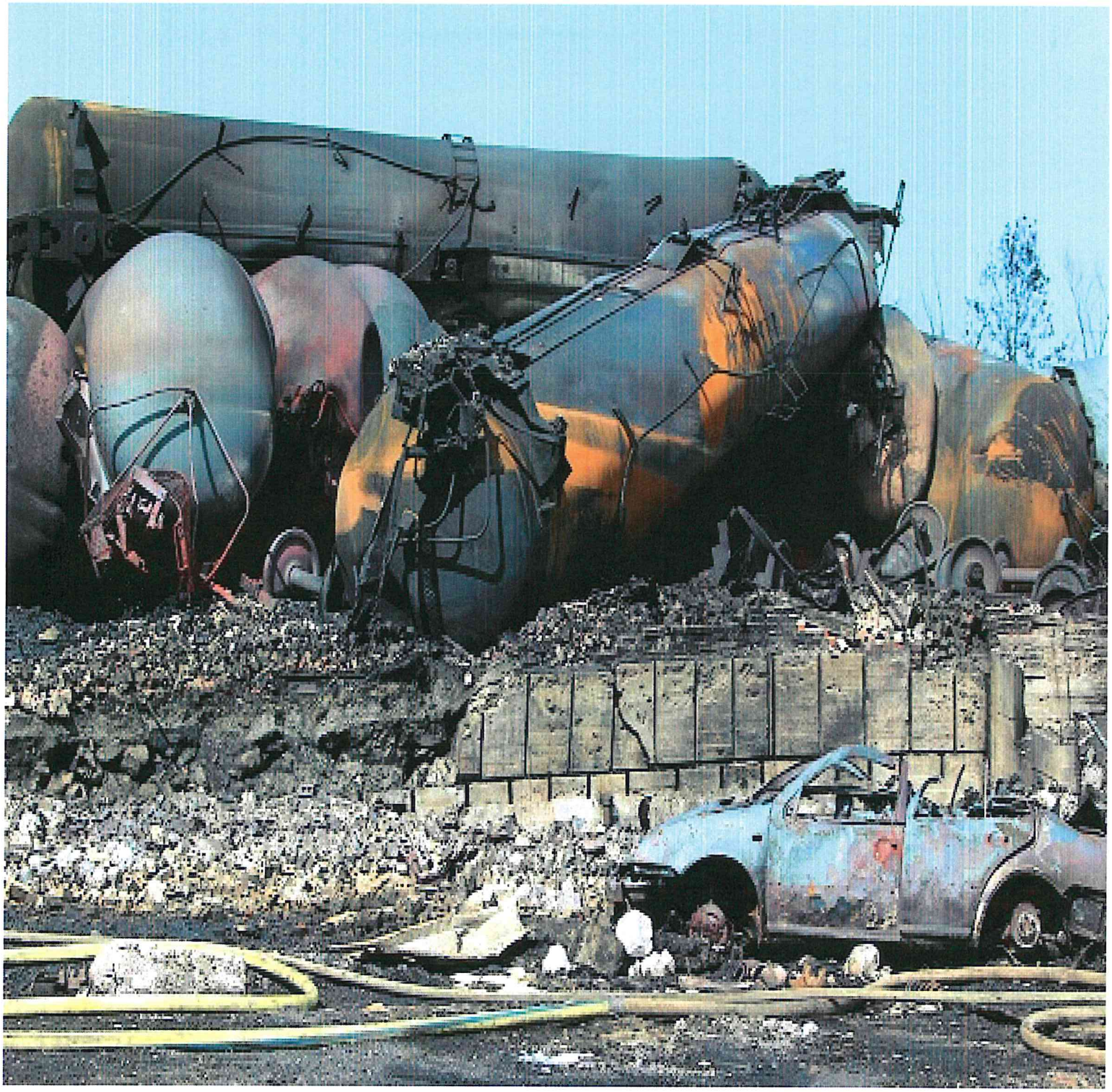
Kim White

57 Ventura St.

Vallejo, CA

JUL 1 1 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

RECEIVED
JUL 1 1 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT



Kathy Kerridge
771 West I Street
Benicia, CA 94510

RECEIVED
JUL 11 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 11, 2013

Dear Planning Commissioners:

I would like to add additional comments and questions to my last comment.

1. In light of the recent train disaster in Canada I want much more information about how these trains will be staffed, what kind of rail cars are they, are they the safest possible? What kind of failsafe plans will be in effect to prevent a runaway train? What are the safety plans in effect now, not ones to be developed in the future? What would happen if there was a derailment in the industrial park near an oil tank?

2. Our general plan puts sustainability first. It specifically states on p. 22 "what is done at the project or local level can affect all levels of the environment, including the local community, neighboring regions, the country, and the world." This means to me that we must take a large view of this project. If tar sands are imported doesn't that directly go against providing for a more sustainable future? There are tremendous greenhouse gas emissions from the tar sands. We live in a community susceptible to sea level rise. Are we slitting our own throats if these are brought in? Can a mitigation of this project be no diluted bitumen, no tar sands allowed?

3. The general plan takes a long term economic view. If Valero refines tar sands oil with its higher pollution, its stronger odors, its greater risk of accident, with the increased production of coke and its increased and dangerous particulate matter will other businesses want to locate in our industrial park? I know that if I was a business I would not want to be near a refinery that smells and pollutes the air. The current refinery operations are pretty good about smells. I seldom am aware of smells from the refinery, but one of the consequences of tar sands refining is increased odor. Will we lose businesses in the industrial park if this happens? What will be the consequences over the next 10 years, 30 years, and 50 years?

4. How does the potential importation of tar sands crude impact AB 32 and the low carbon fuel standards? How can we strive for lower emissions if we encourage the development of the dirtiest fuels? Will these meet the AB 32 standards that need to be met in 2020? We are an impacted community and how will be able to meet our greenhouse gas reduction standards if the refinery doesn't? What mitigation measures could help Benicia with meeting the standards?

5. Once tar sands oil is being refined will it be too late to worry about the increased air pollution and the release of toxic substances?

6. If tar sands are imported how will we know? What will happen when the VIP is fully implemented? Will the crude mix change? Will Valero tell us if it changes its sources after the project is approved? Would we have any say in it at that time? Would an EIR have to be then or does it need to be done now to address this threat?

7. What kind of air monitoring will tell us if there is a change in emissions? There is no fence line monitoring in place now. If there is an accident how will we know what we are being exposed to? How will we know if we need to shelter in place or evacuate?

These questions all need to be addressed. The appropriate place is in an EIR. An EIR needs to be done on this project.

Sincerely,

Kathy Kerridge

Amy Million - Additional info request

From: escazuyoungs <escazuyoungs@gmail.com>
To: <Amy.Million@ci.benicia.ca.us>
Date: 7/11/2013 11:33 PM
Subject: Additional info request

RECEIVED
JUL 12 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Please ask Mr. Morgan to have fehr and peers send a copy of study they did on train crossings at affected intersection, (Park and bayshore?) including number, time of day, length of time for each crossing, and average for all train crossings

Thanks

Steve young

Sent from Samsung tablet

Amy Million - Another question

From: escazuyoungs <escazuyoungs@gmail.com>
To: <Amy.Million@ci.benicia.ca.us>
Date: 7/12/2013 9:07 PM
Subject: Another question

RECEIVED
JUL 13 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

I did not include as one of my questions the following

Can you have someone from the city look at the question of what exactly UP is doing on their current project at Valero?

One of the speakers said they were installing new rail lines, while Mario said they were doing maintenance.

And are they exempt under the interstate commerce law referenced at the meeting that the city is not informed or has no permitting authority over their activities?

I know you will copy the rest of the commission, but would you like me to copy them on my request also?

I would be happy to work through the city manager on this or other questions if you prefer.

I know you have had an inordinate amount of work dumped on you with this project.

Thanks

Steve young

Sent from Samsung tablet

Amy Million - Valero Project and CEQA law

From: "Steve & Marty Young" <escazuyoungs@gmail.com>
To: <katwellman@gmail.com>, Amy Million <Amy.Million@ci.benicia.ca.us>
Date: 7/22/2013 11:18 AM
Subject: Valero Project and CEQA law

I have been reviewing lots of information on this project including CEQA law and guidelines and have a question

I assume it is OK to transmit this email to the rest of the commission?

and that you would be responding to all of us as well?

RECEIVED
JUL 22 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Among the critical points the Commission must determine in this project is :

1) whether or not the project will have a significant effect on the environment;

2) whether the EIS/Mitigated Negative Declaration adequately analyzed the environmental impacts of the project; and

3)whether proposed mitigating factors are sufficient to reduce potentially significant impacts to less than significant impacts.

My question below is based on my review of the CEQA guidelines issued by the State of California and copied below, but I am not a lawyer and would appreciate your response

http://ceres.ca.gov/ceqa/docs/Adopted_and_Transmitted_Text_of_SB97_CEQA_Guidelines_Amendments.pdf

The relevant section is:

"section 15064(f) The decision as to whether a project may have one or more significant effects shall be based on substantial evidence in the record of the lead agency.

(1) If the lead agency determines there is substantial evidence in the record that the project may have a significant effect on the environment, the lead agency shall prepare an EIR (Friends of B Streetv.City of Hayward(1980) 106 Cal. App. 3d 988). Said another way, if a lead agency is presented with a fair argument that a project may have a significant effect on the environment, the lead agency shall prepare an EIR even though it may also be presented with other substantial evidence that the project will not have a significant effect (No Oil, Inc.v.City of Los Angeles(1974) 13 Cal. 3d 68).

(2) If the lead agency determines there is substantial evidence in the record that the project may have a significant effect on the environment but the lead agency determines that revisions in the project plans or proposals made by, or agreed to by, the applicant would avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment would occur and there is no substantial evidence in light of the whole record before the public agency that the project, as revised, may have a significant effect on the environment then a mitigated negative declaration shall be prepared.

(3) If the lead agency determines there is no substantial evidence that the project may have a significant effect on the environment, the lead agency shall prepare a negative declaration (Friends of B Streetv.City of Hayward(1980) 106 Cal. App. 3d 988).

(4) The existence of public controversy over the environment effects of a project will not require preparation of an EIR if there is no substantial evidence before the agency that the project may have a significant effect on the environment.

(5) Argument, speculation, unsubstantiated opinion or narrative, or evidence that is clearly inaccurate or erroneous, or evidence that is not credible, shall not constitute substantial evidence. Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts.

(6) Evidence of economic and social impacts that do not contribute to or are not caused by physical changes in the environment is not substantial evidence that the project may have a significant effect on the environment.

3

X page3image20496.png

(7) The provisions of sections 15162, 15163, and 15164 apply when the project being analyzed is a change to, or further approval for, a project for which an EIR or negative declaration was previously certified or adopted (e.g. a tentative subdivision, conditional use permit). Under case law, the fair argument standard does not apply to determinations of significance pursuant to sections 15162, 15163, and 15164."

According to CEQA law (S.21068.2 (a)) that determination (of potential significant impact) must be based on "substantial evidence in light of the whole record." Subsection c of the same chapter defines substantial evidence as "facts, reasonable assumptions predicated on facts, and expert opinion supported by facts."

SubSection D of that section says that "if there is substantial evidence, in light of the whole record before the lead agency, that a project may have a significant effect on the environment, an environmental impact report shall be prepared."

Appendix G to the CEQA guidelines (Environmental Checklist Form) http://ceres.ca.gov/ceqa/guidelines/pdf/appendix_g-3.pdf outlines the conditions under which the Agency must review projects

There are two sections of the guidelines under "Evaluation of Environmental Impacts" that may be instructive.

"2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project level, indirect as well as direct, and construction as well as operational impacts.

3). Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant . Potentially significant impact is appropriate if there is substantial evidence an effect may be significant. If there is one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required."

Question

if the Commission finds that the mitigation measures proposed for any potentially significant impact (e.g. transportation and traffic, air quality) are not adequate, based on substantial evidence, must we find that an EIR is required?

MARILYN J. BARDET
333 East K Street, Benicia CA 94510
707-745-9094 mjbardet@comcast.net

July 11th, 2013

City Manager Brad Kilger, and staff, Amy Million,
Planning Commissioners: Chair Sherry, Oakes, Smith, Grossman, Spraque, Dean and Young
Mayor Patterson, Vice Mayor Campbell & Councilmembers Hughs, Schwartzman & Strawbridge
City of Benicia, 250 East L Street, Benicia CA 94510

SUBJECT: Additional comments: Valero Crude-By-Rail Project Initial Study/Mitigated Negative Declaration [IS/MND]

Dear Mr. Kilger, Planning Commission Chairman Sherry, Planning Commissioners, and Mayor Patterson, Councilmembers and Amy Million and staff of the Community Development Department.

Please add the following comments to those I officially submitted on July 1, to be included as part of the public record on the review of the IS/MND for the Valero Crude-by-Rail Project [“Project”].

The massive numbers of comments, reports, questions and documents that have been submitted on the Project to date express the level of concern of our citizenry that the City would consider adopting the Valero rail project with an incomplete Project Description, false and unsubstantiated claims, obfuscations, and therefore *fatally flawed and failed* Initial Study and Environmental Check List, and with the incredibly deficient account of potentially significant impacts with only a few mitigation measures called for. What has been presented to you to review would constitute a virtual “scoping session’s worth” of comments for preparation of an EIR.

First, I want to incorporate by reference all comments provided by the Natural Resources Defense Council, both oral testimony given at the planning commission hearing tonight and the written reports submitted July 1st, including the expert reports by Phyllis Fox and The Goodman Group.

I also want it to understood that 70 people attended the open public community meeting, held on July 9th at the Benicia Community Center, hosted by the Good Neighbor Steering Committee. Valero was personally invited by the GNSC to attend and answer questions, but they cordially declined. The community meeting offered Benicia residents a chance to hear from NRDC’s Brant Olson and Diane Bailey, one of NRDC’s staff scientists assigned to review the Project. NRDC is a highly respected national environmental organization with 1.4 million members. Their team of researchers learned of Valero’s initial application and recognized it as a the first crude-by-rail project proposed for a Bay Area refinery.

NRDCs comments, and those of Phyllis Fox and the Goodman Group regard the Initial Study and findings of the MND to be wholly flawed and inadequate, and that therefore, the Initial Study should be immediately withdrawn and a full EIR be drafted.

Some of the most important reasons cited by NRDC for rejecting the Initial Study and MND:

- there are no specifics given about the intended crudes to be imported and where they would come from. The importance of this information goes to the heart of the fatal flaw of the Initial Study and Environmental Checklist;
-
-

- the complex specifics about the chemical constituents of the types of crudes that will be imported are not revealed or discussed with regard their characteristics during processing, thus emissions cannot be evaluated – generalities and assumptions substitute for evidence;
- There is no *current* emissions baseline to make comparisons with projected emissions increases from the Project plus refinery operational emissions;
- In the Initial Study, baseline emissions stats borrowed from VIP FEIR are considered by NRDC to be obsolete since they are up to 10 years old and were produced before new regulations were promulgated by BAAAQMD, such as for PM 2.5 emissions;
- there is no discussion of increased cumulative emissions for entire refinery operations plus Project emissions, including also analysis of other contributors to those cumulative impacts from other industrial large-scale projects current or planned in the area, including the still-to-be-constructed new hydrogen unit which is intrinsic to processing dirty sour crudes;
- The Goodman Group reviewed the market trends in the industry and specifically what Valero Corp reports to its investors regarding the economic advantages of importing heavily discounted tar sands crude types that are diluted bitumen blends, or "dilbits" and light sweet crude from North Dakota's Bakkan shale formation, neither of which would be accessible to Valero Benicia refinery without rail transport;
- Phyllis Fox's report points out tar sands crude dilbits are the most dangerous to process from a public health and safety perspective, because of the constituents of bitumen including highly corrosive sulfur, lead, cadmium, nickel and other metals, as well as VOC's from the lighter diluents that are mixed with the bitumen to make it flow, thus causing highly volatile gases to potentially leak more frequently from valves, compressors, stacks, and piping;
- potential for increasing numbers of accidental releases, fires and explosions from processing highly acidic dilbits, as described above, owing to more tendency to metal corrosion in pipes and pipe failure, such as the resulting huge catastrophic fire at the Chevron refinery fire in Richmond, August 2012;
- there is currently no BAAQMD regulatory framework or enforcement to ensure maintenance and strict performance testing for corrosion of piping, nor standards for upgrading piping, considering the age of metals, metal types used for pipes;
- potential increases in corrosion problems is especially troubling given that refineries are modifying their units to allow for greater processing of sour crude types, and without special consideration that Valero Corp has stated to its investors that it intends to import heaviest dirtiest crude, the tar sands dilbits;
- there will be a higher rate of petroleum coke production, thus more particulate matter (petcoke PM2.5 enters lung tissue, carrying VOC's and other toxic emsissions that attach to the particulate coke dust – more coke ships and coke trains are planned for under VIP.
- Health risks for cancer and non-cancer risks are inaccurately portrayed and underestimated, considering the highly possible crude slate that is likely to be processed on any given day, if up to 42% of crude imported by rail are "dilbits" would be coming from Alberta tar sands with the consequences of increased toxic emissions overall.

ADDITIONAL COMMENTS:

Concerning Project Operations: regarding rail car safety, accidents, schedules and Project Operations:

1) Estimates are that Valero purchased 5,000+ tank cars. What is the DOT class to be used? What types of rail cars has Valero purchased? Please compare to the typical DOT-111A – the standard, cylindrical tank car that currently makes up 69% of the US tank car fleet and 80% of Canada's fleet? (according to Transport Canada).

2) Will the tank cars recently purchased by Valero for importing crude oil be modified and enhanced for security and safety? If so, how? Would thick (how thick?) doubled walls provide maximum strength in the case of collision or derailment?

3) Please cite any and all federal requirements regulating tank car construction for transporting crudes. If there are none that are specific to transporting crude, what kind of modification to the tank cars can be made that would especially address the problem of possible puncture that would cause dilbits to leak out (and catch fire) to prevent the kind of disaster that occurred in Lac-Megantic, Quebec?

4) Please describe the failure rate of DOT-111A tank cars from punctures to tank car walls during accidents (derailments, collisions, etc), according to *current and historic* Department of Transportation or other agency statistics, and factoring the increase daily train trips, accounting cumulative potential impacts, considering all clients' hazmat and other trains traveling on Union Pacific tracks that will also be carrying Valero crude trains.

5) Please describe Valero's, Union Pacific's and the City of Benicia's clean up strategy for removing bitumen in the case of a train accident with leaking tank cars enroute through wetlands, flood plains and marshes. Please consider the fact that EPA to date has not found any ecologically safe method to restore 35 miles of the Kalamazoo River, its riverbed and shoreline, following the Embridge Energy crude pipeline spill in 2010 that put 877,000 gallons of a tar sands dilbit into the river-- the largest on land oil spill in US history? Please address the indirect economic impact of the Kalamazoo disaster spill, considering that by 2012 more than $765 million dollars had been spent trying to clean the river *without destructive dredging*, and the spill hasn't been resolved after 3 years?

6) Does the Federal Department of Transportation or other agency overseeing hazmat freight transport by rail have any special enforceable requirements or regulatory framework for RR operations involving shipments of crude oil in large "single unit" trains? Is there any federal limit on the number of railroad tank cars that can be part of one single train carrying crude oil?

7) On a daily schedule, how many *total number of trains*, managed and run by Union Pacific for Valero will be "on the tracks," and how far do Union Pacific's rail routes run that would be carrying crude in Valero's trains? Does Union Pacific have to switch operators for trains at any point enroute, that is, use another RR company and its tracks to reach Alberta and North Dakota?

8) How many trains of all sorts run daily by Union Pacific pass through Benicia? How many hazmat-loaded freight trains?

8) Who is financially responsible for spill cleanups "off-site" of the Project? On site? Who manages the coke trains now and who would manage crude trains if the Project is permitted?

9) How would the City of Benicia, Union Pacific and Cal Trans be involved if a train were backed up at Park Road and vehicles exiting I-680 were backed up trying to get into Benicia via Industrial Way and/ or other access roads? Please consider this scenario in the case of a train derailment or collision, whether large or small accident?

10) How would Union Pacific handle a delay or change in crude train schedule on any particular day or night? Will crude trains take priority over passenger (AMTRAK) or other freight trains, including Valero coke trains?

11) Would there always be an engineer "on board" the crude trains? How will the trains be managed on site if "side-lined"?

12) What improvements and physical, mechanical upgrades have been made to date on Union Pacific tracks in Benicia and Solano County? Is Union Pacific prepared for the addition of two 50 car crude-loaded trains per day? What still needs to be done to ensure the safety of the rail bed and tracks themselves for handling crude-by-rail safely?

13) Please describe the hoses and valve connectors on the tank cars that would allow the off-loading of crude oil into the pipes leading to the #1776 Storage Tank. How long would it take to fix the hoses onto the connectors on a 50 car train? How many workers would be involved in this operation? What types of fugitive emissions from this operation are anticipated and what is the emission threshold for fugitive emissions during this operation? How would the emissions be measured in real time? Would vapors escape at the top of the crude tank cars? Will any valve or "top" be open to the atmosphere? Would the tank cars be pressurized? What reduces the volatile gases under pressure?

14) From a reliable source of information, it has been emphatically stated that it can be expected routinely that there would be a "liquid mess" underneath the rail cars, especially given the length of time of off-loading operation, the two 50 car trains off-loading daily, etc. How will the emissions from spilt crude be measured and mitigated?

Concerning AB32, the Benicia General Plan and Climate Action Plan:

1) Please describe Valero's plan to meet AB32 requirements for GHG reductions by 2020, considering that Valero is the largest industrial producer of GHG emissions in the city. The Initial Study addresses GHG emissions during construction phases, but does not reference AB32 as a regulatory framework for the Project and refinery operations nor AB32's targets for GHG reductions by 2020.

2) Please reference and supply hot links to all regulatory statutes, frameworks and guidelines that would govern the Project and refinery as related to potential and cumulative negative impacts on site and "off site," for all areas of concern: Air Quality; Public Health; Biologic REsources; Transportation; Hazards; Odors; Seismic; Soils; Noise; etc, thus all CEQA areas of concern and public concern of the local community.

3) In the absence of enforceable regulations, (state or federal) please list issues of concern that depend on the refinery's "voluntary compliance" to mitigate such concerns and impacts, such as potential, foreseeable problems with corrosion in pipes, valves, etc. wherein replacement of damaged parts could be warranted and whereas structural integrity can no longer be guaranteed.

4) Please specifically describe conditions and criteria for the City of Benicia to judge the sustainability of a project, as it contributes to the city's well-being and economic health as a whole. "Sustainable development"is the integrating, overarching goal of Benicia's 1999 General Plan. [General Plan, page 22]. The goal outlines the rippling effect of what we do here in our city. Please provide specific criteria and performance measures that would ensure that industrial polluters and newly planned developments, such as Valero's Crude-by-Rail Project, would be obliged to adhere to and be evaluated by to meet the General Plan's essential goal, which would be consistent also with AB32 and Benicia's Climate Action Plan.

5) Please reference Benicia's Climate Action Plan and the efforts that have been made by the Benicia Community Sustainability Commission to address the strategies pertinent to energy and water conservation and how the Crude-by-Rail project fits into the model for conserving energy and resources generally. Please do not use obsolete emission baseline stats for data comparisons. [See Phyllis Fox Report]

Thank you for your attention to my comments.

Marilyn Bardet, member of the Good Neighbor Steering Committee

MARILYN J. BARDET
333 East K Street, Benicia CA 94510
707-745-9094 mjbardet@comcast.net

RECEIVED
JUL 22 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 17, 2013

City Manager Brad Kilger and Amy Million, Community Development Department;
Planning Commissioners: Chair Sherry, Oakes, Smith, Grossman, Spraque, Dean and Young
Mayor Patterson, Vice Mayor Campbell & Councilmembers Hughs, Schwartzman & Strawbridge
City of Benicia, 250 East L Street, Benicia CA 94510

SUBJECT: Valero Crude-By-Rail Project Initial Study/Mitigated Negative Declaration

Dear Mr. Kilger, Amy Million, Planning Commissioners, Mayor and City Councilmembers;

In my original comments submitted on July 1st, I had made a statement that I now would like to correct based on information I've received from a reliable source, a community member involved with Phillips 66 refinery (formerly ConocoPhillips) in Rodeo. Jay Gunkelman is a neuroscientist who over many years has participated as a community member in discussions with the Air District and with Conoco over operations, emissions, and the refinery's community air monitoring system operating along the refinery fenceline.

I had said (quote from original statement, page 2 of my introductory letter) "Valero's Project would replace equivalent deliveries of crude by ship, and would be the second refinery rail project in the Bay Area. According to online news reports, Phillips 66 (formerly Conoco-Phillips) in Rodeo currently imports crude by rail."

According to Jay Gunkelman, the Phillips 66 refinery (formerly ConocoPhillips) has a rail facility that to date only *exports* refinery products. He said that to change the facility for *importing* crude would require a new use permit from Contra Costa County. At this writing, I do not have information as to Phillips 66 intentions. I do know, however, from my own reading on the subject of the tar sands mining operations [*Tar Sands: Dirty Oil and the Future of a Continent,* by Andrew Nikiforuk, renown Canadian journalist and author] that Conoco has investments in tars sands mining operations in Alberta (as does Shell and Tesoro). Thus, it is highly plausible and foreseeable that other Bay Area refineries, including Phillips 66, Shell, Tesoro, Chevron and Valero may be intending to import tar sands diluted bitumen or "dilbits." NRDC's research states that Valero already imports a small percentage of tar sands-sourced "crude." Although I don't have statistics, it's likely that other Bay Area refineries are doing the same. The question is, to what extent the importation of tar sands crude is to be expanded by Valero through their proposed rail project, and also, to what extent are other refineries in the area also planning to expand importation of bitumen or diluted bitumen by rail or other means.

Thus, despite my misstatement re current rail use at Phillips 66, calculations for potential and *cumulative* impacts of large-scale rail projects that could be constructed during the lifetime of the Valero crude-by-rail project and would contribute significantly to total toxic emissions for the Bay Area air basin should be factored into analysis of Valero crude-by-rail project emissions with respect to processing heavier crudes and especially tar sands bitumen and/or diluted bitumen. Total cumulative GHG emissions would also have to be calculated for same.

Thank you for consideration of my additional comments,

Marilyn Bardet

MARILYN J. BARDET
333 East K Street, Benicia CA 94510
707-745-9094 mjbardet@comcast.net

RECEIVED
JUL 29 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 29, 2013

City Manager Brad Kilger, and Amy Million,
Planning Commissioners: Dean, Oakes, Smith, Grossman, Spraque, and Young
cc: Mayor Patterson, Vice Mayor Campbell & Councilmembers Hughs, Schwartzman & Strawbridge
City of Benicia, 250 East L Street, Benicia CA 94510

SUBJECT: Additional comments on cumulative impacts of transporting crude-by-rail in the Bay Area: Valero Crude-By-Rail Project Initial Study/Mitigated Negative Declaration [IS/MND]

Dear Brad, Amy, and Planning Commissioners,

My initial comments (July 1st) cited the absence of any reference or analysis in the IS/MND of cumulative impacts that could be foreseeable during the construction and lifetime of the proposed Valero Project of other potential industrial developments (including Valero's planned new hydrogen unit) in the area that would contribute to cumulative emissions impacts to local air quality as well as to the whole Bay Area air basin monitored by BAAQMD.

A point in fact is that the oil industries represented by refineries in the Bay Area, besides Valero — Royal Dutch Shell, ConocoPhillips, Tesoro and Chevron—all have heavily invested in tar sands extraction mines in Alberta. All of these corporations benefit from the very low, almost negligible royalties charged by Alberta's provincial government, as well as that of Canada's federal gov't. That discount rate has been trumpeted in Texas since at least 2005 by the Canadian government that heavily subsidizes tar sands development and keeps few records of the costs of the environmental destruction wrought by the operations. Therefore, the tar sands appear to be a "gold mine" at least in the near-term for the industry giants generally.

This being the case, it is highly likely that other Bay Area refineries, within the next 2 - 5 years, *while the high discount rate is maintained by the Canadian and Alberta governments*, thus *making importing tar sands "dilbits" a potential financial windfall for US refiners in the near term,* that at least one, if not ALL Bay Area refineries may seek to import by Union Pacific as much tar sands dilbits, as well as Bakkan tight oils from the Dakotas, (and other fracking sources, including Monterrey Shale) as Valero proposes to import by rail at the rate of 70,000 barrels per day.

Under CEQA, the possibility of development of other such large-scale industrial projects that are either "on the books" as plans or are envisioned within the time-frame of the proposed project must be described based on planning evidence and information available, whether through industry investor reports, or independent reliable news sources. Cumulative emissions impacts, as well as cumulative transportation impacts must be analyzed.

The IS/MND fails to account for the potential impacts to Benicia, its community and sensitive environs, considering the likely probability in a "near future" scenario, when more crude-loaded "50-car unit trains" are running through our city on their way to other refineries in our area that today, could possibly be in the planning stages of developing crude-by-rail off-loading terminals. The fact that UP tracks access all of the CC County refineries already is a case in point. The research shouldn't be a guessing game but based on available fact. If this info can't be found or determined, the benefit of doubt should reside with communities with regard to future scenarios that could impact local and regional community health.

Cumulative diesel emissions from all locomotives that pass through Benicia on a daily basis should be factored in to cumulative GHG calculations as well as public health impacts. Cumulative emissions of PM10 and PM2.5 from increased pet coke production, storage, transport and terminal/shipping operations must also be calculated from a public health perspective.

Thank you again for addressing my comments.

— Marilyn Bardet

Amy Million - Valreo Crude by Rail Project

From: "George Oakes Sr." <george@twinoaksre.com>
To: Amy Million <Amy.Million@ci.benicia.ca.us>
Date: 7/19/2013 9:38 AM
Subject: Valreo Crude by Rail Project

RECEIVED
JUL 22 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Amy,

The Valero Crude By Rail Project has raised many questions and uncovered areas where it seems we have no control over the rail lines. One thing is that tank cars are not normally owned by the rail lines, but leased to them. My question is who hold responsibility for a problem with a tank car while in our (or anyone's jurisdiction), the owner, the carriers, or the property on which it rests when the problem occurs? Can we specify the type and construction of tank cars coming into and out of Valero?

I am very concerned that any approval will increase the likelihood of a problem for Benicia and its citizens. To off set that risk I would like to explore options to insulate or insure our town from costs associated with such a problem, including lost of revenue, clean up, and the development and implementation of alternatives for work/business' etc.

To that end I am contacting the State Attorney General to seek answers to how that may be accomplished. While I do not know if that is overstepping our authority, the answers received thus far at meetings and in the documentation are vague and/or do not address this issue. Would appreciate any feedback on this so I can be sure not to exceed our scope or authority.

Regards,

George Oakes Sr.
Twin Oaks Real Estate, Inc.
707-746-8700 Office
707-319-1734 mobile

From: Amy Million [Amy.Million@ci.benicia.ca.us]
Sent: Thursday, July 11, 2013 7:57 AM
To: Adam Petersen; Amy Million; Gina Eleccion; Rod Sherry; George Oakes, Sr.; Stephen

Amy Million - Environmental Impact Report on Valero's Proposal to bring Crude Oil in by Rail

---

From: Priscilla Whitehead <priswhite@aol.com>
To: <amy.million@ci.benicia.ca.us>
Date: 7/20/2013 12:27 PM
Subject: Environmental Impact Report on Valero's Proposal to bring Crude Oil in by Rail

---

Dear Amy Million

I am writing in support of the NRDC's request for a full EIR on Valero's proposal to import crude oil by rail. I did not know there was a deadline for public comment so I am sending one anyway. I am a member of the NRDC and have great respect for what they do.

Having read the NRDC blog on Diane Bailey's report and her fax to you I think Valero owes the City of Benicia residents full disclosure. I could not attend the last meeting but will be there August 8. I know you are very responsible and care about Benicia.

With due respect for the people who work for Valero and their claims that safety comes first, I am reminded of the BP offshore rig explosion and the Chevron refinery fire. I am sure the people who were killed or injured also were sure their oil companies put safety first.

Thank you for reading my letter

Sincerely, Priscilla Whitehead
288 W J St
748-0877

RECEIVED
JUL 22 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Roger D. Straw

766 West J Street • Benicia, CA 94510
(707) 373-6826 • rogrmail@gmail.com

RECEIVED
JUL 26 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

July 26, 2013

Planning Commissioners Sherry, Dean, Sprague, Oakes, Smith, Cohen Grossman, and Young
c/o City of Benicia
250 East L Street
Benicia, CA 94510

ADDITIONAL COMMENTS: Valero Crude-By-Rail Project

Planning Commissioners:

Thank you for hearing (and offering) so many good questions and concerns at the July 11, 2013 Planning Commission meeting regarding Valero's proposed crude-by-rail project. Your dedication and efforts in studying the huge volume of materials was evident, and I know there is more to come. I want to raise a few more points, so I will do my best to be brief, as follows:

1. I was very much impressed at the comments made in the public hearing on July 11 by Benicia resident Bob Berman. Bob knows CEQA very well, and made the point that **under the law, there is a very low bar for *requiring* a full EIR**. Please be sure to explore this point in your questioning on August 8. I understood Bob to suggest that if any *expert* disagrees that a mitigated negative declaration is sufficient, then the City is *compelled* to require the project to undergo a full EIR. I have asked around as to the **definition of an "expert,"** and again the bar is set extremely low. For instance, Mary Frances Kelly Poh entered information into the record regarding a native plant, Bird's Beak, extant in marshland adjacent to Valero. As a member of the California Native Plant Society, she would qualify as an "expert," (even though she very clearly spoke as a resident rather than in any official capacity). Benicia resident Marilyn Bardet has in the past qualified under CEQA as a "local expert" as a founding member of the Good Neighbor Steering Committee and her history of participation in several EIR reviews. The NRDC and experts Fox and Goodman (obviously), but also common residents living within "smelling distance" of the refinery qualify as experts on air quality; Industrial Park owners and workers qualify as expert on traffic. I understand that the courts have been extremely generous in qualifying experts under CEQA. **Commissioners might want to ask our City Attorney something like the following: "Under CEQA, what does the 'Fair Argument Standard' say regarding the determination of whether a Negative Declaration is appropriate or an EIR is required?"** Please review Bob Berman's July 11 comments, attached, and explore this further on August 8.

2. I was astounded when the author of Valero's Initial Study (ESA) could not or would not answer Commissioner Smith's request for examples of **indirect impacts** that may be considered under CEQA. Commissioner Smith's question arose in the context of the need to review "the whole of the project" and "cumulative impacts." *[Initial Study, Ch. II, Environmental Checklist, p. 1, item 2. "All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts."]* I note here that in the Initial Study, some indirect impacts beyond the very narrowly defined footprint of the refinery are already discussed with suggested mitigations: traffic congestion, nearby air quality, and potential spills on the railroad tracks that would require cooperative agency efforts if/when an emergency cleanup is needed. Commissioners might join me in wanting to know more:
    a. **Does "the whole of the project" and "cumulative impacts" extend out along the tracks here within Solano County**, through the protected Suisun Marshlands, Suisun City, Fairfield, Travis Air Force Base, Vacaville and Dixon? If so, was Solano County and other local and State agencies with jurisdiction notified and given opportunity to comment? Should they be?
    b. **Does "the whole of the project" and "cumulative impacts" extend to other communities farther up the tracks, i.e., beyond Solano County?** Surely all those communities will see a significant increase in shipping by rail, including incredibly heavy and dangerous crude oil tankers. Will those tankers pass close by schools, residential complexes or busy commercial centers? Will Davis or Roseville (for instance) also be required to accommodate crude oil tankers at rest on side rails for periods of time? If our "little" decision here in Benicia affects communities and open spaces from here to North Dakota, why shouldn't those communities and agencies with jurisdiction in those places be noticed and given opportunity to comment?
    c. **Does "the whole of the project" extend to communities who breathe air downwind of Valero, i.e., Concord, Antioch, Pittsburg, etc.?** Shouldn't the BAAQMD have been noticed? I believe residents and City electeds and staff in those cities should also have been given notice. Commissioners might want to explore this on August 8.

3. I was very interested in Kathy Kerridge's point about the *overarching goal of sustainability* in Benicia's General Plan. If I understood her question, it could be that the Initial Study and any subsequent EIR should not only address whether the project satisfies a land use checklist in the General Plan or some other point or two in the Plan,

but rather, the overall goal of making Benicia a more sustainable City. If so, it might cause Benicia to look unfavorably on a project that makes use of Canadian tar-sands crude, which experts agree is the least environmentally sensitive and most highly carbon-intensive process for mining and refining. The same, to a lesser degree perhaps, could be said of Bakken shale formation crude extracted by fracking. **Does a General Plan "sustainable city" have a responsibility to encourage usage that promotes an alternative, more sustainable future – or at least one that doesn't go further down the path to environmental ruin for short-term economic gain?**

Again, thanks for all your work. Your conscientious efforts are an immense gift to our City, present and future.

Roger Straw
766 West J Street, Benicia
(707) 373-6826
rogrmail@gmail.com

Cc: Mayor Patterson, Vice Mayor Campbell, and Councilmembers Hughes, Schwartzman, Strawbridge, City Manager Brad Kilger, City Attorney Heather McLaughlin

TRANSCRIPT - BOB BERMAN SPOKEN COMMENT
Benicia Planning Commission, July 11, 2013
Valero Use Permit – Crude by Rail Project

Good evening. I'm Bob Berman. I live on West K Street. In response to the Initial Study that's been presented by the City, you've received now a wealth of both written, and now oral, testimony in terms of the quality of that environmental impact report. And, of course, the first decision you all have to make is whether or not to proceed with the adoption of a Mitigated Negative Declaration or require the preparation of an EIR, an Environmental Impact Report. The City's consultant briefly mentioned at the beginning of his presentation tonight, that once the Initial Study is made, there's kind of a standard, a standard that's set out in the California Environmental Quality Act, is what's referred to as **the "fair argument" standard**. The guidelines state clearly that an Environmental Impact Report must be prepared when the lead agency, in this case the City of Benicia, determines that it can be fairly argued, based on substantial evidence, that a project may have a significant environmental effect. What this means, simply, is that if project proponents have substantial evidence that a project may have a significant environmental effect, an EIR *must be prepared*, even if the lead agency, in this case the City of Benicia's evidence indicates lack of significant environmental effect. In other words, there's a very low threshold that exists for the requirement of an Environmental Impact Report. And I would maintain, based on what I've read and what I've heard tonight, both from NRDC, and now just recently from CBE and the other testimony, that there clearly is evidence on the record that an argument can be made that the project *may* result in a significant environmental impact, and therefore, **the City is *compelled* to prepare an Environmental Impact Report**. Thank you.

BENICIA CHAMBER OF COMMERCE & VISITORS CENTER
"Promoting Business For A Better Benicia"
601 First Street, Suite 100, Benicia CA 94510
707-745-2120 / Fax 707-745-2275
www.visitbenicia.com • www.beniciachamber.com • email: beniciachamber@aol.com

July 29, 2013

RECEIVED
AUG 02 2013
CITY OF BENICIA
COMMUNITY DEVELOPMENT

Planning Commission
CITY OF BENICIA
250 East L Street
Benicia, California 94510

Dear City of Benicia Planning Commissioners:

Following our attendance at your last Planning Commission meeting, listening to both the advantages and concerns from both sides of the issue, and participating in ongoing discussions, we ask that you accept this letter on behalf of the Benicia Chamber of Commerce requesting your approval of the Use Permit for the Valero Crude By Rail Project.

As you are aware, Valero Benicia Refinery currently brings product in and out of its facility by marine vessel and rail. Together with Union Pacific, Valero is working to ensure they stay competitive in this commodity market while at the same time creating as little impact to Benicia residents and businesses as possible. Valero's Benicia Refinery is constantly monitored by multiple government agencies including Bay Area Air Quality Management and are required to meet or exceed criteria set forth by these numerous agencies. With the Valero Benicia Refinery being one of the newest and most advanced refineries in the nation, and having a commendable safety record, they ask to continue doing what the refinery was designed to do, refine crude oil.

In keeping with the City's ongoing support of Economic Development, the refinery's significant contributions to Benicia's economic viability for more than 45 years, and the Benicia Chamber of Commerce Mission Statement "Promoting Business For A Better Benicia", we respectfully request your approval of the Use Permit as submitted for the Valero Crude By Rail Project at your August 8, 2013 meeting.

Please accept our appreciation for your efforts and the important role you have as a Planning Commissioner for the City of Benicia.

Sincerely,

Eric Hoglund
Chairman of the Board
Benicia Chamber of Commerce

c: Brad Kilger, City Manager
Amy Million, Community Development Department

Appendix C.1

Areas of Controversy—Potential Air Quality Impacts From Increased Use of Heavy Canadian Crudes

ESA

APPENDIX C.1

Areas of Controversy – Potential Air Quality Impacts from Increased Use of Heavy Canadian Crudes

During public review of the IS/MND, several commenters expressed concern that the Project could result in the increased use of heavy sour Canadian crude at the Valero Benicia Refinery, thereby causing an increase in refinery air emissions. According to the commenters, Valero's use of heavy Canadian crudes is likely to increase after the Project is complete because (1) heavy Canadian crudes are the cheapest of the North American crudes that would become available by rail, and (2) the Valero Improvement Project (VIP) significantly increased the Valero Benicia Refinery's ability to process heavy sour crudes. Since heavy sour crudes require more processing than crudes that are relatively lighter and/or sweeter, the commenters conclude, refinery emissions could increase as a result of the Project.

The City has considered this issue carefully, and reached the following conclusions:

(1) There is no reason to believe that, if the Project is approved, Valero would be more likely to purchase heavy Canadian crudes than any number of other North American crudes that are lighter and/or sweeter;

(2) Even if Valero were to purchase large amounts of heavy sour Canadian crudes as a result of the Project, this would not cause an increase in refinery emissions because Valero must blend crude feedstocks to a narrow range of weight and sulfur content before processing them; and

(3) Even if refinery emissions were to increase based on Valero's purchase of heavy sour Canadian crudes, any such emissions increases would properly be considered part of the baseline because the baseline includes of the full scope of operations allowed under existing permits that were issued based upon prior CEQA review.

As explained in Chapter 3, *Project Description*, Valero, like all refiners, decides what crudes to purchase based on linear programming. The analysis takes many factors into account, including the quality of each crude, the price of each crude, the unique configuration of the Refinery, the market demand for specific products, the market price of specific products, and the specifications of the products to be produced. Thus, like all other refiners, Valero does not necessarily purchase the cheapest available crude that it has the ability to process. The cost of crude is but one factor among many.

Moreover, even if Valero were to import heavy sour Canadian crudes by rail, the weight and sulfur content of the crudes actually processed at the Refinery would remain within the same narrow range. As explained in Chapter 3, the Refinery's configuration imposes certain constraints on Valero's ability to process crude oil into products. One of the most important constraints is the fact that the crude to be processed must weigh between roughly 20° and 36° API gravity, and contain between 0.4%-1.9% sulfur. Moreover, actual practice shows that the optimum range is even narrower. Over a recent three year period at the Refinery, a substantial majority of crude blends processed ranged between 24° and 29° API gravity, and had a sulfur content ranging from 0.08%-1.6 %.

It follows that the average weight and sulfur content of the crude feedstocks that Valero purchases over any given time (1) *must* also fall roughly within the narrow ranges of 20° - 36° API gravity and 0.4%-1.9% sulfur content, and (2) *likely* will fall within the even narrower ranges of 24° - 29° API gravity, and 0.08%-1.6% sulfur content. Therefore, although Valero could purchase heavy sour Canadian crudes, it can only purchase so much because the weight and sulfur content of any Canadian crudes would have to be offset by purchases of light sweet crudes. This is so because, again, the crude that is actually processed at the Refinery will remain within the same narrow range of weight and sulfur content.

Finally, even if one assumed that Valero will purchase 70,000 barrels per day of heavy sour Canadian crude, and the crude blend processed became substantially heavier and more sulfurous, the resulting increase in emissions would be within the baseline for operational air quality impacts.

Public Resources Code Section 21166 and CEQA Guidelines Section 15162 strictly limit the ability of a lead agency to require additional CEQA review of a project that has already undergone CEQA review. Thus, as the courts have recognized, when an applicant proposes to modify a previously approved project, the baseline includes the full scope of operations previously approved – regardless of whether the project is operating at maximum capacity when CEQA review commenced. (*Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal.4th 310, 326; *Fairview Neighbors v. County of Ventura* (1999) 70 Cal.App.4th 238, 242-3;, *supra*, 70 Cal.App.4th at 241; *Temecula Band of Luiseno Mission Indians v. Rancho California Water District* (1996) 43 Cal.App.4th 425, 437-38'; *Benton v. Board of* Supervisors (1991) 226 Cal.App.3d 1467, 1477-84;)

In *Fairview Neighbors*, for example, the operator of a mine applied to renew its conditional use permit in the early 1990's. (*Fairview Neighbors v. Ventura*, *supra*, 70 Cal.App.4th at 241.) A previous conditional use permit, approved in 1976, allowed the facility to mine 1.8 million tons of aggregate, which could generate 810 truck trips per day. (*Id*. at 240-41.) In 1994 when the mine filed its application, the mine was operating at less than permitted capacity, such that the volume of truck traffic was significantly less than 810 truck trips per day. The court held that the appropriate baseline for truck traffic was the amount permitted under the 1976 conditional use permit, 810 trips per day, notwithstanding the fact that the facility was operating at less than the fully permitted capacity when the county commenced CEQA review. (*Id*. at 242.) In reaching this

conclusion, the court noted that the use permit had undergone CEQA review in the past. (*Id*. at 243.)

Here, as required by the federal and California Clean Air Acts, Valero holds permits for all of the Refinery's process equipment. Valero also holds a use permit from the City. The City and the Bay Area Air Quality Management District issued these permits based on the environmental impact report for the VIP prepared and certified by the City in 2003. The baseline includes the full scope of operations allowed under these permits.

Thus, to the extent that the Project would cause an increase in emissions based on an increase in the weight and sulfur content of crude feedstocks (as explained above, this cannot happen) – any such emissions increase would be within the baseline environmental conditions. The Project will not require any modifications to the Refinery's process units, or indeed any equipment at the Refinery except for the installation of a loading rack and related rail lines. If the Project were approved, the Refinery would continue to operate within the permit limits of the existing process units and other equipment.

This page intentionally left blank

Appendix C.2

Areas of Controversy—Potential Air Quality Impacts From Increased Use of Light Sweet Crudes

ESA

APPENDIX C.2

Areas of Controversy – Potential Air Quality Impacts from Increased Use of Light Sweet Crudes

During public review of the IS/MND, several commenters expressed concern that, in the short term, the CBR Project could result in the increased use of light crudes such as Bakken at the Valero Benicia Refinery, thereby causing an increase in the emission of volatile organic compounds (VOCs) from storage tanks, pumps, compressors, valves, and connectors at the Refinery.

The City has considered this issue carefully, and reached the following conclusions.

(1) Once the Project is constructed and operational, Valero may well purchase large amounts of light sweet North American crudes. In fact, this is Valero's stated plan.

(2) If Valero were to purchase large amounts of light sweet North American crudes, this would not cause an increase in VOC emissions because (a) Valero must blend crude feedstocks to a narrow range of weight and sulfur content before processing them, and (b) therefore, the average weight and sulfur content of crudes delivered to the Refinery will remain the same. In other words, any deliveries of light North American crudes by rail would simply replace the delivery of other light crudes by ship.

(3) Even if the average crudes purchased, and blends processed, became significantly lighter as a result of the Project, there would still be no increase in fugitive VOC emissions. There is no relationship between the weight of a particular crude oil and the amount of fugitive emissions released from equipment containing that crude oil.

(4) Even if VOC emissions were to increase based on Valero's purchase of light North American crudes, any such emissions increases would properly be considered part of the baseline because the baseline includes the full scope of operations allowed under existing permits that were issued based upon prior CEQA review.

Valero has publicly stated that, when the Project is constructed and operational, Valero plans to purchase relatively light sweet North American crudes. According to Valero, the North American crudes will be "Alaskan North Slope (ANS) look-alikes or sweeter[1]," and will replace similar crudes that are currently delivered by ship.

[1] Valero Benicia Refinery, Response to BAAQMD 3/20/2013 Project Questions, April 11, 2013.

As explained in Chapter 3, *Project Description*, the Refinery's configuration imposes certain constraints on Valero's ability to process crude oil into products. One of the most important constraints is the fact that the crude to be processed must weigh between roughly 20° and 36° API gravity, and contain between 0.4%-1.9% sulfur. Moreover, actual practice shows that the optimum range is even narrower. Over a recent three year period at the Refinery, a substantial majority of crude blends processed ranged between 24° and 29° API gravity, and had a sulfur content ranging from 0.08%-1.6%.

It follows that the average weight and sulfur content of the crude feedstocks that Valero purchases over any given time (1) *must* also fall within the narrow ranges of 20° - 36° API gravity and 0.4%-1.9% sulfur content, and (2) *likely* will fall within the even narrower ranges of 24° - 39° API gravity, and 0.08%-1.6% sulfur content. To the extent that Valero purchases light sweet North American crudes, those purchases must be offset by the purchase of heavier more sour crudes in order to maintain the desired blend. Thus, the Refinery's VOC emissions will remain the same, including any emissions from crudes as they are delivered and crude blends that are actually processed.

Even if the average crudes purchased and processed by the Refinery became lighter, moreover, this would not cause an increase in fugitive VOC emissions from Refinery equipment. The amount of fugitive emissions from a piece of equipment is a function of the mechanical integrity of the equipment and the pressure applied to its contents. The weight of the crude oil is not a factor.

Finally, even if one assumed that Valero will purchase 70,000 barrels per day of light sweet North American crude, and the crudes delivered and processed became substantially lighter, any resulting increase in emissions would be within the baseline for operational air quality impacts.

Public Resources Code Section 21166 and CEQA Guidelines Section 15162 strictly limit the ability of a lead agency to require additional CEQA review of a project that has already undergone CEQA review. Thus, as the courts have recognized, when an applicant proposes to modify a previously approved project, the baseline includes the full scope of operations previously approved -- – regardless of whether the project is operating at maximum capacity when CEQA review commenced. (*Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal.4th 310, 326; *Fairview Neighbors v. County of Ventura* (1999) 70 Cal.App.4th 238, 242-3;, *supra*, 70 Cal.App.4th at 241; *Temecula Band of Luiseno Mission Indians v. Rancho California Water District* (1996) 43 Cal.App.4th 425, 437-38'; *Benton v. Board of* Supervisors (1991) 226 Cal.App.3d 1467, 1477-84;)

In *Fairview Neighbors*, for example, the operator of a mine applied to renew its conditional use permit in the early 1990's. (*Fairview Neighbors v. Ventura*, *supra*, 70 Cal.App.4th at 241.) A previous conditional use permit, approved in 1976, allowed the facility to mine 1.8 million tons of aggregate, which could generate 810 truck trips per day. (*Id*. at 240-41.) In 1994 when the mine filed its application, the mine was operating at less than permitted capacity, such that the volume of truck traffic was significantly less than 810 truck trips per day. The court held that the appropriate baseline for truck traffic was the amount permitted under the 1976 conditional use

permit, 810 trips per day, notwithstanding the fact that the facility was operating at less than the fully permitted capacity when the county commenced CEQA review. (*Id*. at 242.) In reaching this conclusion, the court noted that the use permit had undergone CEQA review in the past. (*Id*. at 243.)

Here, as required by the federal and California Clean Air Acts, Valero holds permits for all of the Refinery's process equipment. Valero also holds a use permit from the City. The City and the Bay Area Air Quality Management District (BAAQMD) issued these permits based on the environmental impact report (EIR) for the Valero Improvement Project (VIP) prepared and certified by the City in 2003. The baseline includes the full scope of operations allowed under these permits.

In particular, the baseline includes the permitted operation of the Refinery's eight crude oil storage tanks (storage tanks S-57 through S-62, S-1047, and S-1048). In connection with the VIP, the BAAQMD issued permits based on the City's EIR. The permits include a combined limit on the material throughput in the tank system as a whole – 171.5 thousand barrels per day (based on an annual daily average), or 62.6 million barrels per year. The permits do not place any restrictions on the weight of crude oil to be stored in the tanks. Thus, the full scope of permitted operations includes the storage of any weight crude oil in the tanks – no matter how light – as long as Valero does exceed the combined throughput limit. The Project would not increase the throughput limit. Thus, even if the Project were to cause an increase in VOC emissions from storage tanks, any such increase would be considered part of the baseline conditions.

This page intentionally left blank

Appendix D.

Discussion of Confidential Business Information

ESA

APPENDIX D

Discussion of Confidential Business Information

At the request of the City, Valero has submitted data and information regarding the proposed project, including data and information regarding the past and anticipated future crude oil slate at the Valero Benicia Refinery. Pursuant to Public Resources Code Section 21160 and Government Code Section 6254.7(d), Valero has designated the following information to be confidential and has requested that it not be disclosed:

- The specific North American crudes that Valero plans to purchase and ship by rail;
- The properties (weight, sulfur content, vapor pressure, and acidity) of specific crudes delivered to Valero in the past;
- The properties (weight, sulfur content, vapor pressure, and acidity) of specific crude blends processed at the refinery;
- Data purchased by Valero showing the weight and sulfur content of specific crudes, including North American crudes;
- Data generated by Valero showing the weight and sulfur content of specific crudes, including North American crudes;
- Detailed information regarding the weight and sulfur content of crude blends suitable for processing at the Valero Benicia Refinery based on the refinery's unique configuration; and
- Detailed daily measurements of the weight and sulfur content of crude blends processed at the Valero Benicia Refinery in the past.

All of this information meets the definition of trade secret under CEQA and Government Code Section 6254.7. Information regarding the crudes that Valero plans to purchase, crudes that have been delivered to the refinery, and the properties and measurements of crude blends processed by the refinery or suitable for processing at the refinery, provides an insight into Valero's operating strategy that would not otherwise be publicly available. This information reveals Valero's preferred suppliers and purchasing strategy, and enables competitors, traders on Wall Street, or foreign governments to use disruptive competitive strategies or to gain an unfair competitive advantage. For example, competitors may lock in crudes targeted by Valero at favorable prices, thus making them unavailable to Valero. Or, competitors, traders, or foreign governments may bid up pricing on crudes targeted by Valero and therefore increase Valero's costs of doing business. Also, competitors may be able to lower their costs by developing purchasing strategies

similar to Valero. In addition, data purchased or generated by Valero showing the weight and sulfur content of specific crudes is often copyrighted. At a minimum, releasing this information allows other companies to obtain it without having to pay for it themselves. Competitors could also use this information to determine which crudes Valero is purchasing. (See Appendix K, McGovern Report).

For these and similar reasons, the U.S. Environmental Protection Agency (EPA) recently determined that detailed information about feedstocks, including crude oil delivered to a refinery, is confidential and entitled to protection under the greenhouse gas (GHG) reporting law. (40 C.F.R. Part 98; 75 Fed. Reg. 39,094 (July 7, 2010).) Under this law, petroleum refineries are required to submit annual GHG reports to the EPA. The Clean Air Act, however, directs the EPA to treat as confidential records, reports, or information that, if made public, would reveal methods or processes that are entitled to protection as trade secrets. (42 U.S.C. § 7414(c).) The EPA interprets this to mean that both trade secrets and confidential business information should be treated as confidential. (40 Fed. Reg. 21,987 (May 20, 1975).)

On this basis, the EPA concluded that several categories of information reported under the GHG reporting law should be treated as confidential. First, the EPA determined that information regarding the amounts and composition of raw materials used in the production process, excluding fuel, should be treated as confidential. The EPA determined that releasing this information could cause substantial harm to the reporting companies, including damage to their respective competitive and marketing strategies. For example, the EPA found that information about feedstock amounts and their composition could reveal a company's suppliers and sourcing strategies. Competitors could then use this information to create their own new strategies to compete for those feedstocks and to obtain similar production costs. The EPA also found that releasing information about feedstock consumption could allow competitors to determine the type of manufacturing processes used, or to infer the product mix of a facility, because manufacturing processes vary by the raw material consumed. And, competitors could use the combined information regarding raw material consumption and production quantities to reveal sensitive information such as operating efficiencies and to infer production costs and pricing structures. (75 Fed. Reg. 39,094, 39,116.)

Second, the EPA determined that production and throughput data that are not used as inputs to calculate annual GHG emissions should be treated as confidential, including the chemical characteristics of the products produced. The EPA found that releasing this information could substantially harm the competitive position of the reporting companies "by revealing confidential process information and operational and marketing strategies." Although this category focuses on the end result of the production process, it also protects information regarding feedstocks and raw materials used in the production process. The EPA reasoned that releasing information about the chemical characteristics of products could allow competitors to infer the types of feedstocks or raw materials used in the production process. "This may enable competitors to devise strategies to compete for resources and harm the competitive position of reporting entities by otherwise driving up the costs of materials used for production." (75 Fed. Reg. 39,094, 39,115.)

Other laws and regulations also recognize the confidentiality of information regarding crude oil feedstocks. For example, under the Petroleum Industry Information Reporting Act (Public Resources Code § 25350-25366), oil refiners are required to submit various reports to the California Energy Commission. (Public Resources Code § 25354.) The weekly report required by the Commission may include the amount of crude oil imported, including information identifying the source of the crude oil. (Public Resources Code § 25354(i)(2)(D).) The monthly report for each refinery requires, among other things, information regarding feedstock inputs. (Public Resources Code § 25354(a).) Any person required to submit this information, however, may request that specific information be kept confidential. (Public Resources Code § 25364(a).) In fact, "[i]nformation presented to the commission pursuant to Section 25354 shall be held in confidence by the commission or aggregated to the extent necessary to assure confidentiality if public disclosure of the specific information or data would result in unfair competitive disadvantage to the person supplying the information." (Public Resources Code, § 25364(b).)

This page intentionally left blank

Appendix E.1
Construction Emissions

ESA

Valero Crude By Rail Project
Construction Emissions

Summary of Construction-Related Emissions

Sources	Average Daily Emissions (lb/day)						
	ROG	CO	NOx	SOx	PM10	PM2.5	CO2e
Equipment Exhaust	6.96	26.60	49.67	0.06	2.56	2.35	5977
Onsite Vehicle Exhaust	0.18	1.63	0.79	0.00	3.57	0.38	297
Offsite Vehicle Exhaust	0.91	8.47	1.43	0.01	0.53	0.17	1307
Fugitive Emissions	0.11	---	---	---	2.63	1.38	---
Total Emissions	**8.17**	**36.7**	**51.9**	**0.08**	**9.28**	**4.29**	**7581**
CEQA Threshold	**54**	**---**	**54**	**---**	**82**	**54**	**---**
Threshold Exceeded (Y/N)	**No**	**No**	**No**	**No**	**No**	**No**	**No**

Sources	Average Annual Emissions (tpy)						
	ROG	CO	NOx	SOx	PM10	PM2.5	CO2e
Equipment Exhaust	0.61	2.33	4.35	0.01	0.22	0.21	523
Onsite Vehicle Exhaust	0.02	0.14	0.07	0.00	0.31	0.03	26
Offsite Vehicle Exhaust	0.08	0.74	0.13	0.00	0.05	0.02	114
Fugitive Emissions	0.01	---	---	---	0.23	0.12	---
Total Emissions	**0.71**	**3.21**	**4.54**	**0.01**	**0.81**	**0.38**	**663**

Civil Work Fugitive PM Emission Factors

Soil handling

Emission Factor [lb/cu. yd] = k x 0.0032 x (mean wind speed [mi/hr] / 5)$^{1.3}$ / (moisture [%] / 2)$^{1.4}$ x (number drops per ton) x (density [ton/cu. yd])
Reference: AP-42, Equation (1), Section 13.2.4, November 2006

Table 1a Soil Handling Reference Data		
Parameter	**Value**	**Basis**
Particle Size Multiplier for PM10 (k)	0.35	AP-42 Chapter 13.2.4
Particle Size Multiplier for PM2.5 (k)	0.053	AP-42 Chapter 13.2.4
Mean Wind Speed (mph)	5	Default, CalEEMod User Manual Appendix D, Table 1.1
Moisture (%)	12	Default, CalEEMod User Manual Appendix A
Number Drops	4	Assumed
Soil Density (ton/cu. yd)	1.264	Default, CalEEMod User Manual Appendix A

Table 1b Soil Handling Emission Factors		
PM10 Emission Factor (Uncontrolled)	4.61E-04	lb/cu. yd
PM2.5 Emission Factor (Uncontrolled)	6.98E-05	lb/cu. yd
Mitigation Efficiency	0%	
Controlled PM10 Emission Factor	4.61E-04	lb/cu. yd
Controlled PM2.5 Emission Factor	6.98E-05	lb/cu. yd

Bulldozing

Emission Factor [lb/hr] = k x C x (silt content [%])^{A} / (moisture)^{B}
Reference: AP-42, Table 11.9-1, October 1998

Table 4-E Bulldozing Reference Data			
Parameter	**PM10**	**PM2.5**	**Basis**
Scaling Factor (k)	0.75	0.105	AP-42, Section 11.9, Table 11.9-1, July 1998
Coefficient (C)	1	5.7	AP-42, Section 11.9, Table 11.9-1, July 1998
Exponent A	1.5	1.2	AP-42, Section 11.9, Table 11.9-1, July 1998
Exponent B	1.4	1.3	AP-42, Section 11.9, Table 11.9-1, July 1998
Silt Content (%)	6.9	6.9	AP-42, Section 11.9, Table 11.9-3, July 1998 for overburden
Moisture (%)	7.9	7.9	AP-42, Section 11.9, Table 11.9-3, July 1998, for overburden

Table 4-F Bulldozing Emission Factors			
	PM10	**PM2.5**	**Units**
Uncontrolled Emission Factor	0.753	0.414	lb/hr
Mitigation Efficiency	0%	0%	%
Controlled Emission Factor	0.753	0.414	lb/hr

Grading

Emission Factor [lb/VMT] = k x A x (mean vehicle speed [mi/hr])^{B}
Reference: AP-42, Section 11.9, Table 11.9-1, July 1998

Table 4-E Grading Reference Data			
Parameter	**PM10**	**PM2.5**	**Basis**
Scaling Factor (k)	0.6	0.031	AP-42, Section 11.9, Table 11.9-1, July 1998
Particle Size Multiplier (A)	0.051	0.04	AP-42, Section 11.9, Table 11.9-1, July 1998
Exponent B	2	2.5	AP-42, Section 11.9, Table 11.9-1, July 1998
Mean vehicle Speed (mph)	7.1	7.1	AP-42, Section 11.9, Table 11.9-3, July 1998
Blade Width (ft)	12	12	Default, CalEEMod User Manual Appendix A

Table 4-F Grading Emission Factors			
Emission Factor	**PM10**	**PM2.5**	**Unit**
Uncontrolled Emission Factor	1.061	0.115	lb/acre
Mitigation Efficiency	0%	0%	
ControlledEmission Factor	1.061	0.115	lb/acre

Notes:

The above equations are used in CalEEMod model to estimate fugitive emissions from demolition of structures.

Fugitive VOC Emission Factors

Architectural Coating VOC Emission Factor			
Parameter	**Value**	**Unit**	**Basis**
Paint VOC Content	250	g/l	BAAQMD Architectural Coating Regulation Requirement
Coating Coverage	180	sq.ft/gal	Default, CalEEMod User Manual Appendix A
Fugitive VOC Emission Factor	0.012	lb/sq.ft	Default, CalEEMod User Manual Appendix A

Asphalt Paving VOC Emissions Factor			
Parameter	**Value**	**Unit**	**Basis**
Fugitive VOC Emission Factor	2.620	lb/acre	Basis: Default, CalEEMod User Manual Appendix A

Equipment and Vehicle Emission Factors (2013)

Equipment	Engine Rating (HP)	OFFROAD Category	Emission Factors (lb/hr)[1]							Fuel Consumption
			ROG	CO	NOx	SOx	PM10	PM2.5[2]	CO2e	gal/hr
Track Hoes (225)	300	Crawler Tractors	0.17018	0.63617	1.49875	0.00170	0.05813	0.05348	173.85033	11.77614
Bulldozer (D-5)	90	Crawler Tractors	0.08657	0.32517	0.51455	0.00052	0.04534	0.04171	44.21753	3.01908
Front End loader (644)	200	Rubber Tired Loaders	0.08425	0.24664	0.81170	0.00112	0.02791	0.02568	99.88438	6.75126
Air Compressor (185)	50	Air Compressors	0.06041	0.16870	0.14804	0.00019	0.01452	0.01336	15.02281	1.03664
Wheel Compactor (small)	60	Other Construction Equipment	0.06734	0.35324	0.47029	0.00063	0.03797	0.03493	54.25431	3.69356
50 Ton Hydraulic Crane	173	Cranes	0.06905	0.32272	0.52007	0.00061	0.02980	0.02742	53.91338	3.66769
25 Ton Hydraulic Crane	130	Cranes	0.06905	0.32272	0.52007	0.00061	0.02980	0.02742	53.91338	3.66769
120 Ton Crawler Crane	600	Cranes	0.17567	0.59574	1.64500	0.00204	0.05921	0.05447	203.19050	13.74438
Welding Machine (300)	30	Welders	0.06424	0.18246	0.16897	0.00022	0.01581	0.01455	17.49801	1.20501
Man Lift (40')	30	Aerial Lifts	0.03874	0.11649	0.12262	0.00017	0.01025	0.00943	13.20215	0.90544
Concrete Pumper (trailer mt.)	30	Pumps	0.06900	0.20670	0.21528	0.00030	0.01815	0.01670	23.11445	1.58573
Forklift - Telehandler TL1255	130	Forklifts	0.03794	0.22116	0.28300	0.00042	0.01628	0.01498	37.59458	2.55555
Bobcat - S770	50	Skid Steer Loaders	0.03461	0.15146	0.15254	0.00022	0.01051	0.00967	17.14806	1.17367
Excavator - 345BL/C	300	Excavators	0.11613	0.35283	0.98828	0.00154	0.03455	0.03179	156.68225	10.58421
Loader - 950G/H	200	Rubber Tired Loaders	0.08425	0.24664	0.81170	0.00112	0.02791	0.02568	99.88438	6.75126
Light Plant - 4,000 Watt Diesel	20	Light	0.06652	0.20859	0.23229	0.00033	0.01833	0.01686	25.30906	1.73303
Scraper - 613C	300	Scrapers	0.21329	0.81078	1.89360	0.00211	0.07357	0.06769	215.56795	14.60463
Off Road Truck - 730 CAT	300	Off-Highway Trucks	0.14523	0.42585	1.19594	0.00179	0.04241	0.03902	182.57509	12.33639
Dozer - D6N LGP	120	Crawler Tractors	0.08657	0.32517	0.51455	0.00052	0.04534	0.04171	44.21753	3.01908
Dozer - D5HXL W/RIPPERS	110	Crawler Tractors	0.08657	0.32517	0.51455	0.00052	0.04534	0.04171	44.21753	3.01908
Blade - 140H/M with GPS	170	Graders	0.09821	0.49170	0.74935	0.00093	0.04227	0.03889	83.13893	5.65398
Loader - John Deere 210 - 4/1 Bucket	90	Rubber Tired Loaders	0.06498	0.27793	0.40270	0.00046	0.03515	0.03234	39.55974	2.69776
Roller - (Dirt) 84" SD	90	Rollers	0.06601	0.27198	0.41860	0.00046	0.03572	0.03286	39.61205	2.70081
Paver - CAT AP800	150	Pavers	0.11898	0.52104	0.92177	0.00097	0.05148	0.04736	86.09952	5.85923
Excavator - 320CL	250	Excavators	0.08317	0.23706	0.76051	0.00120	0.02492	0.02293	106.37955	7.18656
Excavator - Compaction Wheel	0	Excavators	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Compactor - 32" Walk Behind	15	Other Construction Equipment	0.00788	0.04131	0.04932	0.00011	0.00191	0.00176	6.78076	0.46124
Paver - Lee boy Paver	60	Pavers	0.09286	0.33851	0.55942	0.00054	0.04880	0.04490	46.49592	3.17456
Roller - (AC) 42"/47"	60	Rollers	0.06601	0.27198	0.41860	0.00046	0.03572	0.03286	39.61205	2.70081
Loader - 966G/H	200	Rubber Tired Loaders	0.08425	0.24664	0.81170	0.00112	0.02791	0.02568	99.88438	6.75126
Track - Hydraulic Tie Jig	0	Other Construction Equipment	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Track - Low Railer	120	Other Construction Equipment	0.06734	0.35324	0.47029	0.00063	0.03797	0.03493	54.25431	3.69356
Track - Production Tamper	200	Other Construction Equipment	0.09720	0.35038	1.01664	0.00167	0.03288	0.03025	170.37094	11.50093
Track - Regulator	150	Other Construction Equipment	0.06261	0.39312	0.53628	0.00080	0.02811	0.02586	71.42018	4.85059
Loader - Backhoe - 420D	90	Tractors/Loaders/Backhoes	0.04648	0.23621	0.30559	0.00041	0.02564	0.02359	34.71473	2.36493

Vehicles	Fuel	EMFAC Category[3]	Emission Factors (lb/mi)[4]							Fuel Consumption
			ROG	CO	NOx	SOx	PM10	PM2.5	CO2e[5]	gal/mi
Onsite 1/2 Ton Pick-up Truck	GAS	LDT2	0.00062	0.00652	0.00079	0.00001	0.01614	0.00165	1.03463	0.05676
Onsite Dump Truck (Tandum)	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.01689	0.00227	3.97538	0.18054
Onsite Shuttle Truck	GAS	LDT1	0.00126	0.01162	0.00105	0.00001	0.01614	0.00165	0.87092	0.04853
Onsite Concrete Trucks (8 yd)	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.01689	0.00227	3.97538	0.18054
Onsite Truck - Foreman/Superintendent/PM	GAS	LDT2	0.00062	0.00652	0.00079	0.00001	0.01614	0.00165	1.03463	0.05676
Onsite Truck - Crew w/Small Tools	GAS	LDT2	0.00062	0.00652	0.00079	0.00001	0.01614	0.00165	1.03463	0.05676
Onsite Truck - Water	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.01689	0.00227	3.97538	0.18054
Onsite Asphalt Delivery	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.01689	0.00227	3.97538	0.18054
Offsite Concrete Trucks (8 yd)	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.00106	0.00072	3.97538	0.18054
Offsite 18 Wheeler (Deliveries)	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.00106	0.00072	3.97538	0.18054
Offsite Asphalt Delivery	DSL	T7	0.00116	0.00522	0.02383	0.00004	0.00106	0.00072	3.97538	0.18054
Offsite Construction Worker Commute Vehicles	GAS	LDA	0.00054	0.00516	0.00045	0.00001	0.00031	0.00009	0.73759	0.04180

1. Load Factor Correction of 0.67 applied to emissions estimated using OFFROAD2007 emission factors - http://www.arb.ca.gov/regact/2010/offroadlsi10/offroadappd.pdf

OFFROAD2007 Load Factor Correction	0.67

2. PM2.5 Fraction of PM10

	Value	Source
Gasoline Exhaust	0.756	from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5
Diesel Exhaust	0.920	and PM 2.5 Significance Thresholds, SCAQMD, October 2006

3. Vehicle emission factors were compiled by running the California Air Resources Board's EMFAC2011 Emissions Model with EMFAC2007 vehicle categories and dividing calculated daily emissions by daily vehicle-miles-traveled.

4. All vehicle emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions, and PM10 and

5. N_2O and CH_4 factors from 2013 Climate Registry Default Emission Factors, Released: January 2, 2013. http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

Parameters	Onsite Unpaved Road Dust Emission Factor	
	PM10	PM2.5
Particle Size Multiplier (k) - lb/VMT	1.5	0.15
Silt Content (%)	0.03	0.03
Mean Vehicle Weight (W) - tons	20	20
Emission Factor	1.60E-02	1.60E-03

AP-42, Section 13.2.2, November 2006

Parameters	Offsite Paved Road Dust Emission Factor	
	PM10	PM2.5
Particle Size Multiplier (k) - lb/VMT	0.0022	0.00054
Silt Loading (sL) - g/m^2	0.03	0.03
Average Fleet Weight (W) - tons	2.2	2.2
Emission Factor	2.02E-04	4.96E-05

AP-42, Section 13.2.1, January 2011

Fugitive Emissions Activity Rate Estimate

Activity	Value	Unit	Reference
Soil handled	23132	cu. yd Cut	per Sue G's email - 3/27/2013
	711	cu. yd Fill	per Sue G's email - 3/27/2013
Soil hauled	23843	cu. yd	
Truck Capacity	20	cu. yd	URBEMIS/CalEEMOD Default
Asphalt paving	3.9	Acres	per Sue G's email - 3/27/2013
Grading (Acres)	3.9	Acres	per Sue G's email - 3/27/2013
Architectural Coating	800.0	sq. ft	

Disturbed Area Estimate	Value	Unit	Reference
Approximate Distance from Loading rack to Facility Boundary	0.96	miles	Google Earth
	5069	feet	
Approximate Width of Distrubed Area	111	feet	from CBR project drawings
Approximate Area Disturbed/Graded	13	Acres	

Fugitive Emissions

Fugitive Activity Rate		
Source	**Activity Rate Unit**	**Total for Project**
Soil Handling	cu. yd	23,843
Bulldozing/Scraping	hr	578
Grading	Acres	13
Architectural Coating	sq. ft	800
Asphalt Paving	Acres	3.9

Fugitive PM10 Emissions				
Source	**Emisison Factor (lb/Unit)**	**Total Emissions (lb)**	**Average Annual Emissions (tpy)**	**Average Daily Emissions (lb/day)**
Soil Handling	4.61E-04	11	0.005	0.06
Bulldozing	7.53E-01	435	0.218	2.49
Grading	1.06E+00	14	0.007	0.08
Total		**460**	**0.23**	**2.63**

Fugitive PM2.5 Emissions				
Source	**Emisison Factor (lb/Unit)**	**Total Emissions (lb)**	**Average Annual Emissions (tpy)**	**Average Daily Emissions (lb/day)**
Soil Handling	6.98E-05	2	0.001	0.01
Bulldozing	4.14E-01	239	0.120	1.37
Grading	1.15E-01	1	0.001	0.01
Total		**242**	**0.12**	**1.38**

Fugitive VOC Emissions				
Source	**Emisison Factor (lb/Unit)**	**Total Emissions (lb)**	**Average Annual Emissions (tpy)**	**Average Daily Emissions (lb/day)**
Architectural Coating	1.16E-02	9	0.005	0.05
Asphalt Paving	2.62E+00	10	0.005	0.06
Total		**19**	**0.01**	**0.11**

Equipment and Vehicle Activity Rate Data

Construction Duration	25	weeks	June 13 - Dec 31
Number of working days	7	workdays per week	
Number of hours/shirt	10	hours/shift	
Number of shifts/day	2	shifts/day	

Offroad Equipment	Engine Rating (HP)	OFFROAD Category	Fuel	Total Equipment-Hours over Project Duration
			GAS/DSL	
Track Hoes (225)	300	Crawler Tractors	DSL	700
Bulldozer (D-5)	90	Crawler Tractors	DSL	100
Front End loader (644)	200	Rubber Tired Loaders	DSL	800
Air Compressor (185)	50	Air Compressors	DSL	400
Wheel Compactor (small)	60	Other Construction Equipment	DSL	200
50 Ton Hydraulic Crane	173	Cranes	DSL	1000
25 Ton Hydraulic Crane	130	Cranes	DSL	2200
120 Ton Crawler Crane	600	Cranes	DSL	700
Welding Machine (300)	30	Welders	DSL	1100
Man Lift (40')	30	Aerial Lifts	DSL	1000
Concrete Pumper (trailer mt.)	30	Pumps	DSL	50
Forklift - Telehandler TL1255	130	Forklifts	DSL	1608
Bobcat - S770	50	Skid Steer Loaders	DSL	834
Excavator - 345BL/C	300	Excavators	DSL	528
Loader - 950G/H	200	Rubber Tired Loaders	DSL	580
Light Plant - 4,000 Watt Diesel	20	Light	DSL	1400
Scraper - 613C	300	Scrapers	DSL	186
Off Road Truck - 730 CAT	300	Off-Highway Trucks	DSL	386
Dozer - D6N LGP	120	Crawler Tractors	DSL	212
Dozer - D5HXL W/RIPPERS	110	Crawler Tractors	DSL	80
Blade - 140H/M with GPS	170	Graders	DSL	368
Loader - John Deere 210 - 4/1 Bucket	90	Rubber Tired Loaders	DSL	528
Roller - (Dirt) 84" SD	90	Rollers	DSL	488
Paver - CAT AP800	150	Pavers	DSL	200
Excavator - 320CL	250	Excavators	DSL	110
Compactor - 32" Walk Behind	15	Other Construction Equipment	DSL	80
Paver - Lee boy Paver	60	Pavers	DSL	40
Roller - (AC) 42"/47"	60	Rollers	DSL	136
Loader - 966G/H	200	Rubber Tired Loaders	DSL	210
Track - Low Railer	120	Other Construction Equipment	DSL	302
Track - Production Tamper	200	Other Construction Equipment	DSL	302
Track - Regulator	150	Other Construction Equipment	DSL	302
Loader - Backhoe - 420D	90	Tractors/Loaders/Backhoes	DSL	370

Onroad Vehicles	EMFAC (on road vehicle) Category	Fuel: GAS / DSL	Total Equipment-Hours over Project Duration	Estimated speed (MPH)
1/2 Ton Pick-up Truck	LDT2	GAS		5
Dump Truck (Tandum)	T7	DSL	Based on Quantity of Dirt Hauled and Truck Capacity	
Shuttle Truck	LHD1	DSL	1600	5
Concrete Trucks (8 yd)	T7	DSL	Based on Quantity of Concrete Hauled and Truck Capacity	
Truck - Foreman/Superintendent/PM	LDT2	GAS	1824	5
Truck - Crew w/Small Tools	LDT2	GAS	2650	5
Truck - Water	T7	DSL	320	5
Asphalt Delivery	T7	DSL	Based on Quantity of Asphalt Hauled and Truck Capacity	
18 Wheeler (Deliveries)	T7	DSL	180	5
Construction Worker Commute Vehicles	LDA	GAS	Based on man-hours for project	

Concrete Requirement

Manholes, compr. relocation, sub/transformer fndn, fire monitor, custody transfer containment foundation, pipe supports	376	cu. Yd
Tank containment wall footings	420	cu. Yd
Pump pit, etc.	250	cu. Yd
Total Concrete Requirement	1046	cu. Yd
Concrete Truck Capacity	8	cu. Yd
Concrete Supplier - Syar Industries at 885 Lake Herman Rd, Vallejo, CA 94591		
One-way Offsite Concrete Truck Trip Length	4.1	miles

Total Asphalt Requirement	4375	tons
Asphalt Truck Capacity	25	ton/truck
Asphalt Supplier - County Quarry		
One-way Offsite Asphalt Truck Trip Length	8	miles

Construction Worker Trips		
OSBL Manhours	37500	man-hours/project
ISBL Manhours	76300	man-hours/project @ 16 wks, 10 hrs/day, 7 day/wk
Work hours/day	10	
Total Project Worker Trips	11380	

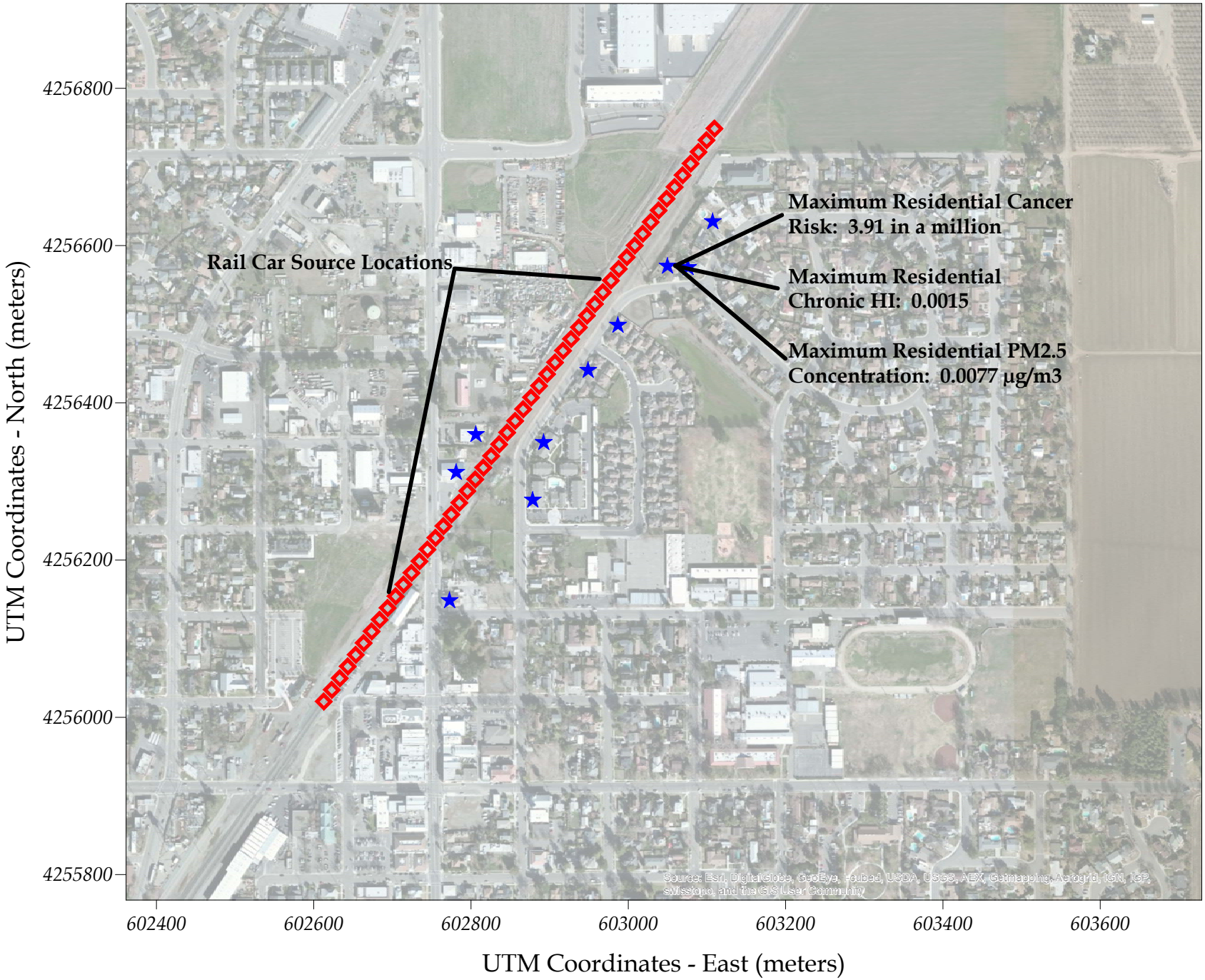
URBEMIS Material Delivery Truck Default Trip Length (	7.3	miles/one-way
Worker Commute Trip Distance (H-W)	12.4	miles/one-way
Onsite Truck Trip Length	2	miles (Assumed)

Equipment and Vehicle Exhaust Emissions

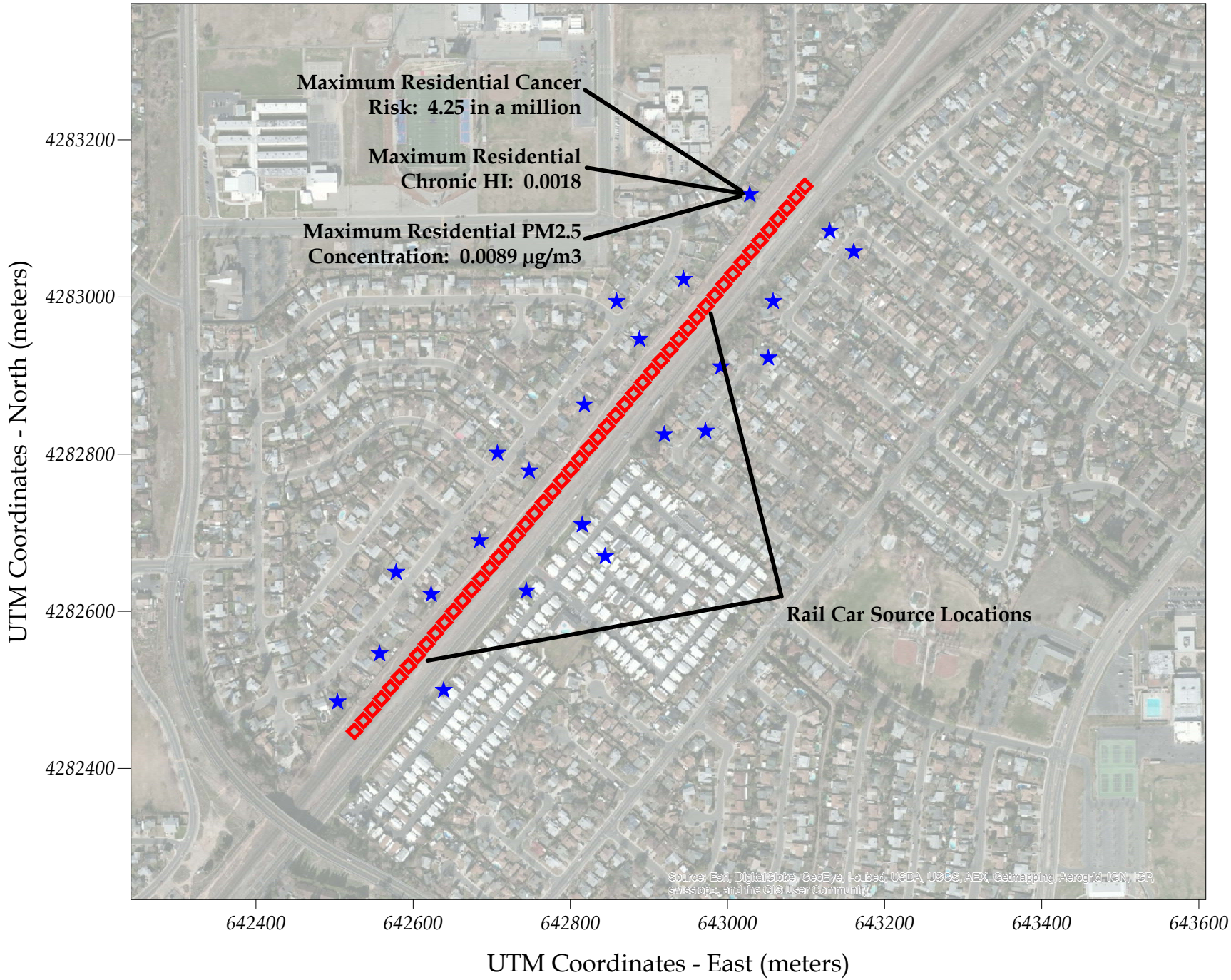
Construction Duration	25	weeks
Number of working days	7	workdays per week
Number of hours/shirt	10	hours/shift
Number of shifts/day	2	shifts/day

Offroad Equipment	Total Equipment-Hours over Project Duration	Total Emissions over The Project Duration (lb/Project)							Fuel Consumption (gal/Project)	
		ROG	CO	NOx	SOx	PM10	PM2.5	CO2e	Diesel	Gasoline
Track Hoes (225)	700	119.12	445.32	1049.12	1.19	40.69	37.44	121695	8243	0
Bulldozer (D-5)	100	8.66	32.52	51.45	0.05	4.53	4.17	4422	302	0
Front End loader (644)	800	67.40	197.31	649.36	0.90	22.33	20.54	79908	5401	0
Air Compressor (185)	400	24.16	67.48	59.22	0.08	5.81	5.35	6009	415	0
Wheel Compactor (small)	200	13.47	70.65	94.06	0.13	7.59	6.99	10851	739	0
50 Ton Hydraulic Crane	1000	69.05	322.72	520.07	0.61	29.80	27.42	53913	3668	0
25 Ton Hydraulic Crane	1100	75.95	354.99	572.07	0.67	32.78	30.16	59305	4034	0
120 Ton Crawler Crane	350	61.48	208.51	575.75	0.71	20.72	19.07	71117	4811	0
Welding Machine (300)	1100	70.66	200.70	185.87	0.25	17.39	16.00	19248	1326	0
Man Lift (40')	1000	38.74	116.49	122.62	0.17	10.25	9.43	13202	905	0
Concrete Pumper (trailer mt.)	50	3.45	10.34	10.76	0.01	0.91	0.83	1156	79	0
Forklift - Telehandler TL1255	1608	61.00	355.62	455.06	0.68	26.18	24.08	60452	4109	0
Bobcat - S770	834	28.86	126.32	127.22	0.18	8.76	8.06	14301	979	0
Excavator - 345BL/C	528	61.32	186.30	521.81	0.81	18.24	16.78	82728	5588	0
Loader - 950G/H	580	48.86	143.05	470.79	0.65	16.19	14.89	57933	3916	0
Light Plant - 4,000 Watt Diesel	1400	93.13	292.03	325.21	0.46	25.66	23.61	35433	2426	0
Scraper - 613C	186	39.67	150.80	352.21	0.39	13.68	12.59	40096	2716	0
Off Road Truck - 730 CAT	386	56.06	164.38	461.63	0.69	16.37	15.06	70474	4762	0
Dozer - D6N LGP	212	18.35	68.94	109.08	0.11	9.61	8.84	9374	640	0
Dozer - D5HXL W/RIPPERS	80	6.93	26.01	41.16	0.04	3.63	3.34	3537	242	0
Blade - 140H/M with GPS	368	36.14	180.94	275.76	0.34	15.56	14.31	30595	2081	0
Loader - John Deere 210 - 4/1 Bucket	528	34.31	146.75	212.62	0.24	18.56	17.08	20888	1424	0
Roller - (Dirt) 84" SD	488	32.21	132.73	204.28	0.23	17.43	16.04	19331	1318	0
Paver - CAT AP800	200	23.80	104.21	184.35	0.19	10.30	9.47	17220	1172	0
Excavator - 320CL	110	9.15	26.08	83.66	0.13	2.74	2.52	11702	791	0
Compactor - 32" Walk Behind	80	0.63	3.30	3.95	0.01	0.15	0.14	542	37	0
Paver - Lee boy Paver	40	3.71	13.54	22.38	0.02	1.95	1.80	1860	127	0
Roller - (AC) 42"/47"	136	8.98	36.99	56.93	0.06	4.86	4.47	5387	367	0
Loader - 966G/H	210	17.69	51.79	170.46	0.24	5.86	5.39	20976	1418	0
Track - Low Railer	302	20.34	106.68	142.03	0.19	11.47	10.55	16385	1115	0
Track - Production Tamper	302	29.35	105.82	307.03	0.50	9.93	9.14	51452	3473	0
Track - Regulator	302	18.91	118.72	161.96	0.24	8.49	7.81	21569	1465	0
Loader - Backhoe - 420D	370	17.20	87.40	113.07	0.15	9.49	8.73	12844	875	0

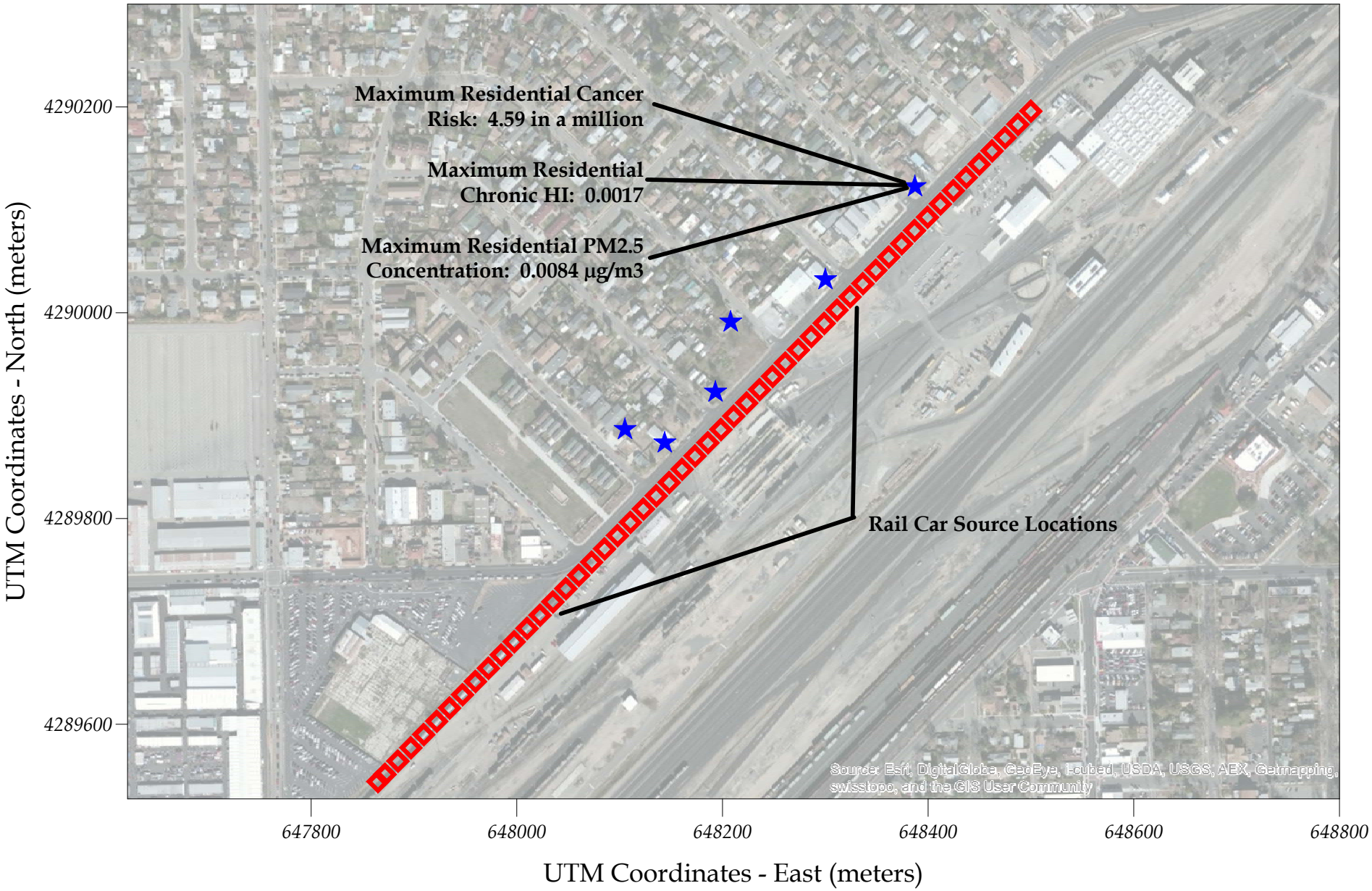
Vehicles	Total VMT over Project Duration	Total Emissions over The Project Duration (lb/Project)							Fuel Consumption (gal/Project)	
		ROG	CO	NOx	SOx	PM10	PM2.5	CO2e	Diesel	Gasoline
Onsite 1/2 Ton Pick-up Truck	3500	2.18	22.81	2.77	0.04	56.48	5.77	3621	0	199
Onsite Dump Truck (Tandum)	2384	2.76	12.45	56.81	0.09	40.27	5.42	9478	430	0
Onsite Shuttle Truck	8000	10.05	92.95	8.42	0.07	129.16	13.24	6967	0	388
Onsite Concrete Trucks (8 yd)	262	0.30	1.37	6.23	0.01	4.42	0.59	1040	47	0
Onsite Truck - Foreman/Superintendent/PM	9120	5.69	59.43	7.21	0.10	147.17	15.03	9436	0	518
Onsite Truck - Crew w/Small Tools	13250	8.26	86.34	10.48	0.14	213.82	21.84	13709	0	752
Onsite Truck - Water	1600	1.85	8.36	38.12	0.06	27.02	3.64	6361	289	0
Onsite Asphalt Delivery	350	0.40	1.83	8.34	0.01	5.91	0.80	1391	63	0
Offsite 18 Wheeler (Deliveries)	1314	1.52	6.86	31.31	0.05	1.39	0.95	5224	237	0
Offsite Asphalt Delivery	2800	3.24	14.62	66.72	0.11	2.96	2.02	11131	506	0
Offsite Concrete Trucks (8 yd)	1072	1.24	5.60	25.55	0.04	1.13	0.77	4262	194	0
Offsite Construction Worker Commute Vehicles	282224	153.61	1454.93	126.86	2.21	86.77	26.73	208166	0	11797
Total Project Equipment Emissions	lb/project	1218.75	4655.42	8692.99	11.33	447.92	412.09	1045904	70964	0
Total Project Onsite Vehicles Emissions	lb/project	31.49	285.53	138.38	0.52	624.24	66.32	52003	830	1857
Total Project Offsite Vehicles Emissions	lb/project	159.60	1482.02	250.43	2.41	92.26	30.46	228783	936	11797
Total Project All Soucrces Emissions	lb/project	1409.85	6422.96	9081.79	14.27	1164.42	508.87	1326690	72730	13654
Average Daily Equipment Emissions	lb/day	6.96	26.60	49.67	0.06	2.56	2.35	5977	406	0
Average Daily Onsite Vehicles Emissions	lb/day	0.18	1.63	0.79	0.00	3.57	0.38	297	5	11
Average Daily Offsite Vehicles Emissions	lb/day	0.91	8.47	1.43	0.01	0.53	0.17	1307	5	67
Average Daily All Soucrces Emissions	lb/day	8.06	36.70	51.90	0.08	6.65	2.91	7581	416	78
Average Annual Equipment Emissions	tpy	0.61	2.33	4.35	0.01	0.22	0.21	523		
Average Annual Onsite Vehicles Emissions	tpy	0.02	0.14	0.07	0.00	0.31	0.03	26		
Average Annual Offsite Vehicles Emissions	tpy	0.08	0.74	0.13	0.00	0.05	0.02	114		
Average Annual All Soucrces Emissions	tpy	0.70	3.21	4.54	0.01	0.58	0.25	663		



Yolo Solono County Rail Source Locations and Modeling Health Risk Results
Valero Crude by Rail Project
Benicia, California



Sacramento County Rail Source Locations and Modeling Health Risk Results
Valero Crude by Rail Project
Benicia, California



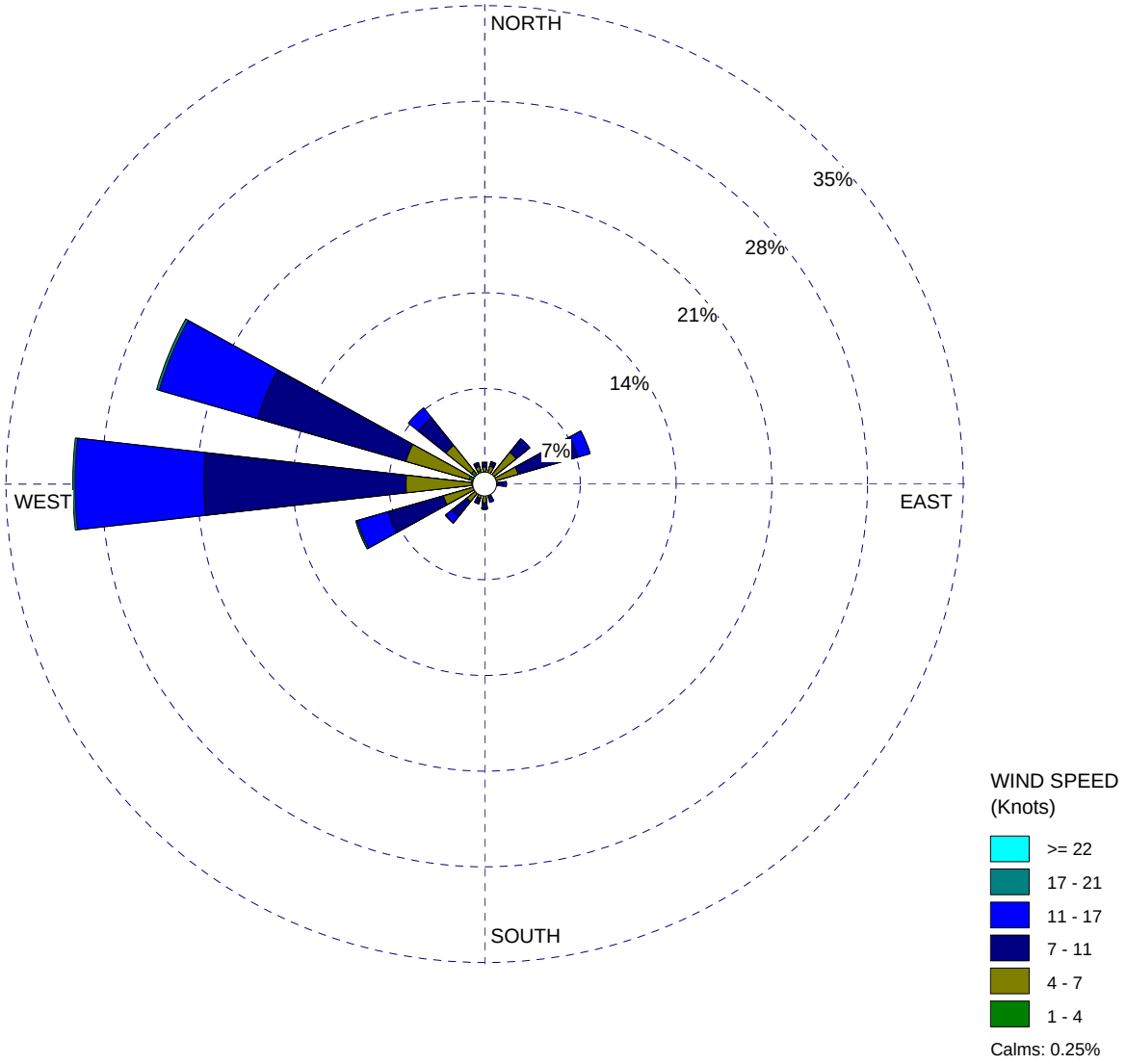
Placer County Rail Source Locations and Modeling Health Risk Results
Valero Crude by Rail Project
Benicia, California

WIND ROSE PLOT:

Valero Refinery, Benicia, California

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
2000, 2001, 2003, 2004	**Start Date: 1/1/2000 - 00:00** **End Date: 12/31/2005 - 23:00**	MODELER:	
	CALM WINDS: **0.25%**	TOTAL COUNT: **43824 hrs.**	
	AVG. WIND SPEED: **8.59 Knots**	DATE: **6/10/2014**	PROJECT NO.:

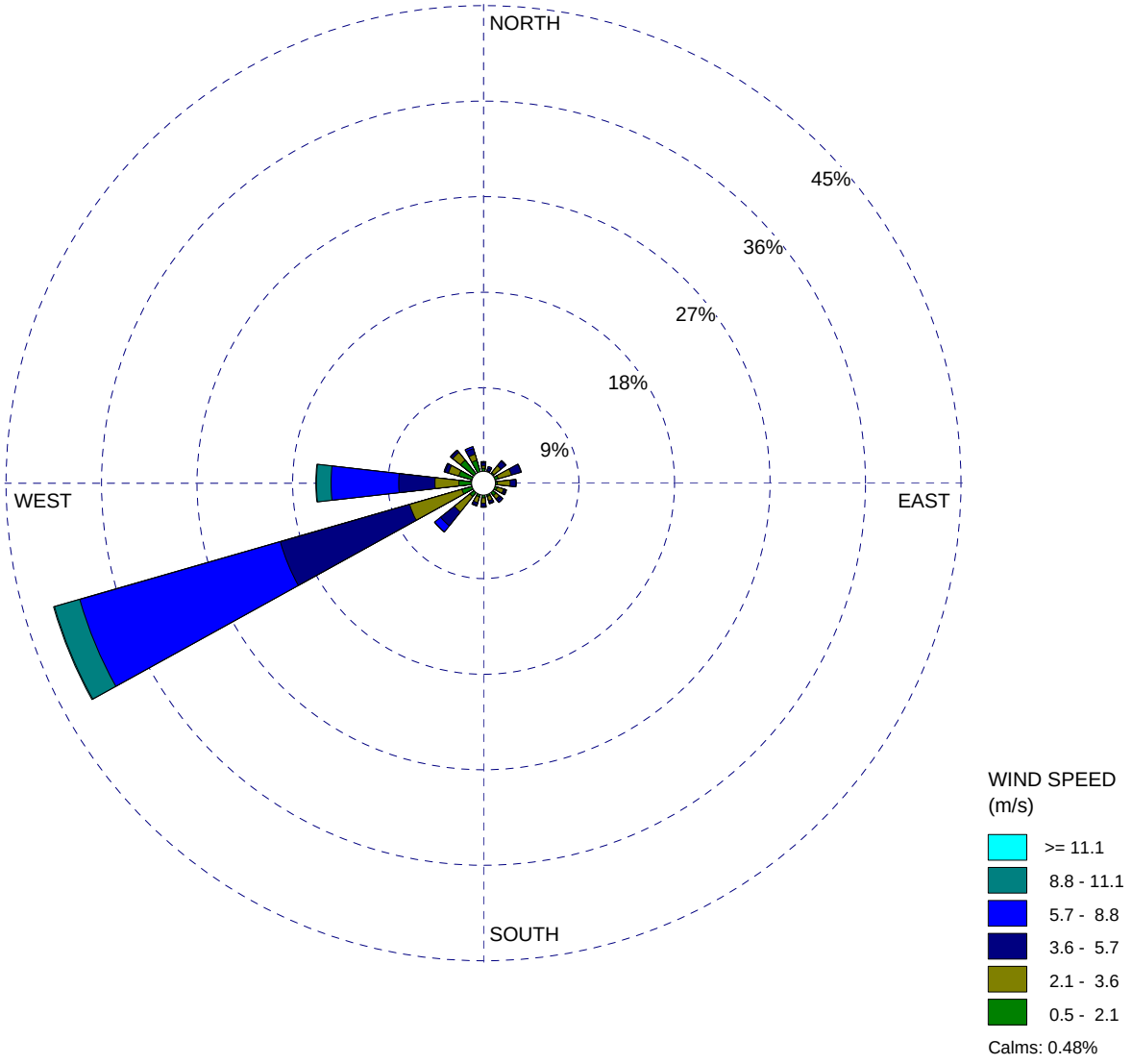
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Suisun City, California

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
2001 through 2005	**Start Date: 1/1/2001 - 00:00** **End Date: 12/31/2005 - 23:00**	MODELER:	
	CALM WINDS: **0.48%**	TOTAL COUNT: **43824 hrs.**	
	AVG. WIND SPEED: **4.30 m/s**	DATE: **6/12/2014**	PROJECT NO.:

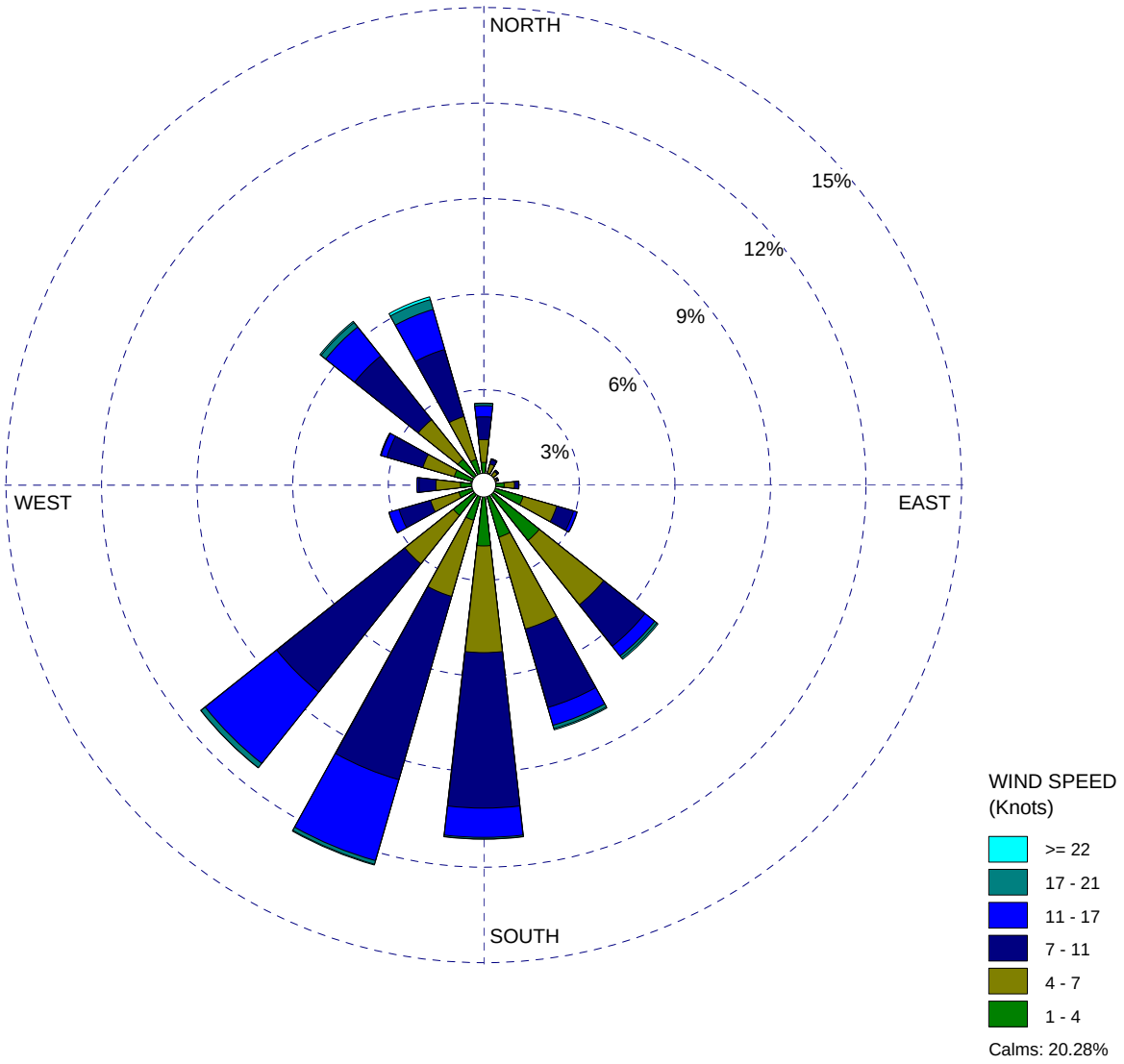
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Sacramento Executive Airport

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
2001 through 2005	**Start Date: 1/1/1985 - 00:00** **End Date: 12/31/1989 - 23:00**	MODELER:	
	CALM WINDS: **20.28%**	TOTAL COUNT: **43824 hrs.**	
	AVG. WIND SPEED: **6.06 Knots**	DATE: **6/12/2014**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Appendix E.2

Marine Vessel Criteria Pollutant and GHG Baseline Emissions

ESA

Public Copy

Total Emissions Over 3-Year Baseline Period

Sources	Total Emissions Over Baseline Period (lb)											
	Within SFBAAB (Sea Buoy - Valero Benicia Terminal)									CO_2e Within SFBAAB (Sea Buoy - Valero Benicia Terminal)	CO_2e Within CA Coastal Boundary - Sea Buoy	
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O			
OGV - Main Engine	218,239	18,710	14,480	5,221	4,809	29,772	1,299	9,213,764	469	9,386,595	22,235,537	9,386,595
OGV - Auxiliary Engine	292,408	26,445	12,501	9,136	8,414	50,486	2,164	16,588,373	697	16,849,940	2,666,586	16,849,940
OGV - Auxiliary Boiler	74,692	7,568	4,162	7,568	7,378	115,501	1,135	36,702,931	2,845	37,608,850	0	37,608,850
Tugboats	85,823	25,437	6,739	4,248	4,248	62	112	5,485,412	247	5,564,409	0	5,564,409
Total	**671,162**	**78,161**	**37,882**	**26,172**	**24,849**	**195,822**	**4,710**	**67,990,480**	**4,259**	**69,409,794**	**24,902,122**	69,409,794
Emission Factor (lb/kbbl)	**7.19**	**0.84**	**0.41**	**0.28**	**0.27**	**2.10**	**0.05**	**728**	**0.05**	**743**	**267**	

Total crude delivered by marine vessel during 3-year baseline period: 93,361,985 barrels
Total annual average crude delivered by marine vessel during : 31,120,662 barrels

Annual Average Emissions Over Baseline Period

Sources	Annual Average Emissions Over Baseline Period (tons/year)										
	Within SFBAAB (Sea Buoy - Valero Benicia Terminal)									CO_2e Within SFBAAB (Sea Buoy - Valero Benicia Terminal)	CO_2e Within CA Coastal Boundary - Sea Buoy
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O		
OGV - Main Engine	36	3	2	1	1	5	0	1,536	0	1,564	3,706
OGV - Auxiliary Engine	48.7	4.41	2.08	1.52	1.40	8.41	0.36	2,765	0.12	2,808	444
OGV - Auxiliary Boiler	12.4	1.26	0.69	1.26	1.23	19.25	0.19	6,117	0.47	6,268	0
Tugboats	14.3	4.24	1.12	0.71	0.71	0.01	0.02	914	0.04	927	0
Total	**111.9**	**13.03**	**6.31**	**4.36**	**4.14**	**32.64**	**0.79**	**11,332**	**0.71**	**11,568**	**4,150**

Public Copy

Average Emissions per Visit Over Baseline Period

Sources	Average Emissions Over Baseline Period (lb/visit)										
	Within SFBAAB (Sea Buoy - Valero Benicia Terminal)									CO_2e Within SFBAAB (Sea Buoy - Valero Benicia Terminal)	CO_2e Within CA Coastal Boundary - Sea Buoy
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O		
OGV - Main Engine	827	71	55	20	18	113	5	34,901	2	35,555	84,226
OGV - Auxiliary Engine	1,108	100	47	35	32	191	8	62,835	3	63,826	10,101
OGV - Auxiliary Boiler	283	29	16	29	28	438	4	139,026	11	142,458	0
Tugboats	325	96	26	16	16	0.2	0	20,778	1	21,077	0
OGV - Total	2,217	200	118	83	78	742	17	236,762	15	241,839	94,326

Projected Emissions Offset by Proposed Crude By Rail Project

	Emissions Offset by 25.55 MMbbls/year of Crude by Rail											
	Within SFBAAB (Sea Buoy - Valero Benicia Terminal)									CO_2e Within SFBAAB (Sea Buoy - Valero Benicia Terminal)	CO_2e Within CA Coastal Boundary - Sea Buoy	Total CO2e: CA Coastal Waters - Valero Benicia Terminal
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O			
Emission Factor (lb/kbbl)	7.19	0.84	0.41	0.28	0.27	2.10	0.05	728	0.05	743	267	1,010
Emissions (tpy)	91.8	10.7	5.18	3.58	3.40	26.8	0.6	9,303	0.6	9,498	3,407	12,905

Note: - Greenhouse gases (GHGs) are calculated as carbon dioxide equivalent (CO_2e) = $CO_2 + 21*CH_4 + 310*N_2O$

21 is the Global Warming Potential of CH_4

310 is the Global Warming Potential of N_2O

GHG Emissions Factor

Baseline Period Crude Imported (bbls)	93,361,985	bbls
CO_2e Within BAAQMD Jurisdiction (Sea Buoy - Valero Benicia Terminal)	69,409,794	lb CO_2e
One-Way Distance: Sea Buoy - Valero Benicia Terminal	49.5	miles
CO_2e Within CA Coastal Boundary - Sea Buoy	24,902,122	lb CO_2e
One-Way Distance: CA Coastal Boundary - Sea Buoy	69.0	miles
Emission Factor for Travel within SFBAAB	3,407	MT CO_2e/MMbbl-kMiles
Emission Factor for Travel in Open Ocean	876	MT CO_2e/MMbbl-kMiles

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Default or Average Tanker Ship Specifications

Ship/Tanker Type	Crude Capacity (barrels)	DWT	Average Aux Engine Rating of ships visiting the Valero Wharf (kW)	Average Max Speed of ships visiting the Valero Wharf (kW)
Handymax		0 to 49,999	2328	14.5
Panamax	500,000	50,000 to 79,999	2616	14.9
Aframax	750,000	80,000 to 119,999	2492	15.0
Suezmax	1,000,000	120,000 to 199,999	3277	15.6
VLCC	2,000,000	200,000 to 299,999	4,502	15.3
ULCC	4,000,000	300,000+	4,502	15.6

VLCC - VERY LARGE CRUDE CARRIER
ULCC - ULTRA LARGE CRUDE CARRIER

Crude Tanker Specific Cargo Capacity Estimate

Description	DWT[1]	Cargo tank capacity (m^3)[1]	Cargo capacity per DWT (m3/DWT)	Specific Cargo Capacity (bbl/DWT)
Suezmax Oil Tanker	166,300	185,447	1.1151	7.01
Oil Tanker	108,000	126,211	1.1686	7.35
Oil Tanker	114,000	126,210	1.1071	6.96
Oil Tanker	70,700	80,400	1.1372	7.15
Oil Tanker	52,600	58,691	1.1158	7.02
Oil Tanker	45,999	53,100	1.1544	7.26
Chemicals and Oil Products Tanker	46,764	52,969	1.1327	7.12
Oil and Chemical Tanker	47,400	53,100	1.1203	7.05
Alaskan class tankers	193,048	210,902	1.0925	6.87
Average				**7.09**

conversion factor:	264.172	gal/m3
conversion factor:	42	gal/bbl

Notes:
1. DWT and cargo tank capacity for oil tankers were obtained from the following websites~
http://www.hb.hr/LinkClick.aspx?fileticket=RetQFnntemc%3D&tabid=74
http://www.nassco.com/products-and-services/comm-dc/bp-tanker-fact-sheet.l
http://www.marinetraffic.com/ais/shipdetails.aspx?MMSI=303656000
Valero to the total cargo capacity of the oil tanker. It was assumed that the oil tanker carries maximum cargo capacity during each call.
3. Maximum cargo capacity = Average specific cargo capacity x DWT

Discharge Rate

DWT	Average Discharge Rate (bbl/hr)
0 -109,999	22707
110,000 - 169,999	22707
170,000 -	22707

Estimated from Quantity of crude oil discharged and recorded discharge time

Public Copy

POLB Air Emissions Inventory for 2011 -Tanker Specifications

Size	Average Model Year	Avg Age (2011 - Model year)	AVG DWT	Max Speed (knots)	Main Eng Rating (kW)	Aux Eng Rating (kW)
Handysize	2004	7	46,314	14.6	8,257	2,328
Panamax	2004	7	70,912	14.8	11,060	2,627
Aframax	2005	6	109,227	15.1	13,319	2,432
Suezmax	2005	6	178,271	15.3	18,587	5,056
VLCC	2003	8	298,571	15.3	25,288	4,502
ULCC	2004	7	311,294	15.6	28,625	4,502

Public Copy

Main Engine Emission Factors

Fuel Switching Regulation

Phase	Effective Date	% Sulfur Content for OGV		Comment
		MGO	MDO	
1	7/1/2009	1.5%	0.5%	No HFO to be used
	8/1/2012	1.0%	0.5%	
2	1/1/2014	0.1%	0.1%	

All main engines on oil tankers are slow speed, category 3 engines with displacement > 30 dm3 and power rating b/w 2,500 kw and 70,000 kW

Main Engine Emission Stand

Tier	For US Flagged Vessels (USEPA Standard for Category 3 Engines)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
1	2004	17	$45 \cdot n^{-0.2}$	9.8
2	2011	14.4	$44 \cdot n^{-0.23}$	7.7
3	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Tier	For Foreign Flagged Vessels (MARPOL Annex VI - not based on category)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
I	2000	17	$45 \cdot n^{-0.2}$	9.8
II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
III	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Tier	For All Flagged Vessels (Combination of USEPA and MARPOL)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0	≤1999			
1	2000 - 2010	17	$45 \cdot n^{-0.2}$	9.8
2	2011 - 2015	14.4	$44 \cdot n^{-0.23}$	7.7
3	2016 -	3.4	$9 \cdot n^{-0.2}$	1.96

Public Copy

Main Engine Emission Factors

Main Engine Emission Factor (g/kW-hr)															
Engine Speed	RPM	Tier	Ship Built Year From	Ship Built Year To	Fuel	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
Slow	<130	0	0	1999	0.5%S MDO	18.1	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	I	2000	2010	0.5%S MDO	17	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	II	2011	2015	0.5%S MDO	14.4	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	0	0	1999	0.1%S MDO	18.1	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	I	2000	2010	0.1%S MDO	17	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	II	2011	2015	0.1%S MDO	14.4	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	III	2016	9999	0.1%S MDO	3.4	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598

All emission factors, except Tier-based NOx and N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Tables II-6 and II-7
Tier-based Nox emission factors are from on MARPOL Annex IV regulations
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.6) x Fuel Correction Factor
(POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Low Load Adjustment Multipliers (Used when Load factor < 20%)

Load Factor (%)	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O
2	4.63	9.7	21.18	7.29	7.29	1	21.18	1	4.63
3	2.92	6.49	11.68	4.33	4.33	1	11.68	1	2.92
4	2.21	4.86	7.71	3.09	3.09	1	7.71	1	2.21
5	1.83	3.9	5.61	2.44	2.44	1	5.61	1	1.83
6	1.6	3.26	4.35	2.04	2.04	1	4.35	1	1.6
7	1.45	2.8	3.52	1.79	1.79	1	3.52	1	1.45
8	1.35	2.45	2.95	1.61	1.61	1	2.95	1	1.35
9	1.27	2.18	2.52	1.48	1.48	1	2.52	1	1.27
10	1.22	1.97	2.18	1.38	1.38	1	2.18	1	1.22
11	1.17	1.79	1.96	1.3	1.3	1	1.96	1	1.17
12	1.14	1.64	1.76	1.24	1.24	1	1.76	1	1.14
13	1.11	1.52	1.6	1.19	1.19	1	1.6	1	1.11
14	1.08	1.41	1.47	1.15	1.15	1	1.47	1	1.08
15	1.06	1.32	1.36	1.11	1.11	1	1.36	1	1.06
16	1.05	1.24	1.26	1.08	1.08	1	1.26	1	1.05
17	1.03	1.17	1.18	1.06	1.06	1	1.18	1	1.03
18	1.02	1.11	1.11	1.04	1.04	1	1.11	1	1.02
19	1.01	1.05	1.05	1.02	1.02	1	1.05	1	1.01
20	1	1	1	1	1	1	1	1	1

POLB 2011 Emisisons Inventory, Section 2, Table 2.9

Public Copy

Auxiliary Boiler Emissions Factors

Auxiliary Boiler Emission Factors (g/kW-hr)										
Fuel	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
2.7% S HFO	2.1	0.2	0.11	0.8	0.78	16.5	0.03	970	0.08	995
0.5%S MDO	1.97	0.20	0.11	0.20	0.195	3.05	0.03	970.00	0.08	993.9
0.1%S MDO	1.97	0.20	0.11	0.136	0.1326	0.61	0.03	970.00	0.08	993.9

All emission factors, except N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-9

N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.15) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Auxiliary Boiler Emission Factors (kg/tonne)										
Fuel	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
2.7% S HFO	6.89	0.66	0.36	2.62	2.56	54.10	0.10	3180	0.26	3264
0.5%S MDO	6.47	0.66	0.36	0.66	0.64	10.0	0.10	3180	0.25	3259
0.1%S MDO	6.47	0.66	0.36	0.45	0.43	2.00	0.10	3180	0.25	3259

Fuel Correction factor

Actual fuel	S Content	NOx	CO	HC	PM10	PM2.5	SOx	CH4	CO2	N2O
HFO	1.50%	1	1	1	0.82	0.82	0.555	1	1	1
MDO	1.50%	0.94	1	1	0.47	0.47	0.555	1	1	0.94
MGO	0.50%	0.94	1	1	0.25	0.25	0.185	1	1	0.94
MGO	0.30%	0.94	1	1	0.21	0.21	0.111	1	1	0.94
MGO	0.20%	0.94	1	1	0.19	0.19	0.074	1	1	0.94
MGO	0.10%	0.94	1	1	0.17	0.17	0.037	1	1	0.94

POLB 2011 Emisisons Inventory, Section 2, Tables 2.17

Public Copy

Auxiliary Boiler Emissions Factors

Fuel Consumption Rates (ARB OGV 2011 Appendix D, Table II-10)

Engine	Engine Speed	Mode	Fuel	Fuel Use Rate (g of fuel/kW-hr)
Auxiliary Engine	All	All	Marine Distillate	217
	All	All	HFO	227
Boiler	NA	All	HFO	305
Main	Slow	Transit	Marine Distillate	185
	Slow	Transit	HFO	195
	Medium	Transit	Marine Distillate	203
	Medium	Transit	HFO	213
	High	Transit	HFO	213
	Slow	Maneuvering	Marine Distillate	185
	Slow	Maneuvering	HFO	195
	Medium	Maneuvering	Marine Distillate	203
	Medium	Maneuvering	HFO	213
	High	Maneuvering	HFO	213

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Auxiliary Engine Emission Factors

Fuel Switching Regulation

Phase	Effective Date	ulfur Content for OGV		Comment
		MGO	MDO	
1	7/1/2009	1.5%	0.5%	No HFO to be
	8/1/2012	1.0%	0.5%	
2	1/1/2014	0.1%	0.1%	

All auxiliary engines are assumed to be medium speed engines

According to USEPA's "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, April 2009", Table 2-2 - Auxiliary engines in OGVs are Category 2 engines

Auxiliary Engine Emission Standards

Tier	For Foreign Flagged			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
I	2000	17	$45 \cdot n^{-0.2}$	9.8
II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
III	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Auxiliary Engine Emission Factors

USEPA Category 2 engine Standards

Tier	Effective Date	Displacement (L/cylinder)	Power (kW)	Speed (rpm)	Nox (g/kW-hr)	HC + Nox (g/kW-hr)	PM (g/kW-hr)
1	2004	≥ 2.5	≥ 37	rpm < 130	17	-	-
				130 ≤ rpm < 2,000	$45 \cdot n^{-0.2}$	-	-
				rpm ≥ 2,000	9.8	-	-
2	2007	5.0 ≤ Disp < 15	all	-	-	7.8	0.27
		15.0 ≤ Disp < 20	< 3,300	-	-	8.7	0.50
		15.0 ≤ Disp < 20	≥ 3,300	-	-	9.8	0.50
		20.0 ≤ Disp < 25	all	-	-	9.8	0.50
		25.0 ≤ Disp < 30	all	-	-	11.0	0.50
3	2013+	7.0 ≤ Disp < 15	< 2,000	-	-	6.2	0.14
			2,000 ≤ kW < 3,700	-	-	7.8	0.14
	2014+	15.0 ≤ Disp < 20	< 2,000	-	-	7	0.34
		20.0 ≤ Disp < 25	< 2,000	-	-	9.8	0.27
		25.0 ≤ Disp < 30	< 2,000	-	-	11.0	0.27
4	2017+	All	600 ≤ kW < 1,400	-	1.8	0.19 HC only	0.04
	2016+	All	1400 ≤ kW < 2,000	-	1.8	0.19 HC only	0.04
	2014+	All	2,000 ≤ kW < 3,700	-	1.8	0.19 HC only	0.04
	2014-2015	< 15.0	≥ 3,700	-	1.8	0.19 HC only	0.12
	2014-2015	15.0 ≤ Disp < 30		-	1.8	0.19 HC only	0.25
	2016+	All		-	1.8	0.19 HC only	0.06

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Auxiliary Engine Emission Factors

Auxiliary Engine Emission Factors for Foreign Flagged Ships (g/kW-hr)															
Engine Speed	**RPM**	**Tier**	**Ship Built Year From**	**Ship Built Year To**	**Fuel**	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
Medium	130 - 2000	0	0	1999	0.5%S MDO	13.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2010	0.5%S MDO	12.2	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	II	2011	2015	0.5%S MDO	9.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	0	0	1999	0.1%S MDO	13.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2010	0.1%S MDO	12.2	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	II	2011	2015	0.1%S MDO	9.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	III	2016	9999	0.1%S MDO	2.6	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701

Engine Category 2
speed (rpm) 500

All emission factors, except Tier-based NOx and N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-8
Tier-based Nox
emission factors are
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.11) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Auxiliary Engine Emission Factors for US Flagged Ships (g/kW-hr)															
Engine Speed	**RPM**	**Tier**	**Ship Built Year From**	**Ship Built Year To**	**Fuel**	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
Medium	130 - 2000	0	0	1999	0.5%S MDO	13.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2006	0.5%S MDO	12.2	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	II	2007	2013	0.5%S MDO	8.4	1.1	0.47	0.11	0.11	2.1	0.09	690	0.029	701
Medium	130 - 2000	0	0	1999	0.1%S MDO	13.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2006	0.1%S MDO	12.2	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	II	2007	2013	0.1%S MDO	8.4	1.1	0.47	0.08	0.08	0.4	0.09	690	0.029	701

Engine Category	2
Displacement (dm3/cyl)	5 ≤ Disp < 30
speed (rpm)	500

All emission factors, except Tier-based NOx and N2O and Tier II ROG and PM, are from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-8

Tier-based NOx and Tier II ROG and PM emission factors are from USEPA commercial marine engine regulations for Category 2 engines. The USEPA Tier II emission standards are based on engine displacement and as the engine displacement is not available, the emission factors are assumed to be an average of emission standards for all displacement categories under Category 2 engines. Tier II NOx and ROG emission factors assumed a 95% to 5% split for the combined NOx+HC standard. Tier 0, I and II NOx factors and Tier II ROG and PM factors are multiplied by fuel correction factor.

Tier II PM 2.5 emissions factors assumed equal to Tier II PM10 factors
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Tables 2.5 and 2.6) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Fuel Correction factor

Actual fuel	**S Content**	**PM**	**NOx**	**SOx**	**CO**	**HC**	**CO2**	**N2O**	**CH4**
HFO	1.50%	0.82	1	0.555	1	1	1	1	1
MDO	1.50%	0.47	0.94	0.555	1	1	1	0.94	1
MGO	0.50%	0.25	0.94	0.185	1	1	1	0.94	1
MGO	0.30%	0.21	0.94	0.111	1	1	1	0.94	1
MGO	0.20%	0.19	0.94	0.074	1	1	1	0.94	1
MGO	0.10%	0.17	0.94	0.037	1	1	1	0.94	1

POLB 2011 Emisisons Inventory, Section 2, Tables 2.17

Public Copy

Auxiliary Boiler Emissions Factors

Auxiliary Boiler Emission Factors (g/kW-hr)										
Fuel	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
2.7% S HFO	2.1	0.2	0.11	0.8	0.78	16.5	0.03	970	0.08	995
0.5%S MDO	1.97	0.20	0.11	0.20	0.195	3.05	0.03	970.00	0.08	993.9
0.1%S MDO	1.97	0.20	0.11	0.136	0.1326	0.61	0.03	970.00	0.08	993.9

All emission factors, except N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-9

N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.15) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Auxiliary Boiler Emission Factors (kg/tonne)										
Fuel	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
2.7% S HFO	6.89	0.66	0.36	2.62	2.56	54.10	0.10	3180	0.26	3264
0.5%S MDO	6.47	0.66	0.36	0.66	0.64	10.0	0.10	3180	0.25	3259
0.1%S MDO	6.47	0.66	0.36	0.45	0.43	2.00	0.10	3180	0.25	3259

Fuel Correction factor

Actual fuel	S Content	NOx	CO	HC	PM10	PM2.5	SOx	CH4	CO2	N2O
HFO	1.50%	1	1	1	0.82	0.82	0.555	1	1	1
MDO	1.50%	0.94	1	1	0.47	0.47	0.555	1	1	0.94
MGO	0.50%	0.94	1	1	0.25	0.25	0.185	1	1	0.94
MGO	0.30%	0.94	1	1	0.21	0.21	0.111	1	1	0.94
MGO	0.20%	0.94	1	1	0.19	0.19	0.074	1	1	0.94
MGO	0.10%	0.94	1	1	0.17	0.17	0.037	1	1	0.94

POLB 2011 Emisisons Inventory, Section 2, Tables 2.17

Public Copy

Auxiliary Boiler Emissions Factors

Fuel Consumption Rates (ARB OGV 2011 Appendix D, Table II-10)

Engine	Engine Speed	Mode	Fuel	Fuel Use Rate (g of fuel/kW-hr)
Auxiliary Engine	All	All	Marine Distillate	217
	All	All	HFO	227
Boiler	NA	All	HFO	305
Main	Slow	Transit	Marine Distillate	185
	Slow	Transit	HFO	195
	Medium	Transit	Marine Distillate	203
	Medium	Transit	HFO	213
	High	Transit	HFO	213
	Slow	Maneuvering	Marine Distillate	185
	Slow	Maneuvering	HFO	195
	Medium	Maneuvering	Marine Distillate	203
	Medium	Maneuvering	HFO	213
	High	Maneuvering	HFO	213

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

OGV and Tugboat Operation in SF Bay Area and Port of Benicia

Speed Requirements per SF Bar Pilot - Steve Teague

Segment	Speed	Distance	Time	Tug assist	
	knots	nm	hrs	Loaded (incoming)	Ballasted (outgoing)
CA Coastal Waters to Sea Buoy	0.937*Max Vessel Speed	60			
Sea buoy - Mile rock (1 mi west of GG Bridge)	12	10	0.83		
Mile rock (1 mi west of GG Bridge) - SPB Light #5	10	19	1.90	Tug 1	
SPB light #5 - SPB light #15	10	7	0.70		
SPB light #15 - Buoy 25	8	4.5	0.56		
Buoy 25 - Berth	5	2.5	0.50	Additional Tugs	Tugs
Berth - Sea Buoy (out)	12	43	3.58		
Total Round Trip		206	8.08		

Tug Operations and Typical Specs per Capt. Shawn Bennett at Bay Delta Maritime

Segment	Tug Requirement	Incoming - Loaded	Outgoing - Ballasted
Mile rock (1 mi west of GG Bridge) - Near Berth (assumed Buoy 25)	1 Tug	3.2	0.5
Near Berth (assumed Buoy 25) - Berth	Tug 1 and Additional Tugs as required per ship DWT	0.5	0.5

Tug Fleet Main Engine Operating in Bay Area	5000 HP
Tug Fleet Aux Engine Operating in Bay Area	150 HP
Tug Fleet Avg Age	10 years

Conclusion - typical tugboats are Class A

Bay Delta Maritime tugs are docked at SF Pier 17 and Valero dock in Port of Benicia

Nearest California Coastal Water Points per BAAQMD Regulation 2-2

Distance from 38°N and 124°W to GG bridge	73	nm
Distance from 37°N and 123.5°W to GG bridge	69	nm
Average Distance upto GG bridge	71	nm

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Ocean Going Vessels Activity Data

	Mode of Operation						
	Cruise	**Slow Cruise -1**	**Slow Cruise - 2**	**Slow Cruise/ Maneuvering**	**Maneuvering/Mooring/Unmooring**	**Hotelling w/o Discharge**	**Hotelling /w Discharge**
Segment Name	CA Coastal Waters to Sea Buoy	Pilot Sea Buoy[1] - GG Bridge and Berth - Pilot Sea Buoy	GG Bridge - San Pablo Bay Light #15	San Pablo Bay Light #15 - Sea Buoy 25	Sea Buoy 25 - Berth	At Berth	At Berth
Speed (knots)[2]	0.937*Max Vessel Speed	12	10	8	5	---	---
Round-trip distance (nm)	120	53.0	26.0	4.5	2.5	---	---
Round-Trip Time (hrs)		4.42	2.60	0.56	0.50	6	Crude delivered/ Discharge Rate
Main Engine Load Factor[2]	82.3%	(12/Max Speed)^3	(10/Max Speed)^3	(8/Max Speed)^3	2%	0%	0%
Auxiliary Engine Load Factor[2]	24%	24%	24%	33%	33%	26%	26%
Auxiliary Boiler Load Factor[2]	0%	0%	0%	12%	12%	100%	100%
Reference	Distance from BAAQMD Reg 2-2 and vessel speed assumed as there are no vessel speed limitations imposed in this zone	Port of Richmond, 2005 Seaport Air Emissions Inventory, Table, 2-6		Distance measured using Google Earth from Valero Wharf	POLB, CARB, Port of Richmond Emissions Inventory	Assumed 3 hours before and after unloading the crude	

1. Per Alison Kirk of BAAQMD, emissions must be estimated from the point the pilot boards the ship at Sea Buoy
2. Vessel speed and load factor in cruise mode obtained from - California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Operating Modes of Emission Sources			
Source	**Operating Mode**		
	Transit	**Maneuvering**	**Hotelling**
Main Engine	x	x	Not Used
Auxiliary Engine	x	x	x
Auxiliary Boiler	Operate if main Engine LF < 20%	x	x

Emission reduction technology control efficiency (Only for main engine)
2004 and newer main engines assumed to be equipped with fuel slide valves

Control Efficiency	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
	30%	0%	0%	25%	25%	0%	0%	0%	0%	0%

POLB 2011 Emissions Inventory

Public Copy

Baseline Ocean Going Vessels Emissions

Date	[redacted]
12/10/09	
12/13/09	
12/25/09	
12/29/09	
12/31/09	
1/10/10	
1/28/10	
1/29/10	
2/7/10	
2/5/10	
2/4/10	
2/9/10	
2/11/10	
2/13/10	
2/21/10	
2/22/10	
2/24/10	
3/6/10	
3/10/10	
3/9/10	
3/14/10	
3/23/10	
2/24/10	
3/30/10	
4/11/10	
4/5/10	
4/16/10	
4/14/10	
4/21/10	
4/27/10	
4/29/10	
5/3/10	
5/13/10	
5/20/10	
5/21/10	
5/25/10	
5/31/10	
6/1/10	
6/4/10	
6/6/10	
6/8/10	
6/15/10	
6/17/10	
6/23/10	
7/13/10	
7/27/10	
7/14/10	
7/27/10	
8/2/10	
8/4/10	
7/29/10	
8/17/10	
8/14/10	
8/24/10	
9/1/10	
9/5/10	
9/7/10	
9/12/10	
9/14/10	
9/16/10	

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Main Engine Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
12/10/09		564613	39564	32120	13108	12073	59789	2883	18503110	963	18862224
12/13/09		582954	40773	32987	13520	12453	61825	2960	19133246	994	19503694
12/25/09		561549	39362	31976	13040	12010	59448	2870	18397614	958	18754838
12/29/09		290396	27758	20809	7060	6503	45424	1867	14057632	708	14316232
12/31/09		406015	40577	32842	10090	9294	61503	2947	19033619	989	19402242
1/10/10		555459	38961	31691	12903	11884	58770	2844	18187913	948	18541377
1/28/10		313993	29907	22324	7623	7021	49210	2003	15229052	765	15508334
1/29/10		390351	39105	31793	9714	8947	59014	2853	18263157	951	18617970
2/7/10		163815	15971	12543	4029	3711	25188	1126	7794989	399	7942384
2/5/10		582419	40735	32954	13508	12441	61770	2957	19116205	994	19486308
2/4/10		300349	28471	21114	7276	6702	47188	1895	14603296	732	14869990
2/9/10		299589	28442	21085	7260	6687	47067	1892	14566022	730	14832088
2/11/10		276744	26485	19905	6733	6201	43249	1786	13384498	674	13631081
2/13/10		307060	29121	21667	7446	6858	48207	1944	14918910	748	15191715
2/21/10		315423	30040	22419	7657	7053	49438	2012	15299624	769	15580166
2/22/10		282043	18201	14430	6100	5618	28395	1295	8787602	452	8954884
2/24/10		579524	40544	32818	13443	12381	61448	2945	19016501	989	19384816
3/6/10		276341	19076	15214	6377	5873	29535	1365	9140398	471	9315206
3/10/10		547933	38470	31347	12735	11729	57929	2813	17927423	935	18276259
3/9/10		534633	53209	43081	13277	12229	81062	3866	25086506	1303	25571593
3/14/10		581342	40664	32904	13484	12419	61650	2953	19079124	992	19448562
3/23/10		337245	32141	24027	8190	7544	52827	2156	16348619	822	16648676
2/24/10		456292	45301	36206	11299	10407	69494	3249	21506660	1112	21919606
3/30/10		546759	38393	31292	12708	11705	57798	2808	17887002	933	18235114
4/11/10		356722	22437	17089	7624	7022	36528	1534	11304361	572	11513746
4/5/10		578882	40502	32788	13428	12368	61376	2943	18994407	988	19362327
4/16/10		389551	39030	31740	9695	8929	58886	2848	18223817	949	18577925
4/14/10		307452	29554	22488	7501	6909	47849	2018	14807910	749	15082559
4/21/10		346685	33007	24698	8418	7753	54292	2216	16802099	845	17110553
4/27/10		427711	42616	34294	10612	9774	64952	3078	20100826	1042	20488576
4/29/10		573884	35903	26968	12225	11260	59046	2420	18273242	919	18609107
5/3/10		212946	20580	15882	5212	4801	32968	1425	10202878	519	10393681
5/13/10		306767	20220	16383	6689	6161	30505	1470	9440383	492	9623624
5/20/10		152625	14976	11905	3767	3469	23351	1068	7226406	372	7364145
5/21/10		294993	28015	20782	7150	6586	46334	1865	14339291	719	14601313
5/25/10		319658	30457	22822	7765	7152	50033	2048	15484019	779	15768519
5/31/10		407796	40744	32961	10133	9333	61786	2958	19121252	994	19491445
6/1/10		289986	27508	20431	7028	6473	45535	1834	14091909	707	14349487
6/4/10		269702	25618	19071	6540	6024	42313	1712	13094690	657	13334382
6/6/10		576766	36079	27093	12286	11316	59348	2431	18366796	924	18704327
6/8/10		226593	21843	16718	5537	5099	35187	1500	10889605	552	11092294
6/15/10		268044	25600	19219	6517	6002	41922	1725	12973842	653	13212559
6/17/10		294855	28024	20894	7153	6588	46235	1875	14308587	719	14570716
6/23/10		531412	37383	30573	12364	11388	56091	2744	17358572	907	17697212
7/13/10		293564	27964	20879	7127	6565	46004	1874	14237017	715	14498143
7/27/10		453467	30241	22666	10281	9469	49683	2034	15375573	774	15658094
7/14/10		296017	28133	20971	7181	6614	46421	1882	14365950	721	14629102
7/27/10		180253	17427	13418	4411	4063	27928	1204	8642968	439	8804430
8/2/10		418276	27958	21048	9494	8745	45752	1889	14158930	714	14419791
8/4/10		356942	34043	25480	8671	7987	55886	2287	17295322	870	17612999
7/29/10		252216	24188	18195	6138	5654	39378	1633	12186570	615	12411401
8/17/10		255137	24398	18366	6207	5717	39865	1648	12337130	622	12564489
8/14/10		432014	28851	21682	9801	9028	47285	1946	14633474	737	14902796
8/24/10		380890	38216	31160	9487	8738	57510	2796	17797773	928	18144246
9/1/10		311288	29718	22365	7570	6972	48649	2007	15055460	759	15332775
9/5/10		193586	18807	14570	4748	4373	29908	1308	9255747	472	9429453
9/7/10		285733	19116	14454	6493	5981	31219	1297	9661585	487	9839927
9/12/10		274807	26304	19777	6686	6158	42941	1775	13288991	670	13533869
9/14/10		333511	31861	23932	8109	7469	52151	2148	16139437	813	16436494
9/16/10		558249	39145	31822	12966	11942	59081	2856	18283988	952	18639174

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Engine Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
12/10/09		211427	19055	9008	6583	6063	36378	1559	11952639	502	12141109
12/13/09		216328	19497	9217	6735	6203	37221	1595	12229711	514	12422551
12/25/09		210569	18978	8971	6556	6038	36230	1553	11904121	500	12091826
12/29/09		622062	56063	26503	19367	17838	107030	4587	35167075	1478	35721593
12/31/09		215743	19444	9192	6717	6187	37120	1591	12196623	513	12388941
1/10/10		208863	18824	8899	6503	5989	35936	1540	11807678	496	11993863
1/28/10		640666	57740	27295	19947	18372	110231	4724	36218831	1522	36789934
1/29/10		209475	18879	8925	6522	6007	36042	1545	11842283	498	12029014
2/7/10		150937	13603	6431	4699	4328	25970	1113	8532927	359	8667475
2/5/10		216415	19504	9220	6738	6206	37236	1596	12234604	514	12427521
2/4/10		227163	20473	9678	7073	6514	39085	1675	12842248	540	13044746
2/9/10		703689	63420	29980	21909	20179	121075	5189	39781722	1672	40409004
2/11/10		215453	19418	9179	6708	6178	37070	1589	12180215	512	12372274
2/13/10		235034	21182	10014	7318	6740	40439	1733	13287173	558	13496687
2/21/10		642933	57944	27392	20017	18437	110621	4741	36347003	1528	36920126
2/22/10		455155	36019	17027	12443	11461	68764	2947	22594009	950	22950274
2/24/10		215604	19431	9186	6713	6183	37096	1590	12188750	512	12380944
3/6/10		222329	20037	9472	6922	6376	38253	1639	12568948	528	12767137
3/10/10		206533	18614	8799	6430	5923	35535	1523	11675949	491	11860057
3/9/10		1258812	113451	53631	39192	36098	216588	9282	71164510	2991	72286641
3/14/10		216113	19477	9207	6729	6197	37184	1594	12217551	513	12410199
3/23/10		602792	54327	25682	18767	17286	103715	4445	34077717	1432	34615058
2/24/10		241930	21804	10307	7532	6938	41626	1784	13677027	575	13892688
3/30/10		206205	18584	8785	6420	5913	35479	1521	11657386	490	11841201
4/11/10		286412	22666	10715	7830	7212	43271	1854	14217553	598	14441737
4/5/10		215424	19415	9178	6707	6178	37065	1589	12178589	512	12370622
4/16/10		209155	18850	8911	6512	5998	35987	1542	11824190	497	12010636
4/14/10		582123	52464	24801	18124	16693	100159	4293	32909238	1383	33428155
4/21/10		1301259	117276	55440	40514	37315	223891	9595	73564172	3092	74724141
4/27/10		230199	20747	9808	7167	6601	39607	1697	13013843	547	13219047
4/29/10		356020	28174	13319	9733	8965	53787	2305	17672942	743	17951611
5/3/10		891654	80361	37989	27761	25569	153416	6575	50407982	2119	51202821
5/13/10		247100	19555	9244	6755	6222	37332	1600	12266117	516	12459531
5/20/10		706909	63710	30118	22009	20271	121629	5213	39963757	1680	40593910
5/21/10		695347	62668	29625	21649	19940	119640	5127	39310135	1652	39929982
5/25/10		262890	23693	11200	8185	7539	45232	1939	14861971	625	15096317
5/31/10		222025	20010	9459	6913	6367	38201	1637	12551741	528	12749659
6/1/10		958706	86404	40845	29849	27492	164952	7069	54198621	2278	55053231
6/4/10		631328	56899	26898	19656	18104	108625	4655	35690920	1500	36253698
6/6/10		357492	28291	13374	9773	9002	54010	2315	17745995	746	18025816
6/8/10		200465	18067	8541	6241	5749	34492	1478	11332933	476	11511632
6/15/10		252196	22729	10745	7852	7232	43392	1860	14257399	599	14482211
6/17/10		209606	18891	8930	6526	6011	36064	1546	11849687	498	12036534
6/23/10		201912	18197	8602	6286	5790	34740	1489	11414710	480	11594698
7/13/10		206692	18628	8806	6435	5927	35563	1524	11684957	491	11869206
7/27/10		228726	20614	9745	7121	6559	39354	1687	12930565	543	13134456
7/14/10		210238	18948	8957	6546	6029	36173	1550	11885405	500	12072815
7/27/10		184744	16650	7871	5752	5298	31786	1362	10444126	439	10608810
8/2/10		185953	16759	7922	5790	5332	31995	1371	10512518	442	10678280
8/4/10		692436	62406	29501	21558	19856	119139	5106	39145523	1645	39762775
7/29/10		930330	83846	39636	28965	26678	160070	6860	52594438	2210	53423753
8/17/10		242279	21835	10322	7543	6948	41686	1787	13696783	576	13912755
8/14/10		190357	17156	8110	5927	5459	32752	1404	10761455	452	10931143
8/24/10		210981	19015	8989	6569	6050	36301	1556	11927407	501	12115480
9/1/10		1192847	107506	50821	37138	34206	205238	8796	67435343	2834	68498671
9/5/10		708279	63834	30176	22052	20311	121865	5223	40041207	1683	40672581
9/7/10		126218	11375	5377	3930	3619	21717	931	7135485	300	7247998
9/12/10		214304	19314	9130	6672	6145	36873	1580	12115263	509	12306298
9/14/10		655439	59072	27925	20407	18796	112773	4833	37054017	1557	37638290
9/16/10		209645	18894	8932	6527	6012	36071	1546	11851863	498	12038745

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Boiler Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
12/10/09		115624	11715	6443	11715	11422	178796	1757	56816353	4405	58218721
12/13/09		118257	11981	6590	11981	11682	182867	1797	58110087	4505	59544388
12/25/09		115163	11668	6417	11668	11376	178083	1750	56589808	4387	57986585
12/29/09		127587	12927	7110	12927	12604	197294	1939	62694563	4860	64242020
12/31/09		117943	11950	6572	11950	11651	182381	1792	57955587	4493	59386074
1/10/10		114247	11575	6366	11575	11286	176666	1736	56139488	4352	57525149
1/28/10		131847	13358	7347	13358	13024	203882	2004	64788085	5023	66387215
1/29/10		114576	11608	6385	11608	11318	177174	1741	56301070	4365	57690720
2/7/10		91760	9297	5113	9297	9064	141893	1395	45089618	3496	46202541
2/5/10		118304	11986	6592	11986	11687	182939	1798	58132934	4507	59567799
2/4/10		127929	12961	7129	12961	12637	197824	1944	62862877	4873	64414488
2/9/10		125945	12760	7018	12760	12441	194755	1914	61887652	4798	63415192
2/11/10		123008	12463	6855	12463	12151	190213	1869	60444541	4686	61936462
2/13/10		123942	12557	6907	12557	12244	191658	1884	60903598	4722	62406850
2/21/10		132294	13404	7372	13404	13069	204573	2011	65007611	5040	66612160
2/22/10		122804	12442	6843	12442	12131	189898	1866	60344352	4678	61833800
2/24/10		117868	11942	6568	11942	11643	182265	1791	57918826	4490	59348406
3/6/10		122866	12448	6847	12448	12137	189994	1867	60374848	4681	61865049
3/10/10		112995	11448	6297	11448	11162	174730	1717	55524408	4305	56894887
3/9/10		179051	18141	9977	18141	17687	276875	2721	87983283	6821	90154928
3/14/10		118141	11970	6583	11970	11671	182688	1795	58053306	4501	59486205
3/23/10		125599	12725	6999	12725	12407	194220	1909	61717788	4785	63241135
2/24/10		128750	13045	7175	13045	12718	199093	1957	63266277	4905	64827845
3/30/10		112819	11430	6287	11430	11145	174457	1715	55437733	4298	56806073
4/11/10		141074	14293	7861	14293	13936	218149	2144	69321835	5374	71032869
4/5/10		117771	11932	6563	11932	11634	182116	1790	57871381	4487	59299790
4/16/10		114404	11591	6375	11591	11301	176908	1739	56216590	4358	57604155
4/14/10		176122	17844	9814	17844	17398	272347	2677	86544202	6709	88680327
4/21/10		165015	16719	9195	16719	16301	255172	2508	81086642	6286	83088061
4/27/10		122606	12422	6832	12422	12112	189593	1863	60247343	4671	61734396
4/29/10		174524	17682	9725	17682	17240	269876	2652	85759129	6649	87875876
5/3/10		114048	11555	6355	11555	11266	176358	1733	56041844	4345	57425095
5/13/10		114239	11574	6366	11574	11285	176653	1736	56135532	4352	57521096
5/20/10		91060	9226	5074	9226	8995	140811	1384	44745793	3469	45850229
5/21/10		124537	12618	6940	12618	12302	192578	1893	61196109	4744	62706581
5/25/10		158116	16020	8811	16020	15619	244503	2403	77696303	6023	79614040
5/31/10		118326	11988	6594	11988	11689	182973	1798	58143773	4508	59578905
6/1/10		124113	12575	6916	12575	12260	191923	1886	60987876	4728	62493208
6/4/10		113708	11521	6336	11521	11233	175833	1728	55874884	4332	57254015
6/6/10		175238	17755	9765	17755	17311	270979	2663	86109783	6676	88235186
6/8/10		120599	12219	6720	12219	11913	186489	1833	59261147	4594	60723858
6/15/10		164746	16692	9180	16692	16274	254755	2504	80954116	6276	82952264
6/17/10		125205	12685	6977	12685	12368	193612	1903	61524443	4770	63043018
6/23/10		110513	11197	6158	11197	10917	170892	1680	54304605	4210	55644977
7/13/10		126728	12840	7062	12840	12519	195966	1926	62272578	4828	63809619
7/27/10		148236	15019	8260	15019	14643	229226	2253	72841594	5647	74639505
7/14/10		125565	12722	6997	12722	12404	194168	1908	61701197	4783	63224135
7/27/10		121505	12311	6771	12311	12003	187890	1847	59706171	4629	61179867
8/2/10		105988	10738	5906	10738	10470	163895	1611	52081226	4038	53366720
8/4/10		161519	16365	9001	16365	15956	249765	2455	79368494	6153	81327505
7/29/10		120767	12236	6730	12236	11930	186748	1835	59343424	4601	60808166
8/17/10		158389	16047	8826	16047	15646	244925	2407	77830309	6034	79751353
8/14/10		108350	10978	6038	10978	10703	167548	1647	53242077	4128	54556224
8/24/10		112542	11402	6271	11402	11117	174029	1710	55301689	4287	56666672
9/1/10		151526	15352	8444	15352	14968	234312	2303	74457948	5772	76295754
9/5/10		114326	11583	6371	11583	11294	176789	1737	56178668	4355	57565296
9/7/10		95611	9687	5328	9687	9445	147849	1453	46982202	3642	48141839
9/12/10		122383	12399	6820	12399	12089	189247	1860	60137452	4662	61621793
9/14/10		153081	15510	8530	15510	15122	236718	2326	75222323	5832	77078996
9/16/10		114667	11618	6390	11618	11327	177315	1743	56345803	4368	57736556

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: between California Coastal Water Boundary & Sea Buoy from Main Engines (g/trip)				Emissions: between California Coastal Water Boundary & Sea Buoy from Auxiliary Engines (g/trip)			
		CH_4	CO_2	N_2O	CO_2e	CH_4	CO_2	N_2O	CO_2e
12/10/09		5964	50096966	2471	50988147	152	1161541	49	1179856
12/13/09		6170	51826311	2556	52748255	157	1199899	50	1218819
12/25/09		5929	49807272	2456	50693299	151	1154824	49	1173034
12/29/09		3919	32919059	1624	33504660	877	6720336	282	6826303
12/31/09		6175	51866212	2558	52788866	157	1202563	51	1221525
1/10/10		5861	49231423	2428	50107206	149	1141473	48	1159472
1/28/10		4068	34170112	1685	34777968	910	6975735	293	7085729
1/29/10		5921	49737671	2453	50622460	150	1153211	48	1171395
2/7/10		1953	16404406	809	16696226	142	1088915	46	1106085
2/5/10		6164	51780549	2554	52701679	157	1200576	50	1219507
2/4/10		3681	30921870	1525	31471943	355	2719134	114	2762010
2/9/10		3893	32704938	1613	33286730	1177	9024925	379	9167231
2/11/10		3730	31334656	1545	31892072	300	2301372	97	2337660
2/13/10		3703	31102978	1534	31656272	349	2674302	112	2716471
2/21/10		4087	34329211	1693	34939898	914	7008215	295	7118721
2/22/10		2410	20240697	998	20600761	288	2209048	93	2243880
2/24/10		6132	51506757	2540	52423017	156	1194228	50	1213059
3/6/10		2599	21835374	1077	22223806	157	1200819	50	1219754
3/10/10		5776	48515075	2393	49378115	147	1123236	47	1140948
3/9/10		7156	60109324	2965	61178616	553	4238501	178	4305334
3/14/10		6152	51678724	2549	52598043	156	1198216	50	1217109
3/23/10		4334	36406984	1796	37054632	864	6621024	278	6725425
2/24/10		6988	58698432	2895	59742625	182	1395987	59	1417999
3/30/10		5762	48404078	2387	49265144	146	1120666	47	1138337
4/11/10		2630	22095346	1090	22488402	219	1679666	71	1706151
4/5/10		6125	51446087	2537	52361267	156	1192822	50	1211630
4/16/10		5908	49628987	2448	50511843	150	1150691	48	1168835
4/14/10		3948	33159395	1635	33749271	478	3662415	154	3720164
4/21/10		4349	36534417	1802	37184332	1427	10943659	460	11116220
4/27/10		6526	54814563	2703	55789666	170	1303619	55	1324175
4/29/10		4441	37302100	1840	37965672	289	2214809	93	2249732
5/3/10		2632	22112911	1091	22506280	864	6623786	278	6728230
5/13/10		3238	27202520	1342	27686429	169	1295053	54	1315473
5/20/10		1858	15608323	770	15885982	610	4675377	197	4749099
5/21/10		3833	32193797	1588	32766496	1159	8883875	373	9023957
5/25/10		4035	33892297	1672	34495211	293	2247760	94	2283202
5/31/10		6203	52108314	2570	53035274	162	1239258	52	1258799
6/1/10		3552	29834554	1471	30365284	1489	11416857	480	11596880
6/4/10		3414	28681256	1415	29191470	1032	7914590	333	8039388
6/6/10		4464	37494119	1849	38161106	290	2226210	94	2261313
6/8/10		2901	24369928	1202	24803447	211	1617661	68	1643169
6/15/10		3463	29093127	1435	29610668	270	2069433	87	2102064
6/17/10		3705	31123859	1535	31677525	308	2361263	99	2398496
6/23/10		5590	46952988	2316	47788240	142	1087070	46	1104211
7/13/10		3803	31943480	1575	32511726	302	2313599	97	2350080
7/27/10		3872	32522548	1604	33101096	261	2000477	84	2032021
7/14/10		3720	31249217	1541	31805113	309	2370773	100	2408156
7/27/10		2301	19329608	953	19673465	179	1374941	58	1396621
8/2/10		3663	30767909	1517	31315243	266	2041578	86	2073770
8/4/10		4650	39062028	1927	39756907	798	6119604	257	6216099
7/29/10		3506	29448242	1452	29972100	1332	10211244	429	10372256
8/17/10		3293	27657724	1364	28149731	257	1967330	83	1998352
8/14/10		3786	31804948	1569	32370730	275	2110390	89	2143667
8/24/10		5768	48451965	2390	49313882	150	1152302	48	1170471
9/1/10		3895	32717427	1614	33299441	1278	9800303	412	9954835
9/5/10		2617	21985075	1084	22376170	710	5443885	229	5529725
9/7/10		2394	20109436	992	20467165	178	1363640	57	1385142
9/12/10		3704	31109854	1534	31663271	298	2284861	96	2320889
9/14/10		4338	36438318	1797	37086524	745	5708564	240	5798577
9/16/10		5892	49495248	2441	50375725	150	1147590	48	1165685

Public Copy

Baseline Ocean Going Vessels Emissions

Date	[redacted]
10/2/10	
10/6/10	
10/5/10	
10/4/10	
10/16/10	
10/17/10	
10/19/10	
10/22/10	
10/23/10	
10/25/10	
10/27/10	
10/29/10	
11/1/10	
11/7/10	
11/17/10	
11/18/10	
11/19/10	
11/26/10	
11/30/10	
12/4/10	
12/14/10	
12/19/10	
12/19/10	
12/27/10	
12/29/10	
3/4/11	
3/10/11	
2/26/11	
3/2/11	
3/7/11	
3/12/11	
3/17/11	
3/30/11	
3/27/11	
4/6/11	
4/13/11	
4/17/11	
4/16/11	
4/24/11	
4/27/11	
5/2/11	
5/3/11	
5/5/11	
5/9/11	
5/13/11	
5/21/11	
5/23/11	
5/25/11	
5/28/11	
6/3/11	
6/10/11	
6/22/11	
6/26/11	
6/28/11	
6/16/11	
7/4/11	
7/2/11	
7/5/11	
7/7/11	
7/8/11	

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Main Engine Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
10/2/10		389690	39043	31749	9698	8932	58909	2849	18230638	950	18584869
10/6/10		274085	26380	19959	6682	6154	42693	1791	13212469	668	13457145
10/5/10		299349	28616	21525	7281	6707	46785	1932	14478818	730	14745532
10/4/10		256780	24423	18242	6232	5740	40240	1637	12453332	626	12681699
10/16/10		438344	29073	21541	9909	9127	48223	1933	14923773	748	15196176
10/17/10		160374	15746	12401	3952	3640	24595	1113	7611468	391	7755996
10/19/10		280290	26811	20059	6812	6274	43848	1800	13569774	683	13819326
10/22/10		344359	23150	17637	7841	7222	37502	1583	11605788	587	11821132
10/23/10		224839	21578	16364	5481	5048	35035	1469	10842465	548	11043162
10/25/10		579253	40527	32806	13437	12376	61418	2944	19007187	988	19375335
10/27/10		229543	21954	16589	5588	5146	35821	1489	11085765	559	11290441
10/29/10		572536	40085	32491	13286	12237	60670	2916	18775918	977	19139922
11/1/10		308363	20319	16453	6723	6192	30671	1477	9491934	494	9676102
11/7/10		470619	33385	27725	11001	10132	49327	2488	15265401	803	15566526
11/17/10		371783	35642	26970	9057	8342	57980	2420	17943223	906	18274919
11/18/10		555728	38979	31704	12909	11890	58800	2845	18197176	948	18550807
11/19/10		283128	26981	20163	6875	6333	44355	1809	13726698	690	13978589
11/26/10		205591	19923	15362	5036	4638	31822	1379	9848172	501	10032440
11/30/10		403488	40340	32673	10030	9238	61102	2932	18909368	983	19275763
12/4/10		304861	20102	16299	6649	6124	30306	1463	9378832	488	9560969
12/14/10		257579	24698	18636	6273	5778	40196	1672	12439572	628	12669284
12/19/10		425281	28505	21515	9663	8901	46469	1931	14381002	725	14646447
12/19/10		381007	38227	31168	9489	8740	57529	2797	17803567	929	18150143
12/27/10		72782	7557	6641	1853	1707	10620	596	3286622	177	3354123
12/29/10		554625	38907	31652	12884	11867	58678	2841	18159198	946	18512148
3/4/11		473689	29439	21751	10051	9258	49013	1952	15168311	759	15444578
3/10/11		275784	26448	19890	6712	6182	43061	1785	13326148	672	13571978
2/26/11		403394	25459	19568	8640	7958	41179	1756	12743670	646	12980907
3/2/11		267081	17175	13693	5778	5322	26869	1229	8315382	428	8473844
3/7/11		286208	27157	20182	6937	6390	44933	1811	13905509	697	14159763
3/12/11		552695	38780	31561	12841	11827	58463	2832	18092739	943	18444498
3/17/11		553013	38801	31576	12848	11834	58498	2834	18103684	943	18455639
3/30/11		333517	31794	23781	8101	7461	52233	2134	16164725	813	16461502
3/27/11		565481	54814	42265	13851	12758	87522	3793	27085868	1378	27592720
4/6/11		389044	38982	31706	9683	8918	58806	2845	18198885	948	18552547
4/13/11		598685	57903	44446	14647	13490	92822	3989	28726031	1459	29262078
4/17/11		236111	22517	16852	5736	5283	36969	1512	11440933	575	11651066
4/16/11		391173	39182	31848	9734	8965	59144	2858	18303604	953	18659142
4/24/11		683804	65934	50295	16702	15383	106270	4514	32887907	1666	33499282
4/27/11		242646	23125	17284	5893	5427	38011	1551	11763317	591	11979201
5/2/11		405133	26914	20009	9166	8443	44516	1796	13776596	691	14028549
5/3/11		289787	27701	20769	7046	6490	45327	1864	14027583	706	14285648
5/5/11		866143	58622	44969	19774	18213	94025	4036	29098392	1478	29641177
5/9/11		232047	22138	16584	5638	5193	36321	1488	11240414	565	11446970
5/13/11		552001	38734	31529	12825	11813	58386	2830	18068866	942	18420197
5/21/11		920607	58524	44899	19741	18182	93860	4029	29047323	1475	29589193
5/23/11		224398	21640	16574	5484	5051	34837	1487	10781090	547	10981850
5/25/11		290749	27791	20832	7069	6511	45481	1870	14075018	709	14333929
5/28/11		553697	38846	31608	12863	11848	58574	2837	18127237	945	18479615
6/3/11		615363	59528	45712	15056	13868	95393	4102	29521683	1500	30072715
6/10/11		278014	26396	19642	6741	6209	43626	1763	13501168	678	13748215
6/22/11		466904	31101	23174	10574	9739	51255	2080	15862208	796	16152792
6/26/11		283427	27253	20580	6906	6361	44180	1847	13672596	691	13925499
6/28/11		262530	25299	19191	6404	5899	40854	1722	12643309	640	12877808
6/16/11		391691	39231	31883	9746	8977	59227	2861	18329095	955	18685090
7/4/11		228623	22112	16985	5594	5152	35440	1524	10967722	557	11172447
7/2/11		263237	25365	19238	6421	5914	40967	1726	12678114	642	12913235
7/5/11		482286	32103	23886	10919	10057	52972	2144	16393397	823	16693456
7/7/11		262700	25315	19202	6408	5902	40881	1723	12651669	640	12886318
7/8/11		301686	28786	21636	7334	6755	47169	1942	14597496	735	14866183

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Engine Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
10/2/10		209211	18855	8913	6514	5999	35996	1543	11827328	497	12013822
10/6/10		1012182	91223	43124	31513	29026	174153	7464	57221751	2405	58124030
10/5/10		230360	20761	9814	7172	6606	39635	1699	13022947	547	13228294
10/4/10		235013	21181	10013	7317	6739	40436	1733	13285993	558	13495488
10/16/10		2640958	238017	112517	82224	75733	454396	19474	149301504	6275	151655707
10/17/10		688967	62093	29353	21450	19757	118542	5080	38949445	1637	39563604
10/19/10		1009034	90939	42990	31415	28935	173612	7440	57043828	2397	57943302
10/22/10		162262	14624	6913	5052	4653	27918	1197	9173185	386	9317829
10/23/10		219000	19737	9330	6818	6280	37681	1615	12380752	520	12575973
10/25/10		215528	19425	9182	6710	6181	37083	1589	12184466	512	12376592
10/27/10		218904	19729	9326	6815	6277	37664	1614	12375322	520	12570457
10/29/10		213647	19255	9102	6652	6127	36759	1575	12078105	508	12268554
11/1/10		247744	19606	9268	6773	6238	37429	1604	12298074	517	12491992
11/7/10		184908	16665	7878	5757	5302	31815	1363	10453443	439	10618274
11/17/10		1002782	90376	42723	31221	28756	172536	7394	56690374	2383	57584274
11/18/10		208938	18831	8902	6505	5992	35949	1541	11811938	496	11998190
11/19/10		205202	18494	8743	6389	5884	35306	1513	11600697	488	11783618
11/26/10		622761	56126	26533	19389	17858	107150	4592	35206592	1480	35761734
11/30/10		220257	19851	9384	6858	6316	37897	1624	12451788	523	12648129
12/4/10		245953	19464	9201	6724	6193	37158	1593	12209185	513	12401701
12/14/10		204086	18393	8695	6354	5852	35114	1505	11537600	485	11719527
12/19/10		689643	62154	29382	21471	19776	118658	5085	38987649	1639	39602411
12/19/10		211029	19019	8991	6570	6052	36309	1556	11930140	501	12118256
12/27/10		462372	41671	19699	14396	13259	79555	3409	26139341	1099	26551509
12/29/10		208630	18803	8889	6496	5983	35896	1538	11794472	496	11980449
3/4/11		264223	20910	9885	7223	6653	39919	1711	13116103	551	13322919
3/10/11		222423	20046	9476	6925	6378	38269	1640	12574232	528	12772504
2/26/11		605294	47901	22644	16548	15241	91447	3919	30046953	1263	30520737
3/2/11		454524	35969	17004	12426	11445	68669	2943	22562683	948	22918454
3/7/11		218918	19730	9327	6816	6278	37666	1614	12376097	520	12571244
3/12/11		208089	18754	8866	6479	5967	35803	1534	11763907	494	11949402
3/17/11		208178	18762	8869	6481	5970	35819	1535	11768941	495	11954515
3/30/11		218171	19663	9295	6793	6256	37538	1609	12333886	518	12528368
3/27/11		876192	78967	37330	27280	25126	150755	6461	49533843	2082	50314898
4/6/11		208952	18832	8902	6506	5992	35952	1541	11812724	496	11998989
4/13/11		917250	82667	39079	28558	26303	157819	6764	51854956	2179	52672611
4/17/11		689005	62097	29355	21452	19758	118548	5081	38951555	1637	39565747
4/16/11		215202	19395	9169	6700	6171	37027	1587	12166026	511	12357862
4/24/11		1036788	93441	44172	32280	29731	178387	7645	58612838	2463	59537052
4/27/11		703561	63409	29975	21905	20175	121053	5188	39774469	1672	40401637
5/2/11		2485892	224042	105911	77396	71286	427716	18331	140535172	5907	142751147
5/3/11		223189	20115	9509	6949	6400	38401	1646	12617557	530	12816512
5/5/11		927840	83622	39530	28888	26607	159642	6842	52453679	2205	53280775
5/9/11		679951	61281	28969	21170	19498	116990	5014	38439713	1616	39045835
5/13/11		207895	18737	8857	6473	5962	35770	1533	11752928	494	11938249
5/21/11		1055129	83499	39472	28845	26568	159408	6832	52376909	2201	53202794
5/23/11		835055	75260	35577	25999	23946	143677	6158	47208255	1984	47952640
5/25/11		223759	20166	9533	6967	6417	38499	1650	12649816	532	12849279
5/28/11		208370	18779	8878	6487	5975	35851	1536	11779773	495	11965518
6/3/11		946564	85309	40328	29470	27144	162863	6980	53512162	2249	54355948
6/10/11		214140	19299	9123	6667	6141	36844	1579	12105980	509	12296869
6/22/11		225661	20338	9614	7026	6471	38827	1664	12757290	536	12958449
6/26/11		232081	20916	9888	7226	6655	39931	1711	13120276	551	13327158
6/28/11		979337	88263	41724	30491	28084	168502	7222	55364963	2327	56237964
6/16/11		215415	19414	9178	6707	6177	37064	1588	12178051	512	12370076
7/4/11		596103	53724	25397	18559	17094	102564	4396	33699572	1416	34230951
7/2/11		219259	19761	9341	6826	6288	37725	1617	12395405	521	12590857
7/5/11		231391	20854	9858	7204	6635	39813	1706	13081267	550	13287534
7/7/11		979820	88306	41745	30506	28098	168585	7225	55392237	2328	56265668
7/8/11		226249	20391	9639	7044	6488	38928	1668	12790552	538	12992235

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Boiler Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
10/2/10	[redacted]	114433	11594	6377	11594	11304	176954	1739	56231238	4359	57619164
10/6/10	[redacted]	125732	12739	7006	12739	12420	194426	1911	61783060	4790	63308019
10/5/10	[redacted]	148915	15088	8298	15088	14710	230275	2263	73174893	5673	74981030
10/4/10	[redacted]	114324	11583	6371	11583	11293	176785	1737	56177428	4355	57564026
10/16/10	[redacted]	130110	13182	7250	13182	12853	201195	1977	63934334	4957	65512392
10/17/10	[redacted]	87419	8857	4871	8857	8636	135180	1329	42956491	3330	44016763
10/19/10	[redacted]	130452	13217	7269	13217	12887	201725	1983	64102773	4970	65684988
10/22/10	[redacted]	93278	9451	5198	9451	9214	144240	1418	45835624	3553	46966961
10/23/10	[redacted]	143466	14536	7995	14536	14172	221848	2180	70497249	5465	72237295
10/25/10	[redacted]	117827	11938	6566	11938	11639	182202	1791	57898825	4489	59327911
10/27/10	[redacted]	131504	13324	7328	13324	12990	203351	1999	64619289	5010	66214253
10/29/10	[redacted]	116816	11836	6510	11836	11540	180639	1775	57402190	4450	58819019
11/1/10	[redacted]	114503	11601	6381	11601	11311	177063	1740	56265585	4362	57654358
11/7/10	[redacted]	101378	10271	5649	10271	10015	156767	1541	49816163	3862	51045749
11/17/10	[redacted]	188975	19146	10531	19146	18668	292222	2872	92860096	7199	95152113
11/18/10	[redacted]	114287	11579	6369	11579	11290	176728	1737	56159380	4354	57545533
11/19/10	[redacted]	126095	12776	7027	12776	12456	194988	1916	61961772	4804	63491142
11/26/10	[redacted]	125693	12735	7004	12735	12417	194366	1910	61764155	4788	63288647
11/30/10	[redacted]	117400	11895	6542	11895	11597	181541	1784	57688765	4472	59112666
12/4/10	[redacted]	113721	11522	6337	11522	11234	175852	1728	55881047	4332	57260330
12/14/10	[redacted]	116825	11836	6510	11836	11540	180652	1775	57406261	4450	58823189
12/19/10	[redacted]	150019	15199	8360	15199	14820	231982	2280	73717530	5715	75537061
12/19/10	[redacted]	112567	11405	6273	11405	11120	174068	1711	55314131	4288	56679420
12/27/10	[redacted]	60632	6143	3379	6143	5989	93759	921	29793864	2310	30529250
12/29/10	[redacted]	114121	11562	6359	11562	11273	176472	1734	56077826	4347	57461965
3/4/11	[redacted]	129311	13101	7206	13101	12774	199961	1965	63542018	4926	65110392
3/10/11	[redacted]	126297	12796	7038	12796	12476	195300	1919	62060947	4811	63592765
2/26/11	[redacted]	120126	12171	6694	12171	11867	185758	1826	59028661	4576	60485634
3/2/11	[redacted]	90628	9182	5050	9182	8953	140142	1377	44533388	3452	45632582
3/7/11	[redacted]	123514	12514	6883	12514	12201	190995	1877	60693062	4705	62191117
3/12/11	[redacted]	113831	11533	6343	11533	11245	176023	1730	55935109	4336	57315726
3/17/11	[redacted]	113879	11538	6346	11538	11249	176097	1731	55958612	4338	57339809
3/30/11	[redacted]	124653	12630	6946	12630	12314	192758	1894	61253218	4749	62765099
3/27/11	[redacted]	163015	16516	9084	16516	16103	252079	2477	80103717	6210	82080875
4/6/11	[redacted]	114295	11580	6369	11580	11291	176740	1737	56163051	4354	57549294
4/13/11	[redacted]	170473	17272	9500	17272	16840	263612	2591	83768619	6494	85836235
4/17/11	[redacted]	124322	12596	6928	12596	12281	192245	1889	61090156	4736	62598012
4/16/11	[redacted]	114752	11626	6395	11626	11336	177448	1744	56387927	4372	57779721
4/24/11	[redacted]	193774	19633	10798	19633	19142	299642	2945	95217997	7382	97568213
4/27/11	[redacted]	126826	12850	7067	12850	12528	196117	1927	62320645	4831	63858872
5/2/11	[redacted]	122838	12446	6845	12446	12134	189952	1867	60361343	4680	61851211
5/3/11	[redacted]	127216	12889	7089	12889	12567	196720	1933	62512294	4846	64055252
5/5/11	[redacted]	172529	17480	9614	17480	17043	266790	2622	84778465	6573	86871008
5/9/11	[redacted]	122764	12438	6841	12438	12127	189837	1866	60324808	4677	61813774
5/13/11	[redacted]	113727	11522	6337	11522	11234	175861	1728	55883843	4332	57263195
5/21/11	[redacted]	172274	17454	9600	17454	17018	266396	2618	84653207	6563	86742657
5/23/11	[redacted]	128289	12998	7149	12998	12673	198380	1950	63039771	4887	64595749
5/25/11	[redacted]	127526	12921	7106	12921	12598	197200	1938	62664815	4858	64211537
5/28/11	[redacted]	113982	11548	6352	11548	11260	176256	1732	56009192	4342	57391638
6/3/11	[redacted]	176770	17910	9850	17910	17462	273349	2686	86862699	6734	89006685
6/10/11	[redacted]	120955	12255	6740	12255	11948	187039	1838	59435741	4608	60902762
6/22/11	[redacted]	127711	12939	7117	12939	12616	197486	1941	62755731	4865	64304698
6/26/11	[redacted]	128879	13058	7182	13058	12731	199293	1959	63329677	4910	64892810
6/28/11	[redacted]	121838	12344	6789	12344	12036	188405	1852	59869949	4641	61347688
6/16/11	[redacted]	114864	11638	6401	11638	11347	177620	1746	56442667	4376	57835812
7/4/11	[redacted]	130444	13216	7269	13216	12886	201713	1982	64098826	4969	65680944
7/2/11	[redacted]	122077	12368	6803	12368	12059	188773	1855	59986939	4651	61467565
7/5/11	[redacted]	130800	13252	7289	13252	12921	202263	1988	64273458	4983	65859886
7/7/11	[redacted]	121896	12350	6793	12350	12041	188494	1853	59898051	4644	61376483
7/8/11	[redacted]	146473	14840	8162	14840	14469	226498	2226	71974885	5580	73751403

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: between California Coastal Water Boundary & Sea Buoy from Main Engines (g/trip)				Emissions: between California Coastal Water Boundary & Sea Buoy from Auxiliary Engines (g/trip)			
		CH_4	CO_2	N_2O	CO_2e	CH_4	CO_2	N_2O	CO_2e
10/2/10		5910	49647832	2449	50531023	150	1151128	48	1169279
10/6/10		4036	33898238	1672	34501258	1349	10343132	435	10506223
10/5/10		3864	32461446	1601	33038907	260	1994065	84	2025508
10/4/10		3137	26350594	1300	26819347	352	2699085	113	2741645
10/16/10		3762	31603345	1559	32165541	4143	31764671	1335	32265540
10/17/10		2314	19441003	959	19786842	774	5931897	249	6025432
10/19/10		3906	32808979	1618	33392622	1484	11376587	478	11555975
10/22/10		2999	25188440	1242	25636520	218	1671357	70	1697712
10/23/10		2891	24288153	1198	24720218	225	1727648	73	1754890
10/25/10		6129	51481180	2539	52396985	156	1193635	50	1212457
10/27/10		2789	23429056	1156	23845839	243	1860152	78	1889483
10/29/10		6053	50846108	2508	51750615	154	1178911	50	1197500
11/1/10		3256	27353137	1349	27839725	170	1302223	55	1322757
11/7/10		4905	41205064	2032	41938065	124	953993	40	969035.2
11/17/10		4786	40203835	1983	40919026	840	6436552	271	6538044
11/18/10		5864	49256860	2429	50133096	149	1142063	48	1160071
11/19/10		3666	30795800	1519	31343630	296	2271963	95	2307788
11/26/10		2737	22992680	1134	23401699	599	4595558	193	4668021
11/30/10		6134	51522945	2541	52439492	160	1225337	51	1244658
12/4/10		3217	27022691	1333	27503401	168	1286491	54	1306777
12/14/10		3466	29110515	1436	29628365	279	2138020	90	2171732
12/19/10		3837	32230789	1590	32804147	733	5622226	236	5710877
12/19/10		5770	48467970	2390	49330173	150	1152682	48	1170858
12/27/10		833	6998578	345	7123076.3	273	2096381	88	2129437
12/29/10		5851	49152572	2424	50026953	149	1139645	48	1157615
3/4/11		3767	31644649	1561	32207579	382	2925490	123	2971619
3/10/11		3871	32514262	1604	33092662	311	2382557	100	2420126
2/26/11		2749	23087807	1139	23498518	444	3404832	143	3458520
3/2/11		1786	15001932	740	15268803	289	2212382	93	2247268
3/7/11		3505	29438227	1452	29961907	338	2588669	109	2629487
3/12/11		5830	48970073	2415	49841207	148	1135413	48	1153316
3/17/11		5833	49000127	2417	49871796	148	1136110	48	1154024
3/30/11		4285	35995463	1775	36635791	312	2388448	100	2426110
3/27/11		7706	64727917	3192	65879369	686	5259655	221	5342590
4/6/11		5900	49560109	2444	50441740	150	1149094	48	1167213
4/13/11		8176	68681528	3387	69903312	731	5603214	235	5691566
4/17/11		3055	25663716	1266	26120251	981	7517770	316	7636311
4/16/11		5934	49849413	2459	50736190	155	1185536	50	1204230
4/24/11		9367	78685369	3881	80085112	802	6149953	258	6246926
4/27/11		3142	26390500	1302	26859964	1008	7730669	325	7852567
5/2/11		3472	29164206	1438	29683012	3823	29313081	1232	29775293
5/3/11		3911	32848332	1620	33432675	315	2412543	101	2450585
5/5/11		8283	69576587	3431	70814293	738	5654288	238	5743445
5/9/11		3001	25211666	1243	25660160	963	7385349	310	7501802
5/13/11		5822	48904516	2412	49774484	148	1133893	48	1151773
5/21/11		8268	69453644	3425	70689162	736	5645278	237	5734294
5/23/11		2872	24125132	1190	24554297	826	6331790	266	6431631
5/25/11		3924	32959983	1626	33546312	316	2420744	102	2458914
5/28/11		5841	49064807	2420	49937626	148	1137610	48	1155548
6/3/11		8402	70580722	3481	71836291	727	5570566	234	5658403
6/10/11		3402	28578514	1409	29086901	328	2513070	106	2552696
6/22/11		4207	35335315	1743	35963899	338	2589066	109	2629890
6/26/11		4177	35085911	1730	35710059	312	2391903	101	2429619
6/28/11		3861	32429129	1599	33006014	1291	9894872	416	10050896
6/16/11		5943	49919836	2462	50807866	155	1187211	50	1205931
7/4/11		3050	25617424	1263	26073136	583	4468613	188	4539075
7/2/11		3871	32518967	1604	33097451	289	2216908	93	2251864
7/5/11		4348	36524019	1801	37173749	349	2676163	112	2718362
7/7/11		3863	32450708	1600	33027978	1291	9901457	416	10057584
7/8/11		3803	31941937	1575	32510155	256	1962153	82	1993092

Public Copy

Baseline Ocean Going Vessels Emissions

Date	[redacted]
7/10/11	
7/17/11	
7/20/11	
7/21/11	
7/23/11	
7/26/11	
8/10/11	
8/13/11	
8/21/11	
8/7/11	
8/1/11	
8/3/11	
8/25/11	
8/27/11	
8/29/11	
9/1/11	
9/5/11	
9/11/11	
9/17/11	
9/21/11	
9/20/11	
10/2/11	
10/3/11	
10/8/11	
10/12/11	
10/15/11	
10/16/11	
10/17/11	
10/19/11	
10/24/11	
10/25/11	
10/26/11	
10/30/11	
11/4/11	
11/1/11	
11/16/11	
11/18/11	
11/21/11	
11/22/11	
11/25/11	
11/24/11	
12/1/11	
12/5/11	
12/11/11	
12/22/11	
12/24/11	
1/4/12	
12/31/11	
1/11/12	
1/14/12	
1/14/12	
1/28/12	
1/30/12	
2/5/12	

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Main Engine Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
7/10/11		427246	28352	21029	9661	8898	46984	1887	14540405	729	14805974
7/17/11		327122	30983	22987	7926	7301	51408	2063	15909436	797	16199886
7/20/11		427873	28392	21058	9675	8911	47054	1890	14562088	730	14828044
7/21/11		314193	29783	22136	7617	7015	49345	1987	15271114	766	15550193
7/23/11		651381	62834	47972	15913	14657	101199	4305	31318331	1587	31900833
7/26/11		288782	27396	20351	6999	6447	45343	1826	14032509	704	14289028
8/10/11		254722	24555	18791	6224	5732	39557	1686	12241748	621	12469595
8/13/11		371627	35628	26945	9053	8338	57963	2418	17938009	906	18269540
8/21/11		257738	24756	18806	6285	5789	40136	1688	12421012	628	12651165
8/7/11		305325	29172	21920	7425	6839	47738	1967	14773623	744	15045596
8/1/11		368306	24479	18258	8340	7682	40440	1639	12515259	628	12744437
8/3/11		205130	19926	15430	5030	4633	31697	1385	9809265	500	9993313
8/25/11		283462	27112	20350	6894	6350	44320	1826	13715738	691	13968235
8/27/11		353763	33842	25493	8608	7929	55260	2288	17101529	862	17416829
8/29/11		247244	23766	18084	6032	5556	38479	1623	11908120	603	12128984
9/1/11		257569	24740	18795	6281	5785	40109	1687	12412689	628	12642694
9/5/11		520681	59477	45694	15042	13854	95272	4101	29484252	1498	30034745
9/11/11		202615	19559	14964	4952	4561	31455	1343	9734619	494	9915889
9/17/11		532008	35355	26296	12038	11088	58446	2360	18087356	908	18418253
9/21/11		581388	56299	43322	14233	13109	90054	3888	27869473	1417	28390336
9/20/11		231488	22251	16877	5645	5199	36056	1515	11158229	564	11364916
10/2/11		519672	34553	25727	11762	10834	57069	2309	17661240	886	17984540
10/3/11		265585	25272	18937	6451	5942	41591	1699	12871277	647	13107606
10/8/11		534692	52668	41453	13183	12142	81955	3720	25362999	1303	25845062
10/12/11		454138	52078	40323	13147	12109	82846	3619	25638541	1307	26119565
10/15/11		306164	29054	21520	7418	6832	48115	1931	14890356	746	15162208
10/16/11		253962	17083	13035	5785	5328	27643	1170	8554641	433	8713508
10/17/11		428325	28422	21079	9685	8920	47105	1892	14577678	731	14843911
10/19/11		410116	25462	18771	8697	8011	42468	1685	13142707	657	13381780
10/24/11		582047	40710	32937	13499	12434	61729	2956	19103391	993	19473264
10/25/11		387665	25778	19203	8775	8083	42566	1723	13173181	661	13414377
10/26/11		222187	21434	16428	5431	5002	34484	1474	10672021	541	10870836
10/30/11		420753	27930	20730	9516	8764	46259	1860	14316021	718	14577593
11/4/11		161081	18519	14371	4666	4298	29342	1290	9080479	463	9251225
11/1/11		424284	41637	32897	10462	9636	65035	2952	20126685	1034	20509213
11/16/11		564127	54735	42285	13825	12734	87248	3795	27000901	1375	27506768
11/18/11		464802	30014	23365	10021	9230	46998	2097	14544576	745	14819471
11/21/11		133128	15435	12180	3874	3569	24088	1093	7454710	383	7596397
11/22/11		267495	25674	19340	6513	5999	41741	1736	12917800	652	13156331
11/25/11		321596	30470	22623	7794	7179	50526	2030	15636566	784	15922156
11/24/11		315686	30240	22755	7683	7077	49309	2042	15259817	769	15541190
12/1/11		312358	29899	22550	7603	7003	48771	2024	15093330	761	15371802
12/5/11		438924	29111	21568	9922	9139	48287	1936	14943693	749	15216455
12/11/11		342712	22874	17254	7782	7167	37486	1548	11600849	585	11814600
12/22/11		388945	25873	19380	8816	8120	42650	1739	13199036	663	13441244
12/24/11		909117	61443	46996	20739	19102	98800	4218	30575855	1551	31145186
1/4/12		314953	29853	22186	7635	7032	49467	1991	15308601	768	15588348
12/31/11		248666	23685	17682	6037	5560	38970	1587	12060256	606	12281437
1/11/12		200328	19186	14488	4878	4493	31265	1300	9675677	488	9854321
1/14/12		692600	66708	50770	16906	15572	107729	4556	33339372	1688	33958286
1/14/12		444485	29427	21768	10045	9252	48948	1954	15148005	758	15424083
1/28/12		306723	29058	21512	7428	6841	48215	1931	14921394	747	15193653
1/30/12		432547	28652	21218	9778	9006	47614	1904	14735406	738	15004134
2/5/12		302502	28887	21611	7351	6771	47353	1939	14654500	737	14923756

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Engine Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
7/10/11		1045838	94256	44558	32561	29991	179944	7712	59124469	2485	60056750
7/17/11		246722	22236	10511	7681	7075	42450	1819	13947951	586	14167884
7/20/11		2590399	233460	110363	80650	74283	445697	19101	146443235	6155	148752369
7/21/11		239190	21557	10191	7447	6859	41154	1764	13522128	568	13735346
7/23/11		985798	88845	42000	30692	28269	169614	7269	55730220	2342	56608981
7/26/11		220418	19865	9391	6863	6321	37925	1625	12460938	524	12657424
8/10/11		537434	48436	22897	16733	15412	92469	3963	30382807	1277	30861887
8/13/11		833167	75089	35497	25940	23892	143352	6144	47101495	1980	47844197
8/21/11		672432	60603	28649	20936	19283	115697	4958	38014668	1598	38614088
8/7/11		233827	21074	9962	7280	6705	40232	1724	13218945	556	13427383
8/1/11		605436	54565	25794	18850	17362	104170	4464	34227183	1439	34766881
8/3/11		658844	59379	28070	20513	18893	113359	4858	37246515	1565	37833822
8/25/11		219677	19798	9359	6839	6299	37797	1620	12419013	522	12614838
8/27/11		340793	30714	14519	10610	9773	58636	2513	19266107	810	19569898
8/29/11		197976	17843	8435	6164	5677	34063	1460	11192219	470	11368699
9/1/11		672087	60572	28634	20925	19273	115637	4956	37995156	1597	38594268
9/5/11		768470	85350	40347	29484	27157	162940	6983	53537546	2250	54381732
9/11/11		889782	80192	37909	27703	25516	153093	6561	50302110	2114	51095280
9/17/11		222406	20044	9476	6924	6378	38267	1640	12573300	528	12771557
9/21/11		896516	80799	38196	27912	25709	154252	6611	50682841	2130	51482014
9/20/11		986677	88924	42037	30719	28294	169765	7276	55779906	2344	56659450
10/2/11		218452	19688	9307	6801	6264	37586	1611	12349767	519	12544499
10/3/11		195000	17574	8308	6071	5592	33551	1438	11023970	463	11197798
10/8/11		274109	24704	11678	8534	7860	47162	2021	15496205	651	15740551
10/12/11		680970	75632	35753	26127	24065	144388	6188	47441665	1994	48189731
10/15/11		715337	64470	30477	22271	20513	123079	5275	40440235	1700	41077901
10/16/11		155687	14031	6633	4847	4465	26787	1148	8801491	370	8940274
10/17/11		2594176	233801	110524	80767	74391	446347	19129	146656767	6164	148969268
10/19/11		202493	16025	7575	5536	5099	30593	1311	10051835	422	10210333
10/24/11		216311	19495	9216	6735	6203	37218	1595	12228711	514	12421535
10/25/11		2404328	216691	102436	74857	68947	413682	17729	135924077	5713	138067344
10/26/11		828776	74694	35310	25803	23766	142597	6111	46853269	1969	47592057
10/30/11		223769	20167	9534	6967	6417	38501	1650	12650336	532	12849808
11/4/11		153417	17039	8055	5886	5422	32529	1394	10688232	449	10856765
11/1/11		697026	62820	29697	21701	19988	119928	5140	39405040	1656	40026383
11/16/11		879587	79273	37474	27385	25223	151339	6486	49725768	2090	50509850
11/18/11		342209	27081	12802	9355	8617	51701	2216	16987341	714	17255200
11/21/11		133211	14795	6994	5111	4708	28245	1211	9280515	390	9426852
11/22/11		217274	19582	9257	6765	6231	37384	1602	12283162	516	12476844
11/25/11		723041	65164	30805	22511	20734	124404	5332	40875763	1718	41520297
11/24/11		925673	83426	39438	28820	26545	159269	6826	52331128	2199	53156291
12/1/11		624005	56239	26586	19428	17894	107365	4601	35276936	1483	35833187
12/5/11		231186	20836	9850	7198	6630	39777	1705	13069648	549	13275731
12/11/11		198081	17852	8439	6167	5680	34081	1461	11198123	471	11374697
12/22/11		218435	19686	9306	6801	6264	37583	1611	12348778	519	12543495
12/24/11		967765	87220	41231	30131	27752	166511	7136	54710721	2299	55573406
1/4/12		221590	19971	9441	6899	6354	38126	1634	12527152	527	12724681
12/31/11		716968	64617	30546	22322	20560	123360	5287	40532429	1704	41171549
1/11/12		609300	54913	25959	18970	17472	104834	4493	34445592	1448	34988734
1/14/12		1041987	93909	44394	32441	29880	179281	7683	58906769	2476	59835617
1/14/12		698120	62918	29743	21735	20019	120117	5148	39466888	1659	40089206
1/28/12		173867	15670	7408	5413	4986	29915	1282	9829257	413	9984246
1/30/12		683437	61595	29118	21278	19598	117590	5040	38636793	1624	39246022
2/5/12		230986	20818	9841	7192	6624	39743	1703	13058366	549	13264272

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Boiler Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
7/10/11		127648	12933	7113	12933	12610	197389	1940	62724820	4863	64273024
7/17/11		129814	13152	7234	13152	12824	200738	1973	63788894	4945	65363362
7/20/11		127713	12940	7117	12940	12616	197490	1941	62756808	4865	64305801
7/21/11		126030	12769	7023	12769	12450	194886	1915	61929530	4801	63458104
7/23/11		183303	18572	10214	18572	18107	283452	2786	90073130	6983	92296358
7/26/11		124317	12595	6928	12595	12281	192238	1889	61087979	4736	62595781
8/10/11		127154	12883	7086	12883	12561	196625	1932	62482049	4844	64024261
8/13/11		189307	19180	10549	19180	18701	292735	2877	93023165	7212	95319207
8/21/11		140429	14228	7825	14228	13872	217153	2134	69005350	5350	70708572
8/7/11		151074	15306	8419	15306	14924	233614	2296	74236097	5755	76068428
8/1/11		113388	11488	6318	11488	11201	175338	1723	55717420	4320	57092664
8/3/11		120889	12248	6736	12248	11942	186936	1837	59403222	4605	60869441
8/25/11		125345	12700	6985	12700	12382	193828	1905	61593158	4775	63113430
8/27/11		192639	19518	10735	19518	19030	297888	2928	94660447	7339	96996901
8/29/11		128450	13014	7158	13014	12689	198629	1952	63118779	4893	64676707
9/1/11		140359	14221	7821	14221	13865	217044	2133	68970706	5347	70673074
9/5/11		176995	17933	9863	17933	17484	273697	2690	86973267	6743	89119983
9/11/11		127551	12923	7108	12923	12600	197239	1938	62677017	4859	64224041
9/17/11		125545	12720	6996	12720	12402	194136	1908	61691107	4783	63213797
9/21/11		166780	16898	9294	16898	16475	257901	2535	81953929	6354	83976754
9/20/11		141052	14291	7860	14291	13934	218117	2144	69311419	5373	71022197
10/2/11		123423	12505	6878	12505	12192	190856	1876	60648724	4702	62145684
10/3/11		111716	11319	6225	11319	11036	172752	1698	54895682	4256	56250644
10/8/11		145603	14752	8114	14752	14383	225153	2213	71547508	5547	73313478
10/12/11		156212	15827	8705	15827	15431	241559	2374	76760804	5951	78655451
10/15/11		127892	12958	7127	12958	12634	197766	1944	62844574	4872	64395733
10/16/11		89653	9083	4996	9083	8856	138634	1363	44054206	3415	45141573
10/17/11		127916	12960	7128	12960	12636	197803	1944	62856390	4873	64407841
10/19/11		105076	10646	5855	10646	10380	162484	1597	51633049	4003	52907481
10/24/11		118248	11980	6589	11980	11681	182852	1797	58105417	4505	59539602
10/25/11		119014	12058	6632	12058	11757	184037	1809	58481948	4534	59925428
10/26/11		127348	12902	7096	12902	12580	196924	1935	62577054	4851	64121610
10/30/11		126111	12777	7027	12777	12458	195013	1917	61969575	4804	63499137
11/4/11		124285	12592	6926	12592	12277	192189	1889	61072337	4735	62579753
11/1/11		129956	13167	7242	13167	12838	200958	1975	63858760	4951	65434952
11/16/11		164204	16637	9150	16637	16221	253917	2496	80687842	6255	82679418
11/18/11		157186	15926	8759	15926	15527	243065	2389	77239259	5988	79145715
11/21/11		108320	10975	6036	10975	10700	167501	1646	53227317	4126	54541099
11/22/11		123512	12514	6883	12514	12201	190993	1877	60692363	4705	62190400
11/25/11		126505	12817	7049	12817	12497	195621	1923	62162942	4819	63697277
11/24/11		168522	17074	9391	17074	16647	260594	2561	82809488	6420	84853431
12/1/11		146211	14814	8148	14814	14443	226093	2222	71846138	5570	73619478
12/5/11		130083	13180	7249	13180	12850	201155	1977	63921362	4956	65499099
12/11/11		128655	13035	7169	13035	12709	198945	1955	63219303	4901	64779712
12/22/11		141508	14337	7885	14337	13979	218822	2151	69535496	5391	71251804
12/24/11		180085	18246	10035	18246	17790	278474	2737	88491440	6860	90675628
1/4/12		126147	12781	7029	12781	12461	195068	1917	61987089	4806	63517084
12/31/11		129132	13083	7196	13083	12756	199684	1962	63454010	4919	65020212
1/11/12		110610	11207	6164	11207	10927	171042	1681	54352467	4214	55694020
1/14/12		194088	19664	10815	19664	19173	300128	2950	95372498	7394	97726528
1/14/12		129766	13147	7231	13147	12819	200664	1972	63765331	4943	65339217
1/28/12		124493	12613	6937	12613	12298	192511	1892	61174612	4743	62684553
1/30/12		127162	12884	7086	12884	12562	196637	1933	62485789	4844	64028093
2/5/12		131500	13323	7328	13323	12990	203345	1998	64617366	5010	66212283

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: between California Coastal Water Boundary & Sea Buoy from Main Engines (g/trip)				Emissions: between California Coastal Water Boundary & Sea Buoy from Auxiliary Engines (g/trip)			
		CH_4	CO_2	N_2O	CO_2e	CH_4	CO_2	N_2O	CO_2e
7/10/11	[redacted]	3665	30788224	1518	31335919	1631	12502312	525	12699450
7/17/11	[redacted]	3950	33177266	1636	33767460	372	2852654	120	2897635
7/20/11	[redacted]	3671	30834328	1521	31382843	4042	30991728	1303	31480409
7/21/11	[redacted]	3791	31840537	1570	32406952	357	2737719	115	2780888
7/23/11	[redacted]	8919	74923160	3695	76255976	792	6068711	255	6164403
7/26/11	[redacted]	3537	29708257	1465	30236741	341	2612414	110	2653607
8/10/11	[redacted]	3284	27584205	1360	28074904	545	4175388	175	4241226
8/13/11	[redacted]	4945	41535696	2049	42274580	722	5538073	233	5625398
8/21/11	[redacted]	3312	27819202	1372	28314081	688	5270975	222	5354088
8/7/11	[redacted]	3944	33126055	1634	33715338	265	2034892	86	2066978
8/1/11	[redacted]	3105	26085395	1287	26549431	923	7075504	297	7187071
8/3/11	[redacted]	2799	23514356	1160	23932656	638	4891114	206	4968238
8/25/11	[redacted]	3823	32114320	1584	32685605	308	2358634	99	2395825
8/27/11	[redacted]	4564	38335750	1891	39017709	301	2308521	97	2344922
8/29/11	[redacted]	3175	26665907	1315	27140270	213	1636603	69	1662409
9/1/11	[redacted]	3310	27800439	1371	28294984	687	5267420	221	5350477
9/5/11	[redacted]	8391	70487605	3476	71741517	722	5533289	233	5620538
9/11/11	[redacted]	2708	22746994	1122	23151643	932	7148378	300	7261095
9/17/11	[redacted]	4685	39352835	1941	40052887	341	2611224	110	2652398
9/21/11	[redacted]	7930	66615377	3285	67800406	705	5408761	227	5494047
9/20/11	[redacted]	3107	26097848	1287	26562106	1070	8201404	345	8330725
10/2/11	[redacted]	4574	38421628	1895	39105115	333	2549434	107	2589634
10/3/11	[redacted]	3192	26814973	1323	27291988	278	2133441	90	2167081
10/8/11	[redacted]	8256	69352262	3420	70585977	215	1649360	69	1675367
10/12/11	[redacted]	7291	61240636	3020	62330053	649	4972967	209	5051382
10/15/11	[redacted]	3980	33436117	1649	34030916	1203	9226693	388	9372181
10/16/11	[redacted]	2150	18061157	891	18382449	207	1588219	67	1613262
10/17/11	[redacted]	3675	30867475	1522	31416580	4047	31025044	1304	31514251
10/19/11	[redacted]	3265	27424692	1353	27912553	359	2750228	116	2793594
10/24/11	[redacted]	6160	51745360	2552	52665864	156	1199761	50	1218679
10/25/11	[redacted]	3319	27881218	1375	28377200	3655	28023543	1178	28465422
10/26/11	[redacted]	2843	23879247	1178	24304038	817	6267256	263	6366079
10/30/11	[redacted]	3608	30311062	1495	30850269	348	2665422	112	2707451
11/4/11	[redacted]	2629	22080304	1089	22473093	177	1355165	57	1376533
11/1/11	[redacted]	5710	47963052	2366	48816272	510	3907237	164	3968847
11/16/11	[redacted]	7680	64511096	3182	65658692	668	5124432	215	5205234
11/18/11	[redacted]	5014	42115254	2077	42864447	262	2005015	84	2036631
11/21/11	[redacted]	2154	18092027	892	18413869	145	1110387	47	1127896
11/22/11	[redacted]	3751	31512517	1554	32073097	301	2309152	97	2345563
11/25/11	[redacted]	3882	32605842	1608	33185871	1097	8413529	354	8546194
11/24/11	[redacted]	4368	36692995	1810	37345731	996	7632342	321	7752690
12/1/11	[redacted]	4055	34062150	1680	34668086	690	5292100	222	5375547
12/5/11	[redacted]	3767	31645625	1561	32208573	363	2782778	117	2826657
12/11/11	[redacted]	2818	23671210	1167	24092300	223	1706075	72	1732976
12/22/11	[redacted]	3209	26951465	1329	27430908	253	1942495	82	1973125
12/24/11	[redacted]	8706	73132383	3607	74433343	770	5901487	248	5994543
1/4/12	[redacted]	3800	31919042	1574	32486853	331	2539528	107	2579572
12/31/11	[redacted]	3221	27059918	1335	27541290	1034	7926764	333	8051755
1/11/12	[redacted]	2581	21684124	1069	22069866	829	6352013	267	6452172
1/14/12	[redacted]	9498	79784911	3935	81204214	831	6373687	268	6474188
1/14/12	[redacted]	3762	31598703	1558	32160816	1118	8570955	360	8706103
1/28/12	[redacted]	3893	32700346	1613	33282056	294	2255914	95	2291486
1/30/12	[redacted]	3659	30734667	1516	31281410	1087	8336591	350	8468043
2/5/12	[redacted]	4086	34323950	1693	34934543	329	2520920	106	2560670

Public Copy

Baseline Ocean Going Vessels Emissions

Date	[redacted]
2/12/12	
2/8/12	
2/10/12	
2/20/12	
2/27/12	
2/29/12	
3/2/12	
3/4/12	
3/6/12	
3/9/12	
3/11/12	
3/16/12	
3/18/12	
3/20/12	
3/21/12	
3/23/12	
3/28/12	
4/1/12	
4/12/12	
4/11/12	
4/18/12	
4/21/12	
4/22/12	
4/24/12	
4/25/12	
4/30/12	
5/3/12	
5/3/12	
5/5/12	
5/11/12	
5/12/12	
5/21/12	
5/25/12	
5/29/12	
6/3/12	
6/7/12	
6/12/12	
6/12/12	
6/15/12	
6/17/12	
6/17/12	
6/15/12	
6/16/12	
6/23/12	
5/31/12	
6/25/12	
7/6/12	
7/13/12	
7/16/12	
7/18/12	
7/20/12	
7/22/12	
7/25/12	
8/23/12	
8/29/12	
8/29/12	
9/1/12	
9/2/12	
9/4/12	
9/6/12	

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Main Engine Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
2/12/12		333198	22397	16994	7582	6983	36334	1525	11244458	568	11452687
2/8/12		390603	39129	31810	9720	8953	59054	2855	18275534	952	18630569
2/10/12		287351	19244	14499	6526	6011	31418	1301	9723092	490	9902375
2/20/12		422516	28044	20811	9555	8801	46456	1868	14377020	721	14639676
2/27/12		720552	72771	60697	18051	16626	107866	5447	33381810	1756	34040551
2/29/12		390056	39078	31774	9707	8941	58967	2851	18248674	951	18603228
3/2/12		267579	18370	14548	6159	5673	28697	1306	8880987	456	9049906
3/4/12		207605	13587	11144	4531	4174	20619	1000	6380942	333	6505059
3/6/12		289822	27705	20771	7047	6490	45333	1864	14029327	706	14287423
3/9/12		141824	13880	10948	3494	3218	21765	983	6735710	346	6863485
3/11/12		598501	57947	44574	14651	13494	92718	4000	28693675	1459	29229826
3/16/12		571685	58889	50837	14479	13336	84149	4562	26041833	1393	26569528
3/18/12		592324	60813	52204	14974	13792	87437	4685	27059450	1443	27605313
3/20/12		428558	49274	38353	12424	11443	78018	3442	24144604	1233	24599101
3/21/12		388133	38897	31645	9661	8898	58661	2840	18154070	946	18506928
3/23/12		1180375	115653	91152	29084	26788	181126	8180	56053695	2877	57117211
3/28/12		219355	21067	16001	5349	4927	34161	1436	10571910	535	10767780
4/1/12		1074792	105806	84159	26551	24455	164304	7553	50847857	2619	51818430
4/12/12		828092	82800	67820	20631	19003	125000	6086	38684159	2018	39437566
4/11/12		695595	66987	50967	16978	15638	108207	4574	33487264	1695	34108812
4/18/12		272893	26126	19650	6640	6116	42636	1763	13194624	665	13437817
4/21/12		316272	30537	23358	7730	7120	49101	2096	15195458	771	15478409
4/22/12		179429	12374	9879	4140	3813	19177	887	5934916	306	6048420
4/24/12		160488	15494	11894	3925	3615	24894	1067	7703935	391	7847593
4/25/12		307123	29318	21917	7462	6873	48089	1967	14882354	748	15155679
4/30/12		314533	21180	16130	7164	6599	34252	1448	10599968	537	10796700
5/3/12		439054	29192	21736	9938	9153	48216	1951	14921458	749	15194603
5/3/12		293981	27920	20715	7126	6563	46173	1859	14289364	716	14550495
5/5/12		408894	40848	33034	10160	9358	61961	2965	19175271	996	19546432
5/11/12		328517	31031	23015	7956	7328	51659	2065	15986998	801	16278555
5/12/12		296712	28347	21227	7212	6643	46431	1905	14369048	723	14633208
5/21/12		386880	38779	31561	9631	8870	58462	2832	18092438	943	18444191
5/25/12		452120	30042	22339	10230	9422	49674	2005	15372775	771	15653967
5/29/12		240408	27279	20749	6924	6377	44175	1862	13671146	692	13924661
6/3/12		267180	25593	19271	6503	5990	41726	1729	12912963	651	13151127
6/7/12		259594	24827	18697	6316	5818	40556	1678	12550940	633	12782289
6/12/12		276092	26424	19862	6717	6187	43145	1782	13352365	673	13598374
6/12/12		169815	16513	12823	4167	3838	26213	1151	8112289	414	8264743
6/15/12		367246	35220	26670	8948	8242	57257	2393	17719380	895	18047083
6/17/12		132383	12987	10292	3265	3008	20277	924	6275241	323	6394647
6/17/12		388893	24732	19064	8345	7687	39597	1711	12254350	623	12483436
6/15/12		208671	16155	15453	5125	4720	20183	1387	6246104	356	6385577
6/16/12		383364	27646	23637	9043	8330	39619	2121	12261065	654	12508344
6/23/12		209964	23933	18374	6062	5583	38446	1649	11898126	604	12120012
5/31/12		379183	25262	18828	8588	7910	41622	1690	12880774	647	13116779
6/25/12		282097	27006	20440	6870	6328	43994	1834	13615046	687	13866681
7/6/12		275659	30975	23092	7898	7274	51026	2072	15791312	793	16080683
7/13/12		292719	28083	21281	7134	6571	45625	1910	14119776	713	14381020
7/16/12		434327	28812	21356	9819	9044	47775	1917	14785027	741	15054956
7/18/12		513154	34529	26188	11680	10758	55948	2350	17314521	875	17635244
7/20/12		425590	28200	20897	9622	8862	46838	1875	14495002	726	14759448
7/22/12		291252	27690	20657	7067	6509	45661	1854	14130825	710	14389785
7/25/12		256148	24679	18864	6257	5763	39796	1693	12315678	624	12544740
8/23/12		467844	44415	32657	11322	10428	73629	2931	22786091	1140	23201076
8/29/12		246400	23757	17992	6009	5535	38353	1615	11869257	600	12089311
8/29/12		302063	19929	16175	6590	6070	30014	1452	9288457	484	9468970
9/1/12		189706	18409	14280	4652	4285	29307	1282	9069896	462	9240126
9/2/12		345980	40174	31883	10084	9288	62494	2861	19340126	995	19708780
9/4/12		264886	25440	19173	6450	5941	41322	1721	12788213	646	13024457
9/6/12		312662	29641	22035	7580	6981	49101	1978	15195507	762	15473239

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Engine Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
2/12/12		767198	69144	32686	23886	22000	132002	5657	43372067	1823	44055963
2/8/12		209576	18888	8929	6525	6010	36059	1545	11847975	498	12034796
2/10/12		225051	20283	9588	7007	6454	38722	1660	12722857	535	12923472
2/20/12		1036286	93395	44151	32264	29717	178300	7641	58584432	2462	59508198
2/27/12		211694	19079	9019	6591	6071	36423	1561	11967718	503	12156426
2/29/12		214744	19354	9149	6686	6158	36948	1583	12140114	510	12331540
3/2/12		204101	18395	8696	6355	5853	35117	1505	11538469	485	11720409
3/4/12		168950	13370	6320	4619	4254	25525	1094	8386708	352	8518951
3/6/12		223455	20139	9520	6957	6408	38447	1648	12632586	531	12831778
3/9/12		128051	11541	5456	3987	3672	22032	944	7239100	304	7353247
3/11/12		924035	83279	39368	28769	26498	158987	6814	52238528	2196	53062231
3/16/12		183619	16549	7823	5717	5265	31593	1354	10380540	436	10544222
3/18/12		184845	16659	7875	5755	5301	31804	1363	10449837	439	10614611
3/20/12		650983	72301	34179	24977	23005	138029	5916	45352518	1906	46067641
3/21/12		208588	18799	8887	6494	5982	35889	1538	11792113	496	11978053
3/23/12		307976	27756	13121	9589	8832	52989	2271	17410817	732	17685353
3/28/12		214786	19358	9151	6687	6159	36956	1584	12142531	510	12333996
4/1/12		290770	26206	12388	9053	8338	50029	2144	16438148	691	16697347
4/12/12		234212	21108	9979	7292	6716	40298	1727	13240714	556	13449495
4/11/12		1045723	94246	44553	32558	29987	179924	7711	59117936	2485	60050114
4/18/12		213169	19212	9082	6637	6113	36677	1572	12051087	506	12241110
4/21/12		1432970	129147	61051	44614	41092	246553	10567	81010242	3405	82287621
4/22/12		489848	44148	20870	15251	14047	84282	3612	27692642	1164	28129303
4/24/12		451076	40653	19218	14044	12935	77611	3326	25500706	1072	25902804
4/25/12		168133	15153	7163	5235	4821	28929	1240	9505101	399	9654979
4/30/12		733532	66110	31252	22838	21035	126210	5409	41468848	1743	42122733
5/3/12		820952	73989	34976	25560	23542	141251	6054	46410973	1951	47142786
5/3/12		693238	62478	29535	21583	19879	119277	5112	39190859	1647	39808825
5/5/12		216895	19548	9241	6753	6220	37318	1599	12261769	515	12455114
5/11/12		213368	19230	9090	6643	6119	36712	1573	12062356	507	12252557
5/12/12		163752	14758	6977	5098	4696	28175	1207	9257431	389	9403403
5/21/12		208086	18754	8865	6479	5967	35803	1534	11763769	494	11949261
5/25/12		839581	75667	35770	26140	24076	144456	6191	47464081	1995	48212500
5/29/12		476959	52973	25042	18300	16855	101131	4334	33228664	1397	33752618
6/3/12		583731	52609	24870	18174	16739	100435	4304	33000134	1387	33520484
6/7/12		510897	46045	21767	15906	14651	87904	3767	28882590	1214	29338014
6/12/12		598445	53935	25497	18632	17161	102967	4413	33831953	1422	34365419
6/12/12		152030	13702	6477	4733	4360	26158	1121	8594752	361	8730275
6/15/12		992146	89417	42270	30890	28451	170706	7316	56089089	2357	56973509
6/17/12		328783	29632	14008	10236	9428	56570	2424	18587143	781	18880227
6/17/12		787326	62306	29454	21524	19825	118948	5098	39083065	1643	39699331
6/15/12		111641	10062	4756	3476	3201	19209	823	6311421	265	6410941
6/16/12		160503	14465	6838	4997	4603	27616	1184	9073732	381	9216807
6/23/12		429693	47724	22560	16486	15185	91109	3905	29935725	1258	30407755
5/31/12		509457	45915	21705	15862	14609	87656	3757	28801188	1210	29255329
6/25/12		1103443	99448	47012	34355	31643	189855	8137	62381033	2622	63364664
7/6/12		498488	55364	26172	19126	17616	105695	4530	34728512	1460	35276115
7/13/12		596112	53725	25397	18559	17094	102565	4396	33700060	1416	34231447
7/16/12		2621967	236305	111708	81633	75188	451128	19334	148227908	6230	150565183
7/18/12		635935	57314	27094	19799	18236	109417	4689	35951358	1511	36518244
7/20/12		675132	60846	28764	21020	19360	116161	4978	38167279	1604	38769105
7/22/12		724135	65263	30852	22545	20765	124593	5340	40937584	1721	41583092
7/25/12		537677	48458	22908	16740	15419	92511	3965	30396541	1278	30875837
8/23/12		406152	36604	17304	12645	11647	69881	2995	22961003	965	23323055
8/29/12		199817	18009	8513	6221	5730	34380	1473	11296257	475	11474377
8/29/12		244269	19331	9138	6678	6151	36904	1582	12125590	510	12316788
9/1/12		131852	11883	5618	4105	3781	22686	972	7454004	313	7571539
9/2/12		550287	61117	28892	21113	19446	116679	5001	38337243	1611	38941749
9/4/12		255635	23039	10891	7959	7331	43984	1885	14451834	607	14679712
9/6/12		220356	19860	9388	6861	6319	37914	1625	12457402	524	12653832

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Boiler Emissions (g/trip)									
		NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
2/12/12		138801	14063	7735	14063	13711	214636	2109	68205231	5288	69888705
2/8/12		114630	11614	6388	11614	11324	177258	1742	56327648	4367	57717954
2/10/12		110630	11209	6165	11209	10928	171073	1681	54362219	4214	55704014
2/20/12		126516	12818	7050	12818	12498	195638	1923	62168292	4820	63702760
2/27/12		103444	10481	5764	10481	10219	159961	1572	50831185	3941	52085825
2/29/12		114512	11602	6381	11602	11312	177076	1740	56269969	4362	57658851
3/2/12		114838	11635	6399	11635	11344	177580	1745	56430084	4375	57822918
3/4/12		83814	8492	4670	8492	8279	129606	1274	41185085	3193	42201635
3/6/12		127401	12908	7099	12908	12585	197007	1936	62603381	4853	64148588
3/9/12		75045	7603	4182	7603	7413	116045	1140	36876009	2859	37786200
3/11/12		172492	17476	9612	17476	17039	266733	2621	84760328	6571	86852422
3/16/12		88324	8949	4922	8949	8725	136580	1342	43401331	3365	44472583
3/18/12		90420	9161	5039	9161	8932	139821	1374	44431293	3445	45527968
3/20/12		149546	15152	8333	15152	14773	231250	2273	73484974	5697	75298765
3/21/12		114099	11560	6358	11560	11271	176437	1734	56066813	4347	57450680
3/23/12		150148	15213	8367	15213	14832	232182	2282	73781097	5720	75602198
3/28/12		140764	14262	7844	14262	13905	217671	2139	69169861	5362	70877144
4/1/12		139425	14126	7769	14126	13773	215600	2119	68511683	5311	70202721
4/12/12		114367	11587	6373	11587	11298	176852	1738	56198558	4357	57585677
4/11/12		194770	19734	10853	19734	19240	301183	2960	95707589	7420	98069889
4/18/12		121765	12337	6785	12337	12028	188292	1851	59834028	4639	61310880
4/21/12		179194	18155	9985	18155	17702	277097	2723	88053749	6826	90227134
4/22/12		89898	9108	5010	9108	8881	139014	1366	44174900	3425	45265246
4/24/12		83317	8441	4643	8441	8230	128838	1266	40941218	3174	41951749
4/25/12		125263	12691	6980	12691	12374	193701	1904	61552687	4772	63071959
4/30/12		132865	13462	7404	13462	13125	205456	2019	65288351	5062	66899829
5/3/12		123424	12505	6878	12505	12192	190856	1876	60648863	4702	62145827
5/3/12		124164	12580	6919	12580	12265	192002	1887	61012821	4730	62518768
5/5/12		118562	12012	6607	12012	11712	183338	1802	58259774	4517	59697769
5/11/12		121762	12337	6785	12337	12028	188287	1850	59832376	4639	61309187
5/12/12		122166	12377	6808	12377	12068	188911	1857	60030735	4654	61512442
5/21/12		113830	11533	6343	11533	11245	176021	1730	55934462	4336	57315063
5/25/12		126083	12774	7026	12774	12455	194969	1916	61955613	4803	63484831
5/29/12		139304	14114	7763	14114	13761	215413	2117	68452239	5307	70141810
6/3/12		120082	12166	6692	12166	11862	185690	1825	59007028	4575	60463468
6/7/12		107970	10939	6017	10939	10666	166959	1641	53055045	4113	54364575
6/12/12		122963	12458	6852	12458	12147	190144	1869	60422554	4684	61913933
6/12/12		88509	8968	4932	8968	8743	136867	1345	43492474	3372	44565976
6/15/12		186978	18944	10419	18944	18470	289133	2842	91878522	7123	94146312
6/17/12		71729	7267	3997	7267	7086	110918	1090	35246749	2733	36116726
6/17/12		148893	15085	8297	15085	14708	230241	2263	73164281	5672	74970157
6/15/12		62020	6284	3456	6284	6127	95905	943	30475843	2363	31228062
6/16/12		88268	8943	4919	8943	8719	136494	1341	43373885	3363	44444460
6/23/12		125803	12746	7010	12746	12427	194536	1912	61818188	4793	63344014
5/31/12		127188	12886	7088	12886	12564	196678	1933	62498906	4845	64041534
6/25/12		140401	14225	7824	14225	13869	217110	2134	68991411	5349	70694290
7/6/12		130014	13173	7245	13173	12843	201048	1976	63887493	4953	65464394
7/13/12		140326	14217	7820	14217	13862	216993	2133	68954514	5346	70656482
7/16/12		129216	13092	7200	13092	12764	199813	1964	63494983	4922	65062196
7/18/12		194515	19708	10839	19708	19215	300789	2956	95582375	7410	97941585
7/20/12		125704	12736	7005	12736	12418	194382	1910	61769199	4789	63293816
7/22/12		124192	12583	6921	12583	12268	192045	1887	61026527	4731	62532813
7/25/12		126899	12857	7071	12857	12536	196231	1929	62356675	4834	63895792
8/23/12		194440	19700	10835	19700	19208	300673	2955	95545462	7407	97903760
8/29/12		122183	12379	6809	12379	12070	188938	1857	60039344	4655	61521264
8/29/12		112960	11445	6295	11445	11159	174677	1717	55507381	4303	56877441
9/1/12		82657	8375	4606	8375	8165	127817	1256	40616554	3149	41619071
9/2/12		126609	12828	7055	12828	12507	195782	1924	62214162	4823	63749761
9/4/12		124656	12630	6946	12630	12314	192762	1894	61254458	4749	62766369
9/6/12		125477	12713	6992	12713	12395	194032	1907	61658039	4780	63179912

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: between California Coastal Water Boundary & Sea Buoy from Main Engines (g/trip)				Emissions: between California Coastal Water Boundary & Sea Buoy from Auxiliary Engines (g/trip)			
		CH_4	CO_2	N_2O	CO_2e	CH_4	CO_2	N_2O	CO_2e
2/12/12		3099	26027699	1284	26490709	828	6345327	267	6445381
2/8/12		5925	49771864	2455	50657261	151	1154003	49	1172200
2/10/12		2595	21795419	1075	22183140	316	2424910	102	2463146
2/20/12		3624	30440833	1501	30982349	1612	12361246	520	12556159
2/27/12		9188	77178198	3806	78551130	118	901647	38	915864
2/29/12		5916	49697659	2451	50581736	154	1181927	50	1200564
3/2/12		2357	19797824	976	20150010	153	1175494	49	1194029
3/4/12		1535	12893335	636	13122696	100	765541	32	777611.8
3/6/12		3911	32852437	1620	33436853	315	2412845	101	2450891
3/9/12		1788	15022727	741	15289968	144	1103343	46	1120741
3/11/12		8165	68588066	3383	69808187	709	5435243	228	5520946
3/16/12		7131	59901564	2954	60967160	93	711809	30	723032.6
3/18/12		7416	62296802	3072	63405007	95	727792	31	739268.3
3/20/12		6862	57638011	2843	58663341	607	4650463	195	4723792
3/21/12		5885	49436298	2438	50315726	150	1146223	48	1164297
3/23/12		15541	130542650	6438	132864888	199	1525086	64	1549133
3/28/12		2819	23678213	1168	24099427	220	1684263	71	1710820
4/1/12		14082	118289293	5834	120393555	183	1405629	59	1427793
4/12/12		10674	89658720	4422	91253670	137	1047452	44	1063969
4/11/12		9541	80141366	3953	81567010	835	6403970	269	6504949
4/18/12		3677	30887736	1523	31437201	296	2268548	95	2304318
4/21/12		4342	36475114	1799	37123974	1148	8802866	370	8941670
4/22/12		1626	13658460	674	13901432	434	3329814	140	3382319
4/24/12		2052	17235055	850	17541651	620	4756012	200	4831005
4/25/12		4150	34860267	1719	35480400	252	1931684	81	1962143
4/30/12		2920	24526280	1210	24962581	780	5979294	251	6073576
5/3/12		3864	32461324	1601	33038782	1250	9582453	403	9733550
5/3/12		3819	32081240	1582	32651937	1155	8852815	372	8992407
5/5/12		6221	52257549	2577	53187165	158	1211636	51	1230741
5/11/12		3730	31332697	1545	31890078	325	2492878	105	2532186
5/12/12		4006	33652061	1660	34250702	243	1864735	78	1894138
5/21/12		5865	49266029	2430	50142428	149	1142275	48	1160287
5/25/12		3982	33447604	1650	34042607	1288	9873599	415	10029287
5/29/12		3670	30825129	1520	31373481	598	4584090	193	4656372
6/3/12		3598	30224770	1491	30762442	805	6170304	259	6267598
6/7/12		3320	27885420	1375	28381477	733	5618636	236	5707231
6/12/12		3721	31259021	1542	31815091	832	6381444	268	6482067
6/12/12		2253	18925076	933	19261736	181	1389951	58	1411868
6/15/12		4726	39699204	1958	40405418	829	6355761	267	6455980
6/17/12		1650	13863388	684	14110005	364	2793335	117	2837381
6/17/12		3238	27201196	1342	27685082	551	4224026	178	4290631
6/15/12		1957	16437737	811	16730150	50	380572	16	386572.6
6/16/12		3923	32955045	1625	33541286	100	762986	32	775016.4
6/23/12		3191	26800602	1322	27277361	520	3985591	168	4048437
5/31/12		3441	28905717	1426	29419925	766	5869746	247	5962301
6/25/12		3520	29569640	1458	30095657	1155	8857403	372	8997067
7/6/12		4181	35120859	1732	35745628	897	6873788	289	6982174
7/13/12		3792	31849327	1571	32415899	636	4874803	205	4951670
7/16/12		3727	31308342	1544	31865290	4105	31468162	1323	31964355
7/18/12		4821	40496680	1997	41217080	522	4003987	168	4067122
7/20/12		3599	30231232	1491	30769018	1070	8200037	345	8329336
7/22/12		3659	30735391	1516	31282146	1060	8126362	342	8254499
7/25/12		3304	27754259	1369	28247982	554	4248019	179	4315003
8/23/12		6836	57419484	2832	58440926	638	4894614	206	4971793
8/29/12		3674	30864024	1522	31413068	274	2100269	88	2133386
8/29/12		3186	26758644	1320	27234657	166	1273921	54	1294008
9/1/12		2395	20118361	992	20476249	161	1235767	52	1255253
9/2/12		5484	46064179	2272	46883620	486	3725092	157	3783829
9/4/12		3827	32145645	1585	32717487	357	2740194	115	2783402
9/6/12		3772	31682207	1563	32245805	329	2520685	106	2560432

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emissions

Date	[redacted]
	[redacted]
9/7/12	[redacted]
9/14/12	[redacted]
9/18/12	[redacted]
9/23/12	[redacted]
9/24/12	[redacted]
9/28/12	[redacted]
10/1/12	[redacted]
10/2/12	[redacted]
10/9/12	[redacted]
10/3/12	[redacted]
10/12/12	[redacted]
10/13/12	[redacted]
10/16/12	[redacted]
10/19/12	[redacted]
10/14/12	[redacted]
10/27/12	[redacted]
10/28/12	[redacted]
10/31/12	[redacted]
11/2/12	[redacted]
11/5/12	[redacted]
11/12/12	[redacted]
11/9/12	[redacted]
11/14/12	[redacted]
11/19/12	[redacted]
11/24/12	[redacted]
11/25/12	[redacted]
11/21/12	[redacted]
12/2/12	[redacted]
12/3/12	[redacted]
12/9/12	[redacted]
SUM	264
3-year Average (Yearly)	88
Average crude delivered per call (bbls/call)	[redacted]
Maximum crude delivered per call (bbls/call)	[redacted]
Minimum crude delivered per call (bbls/call)	[redacted]

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Main Engine Emissions (g/trip)									
	[redacted]	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
9/7/12	[redacted]	284469	27059	20209	6904	6359	44579	1814	13796104	693	14049096
9/14/12	[redacted]	458608	28891	21836	9791	9018	47041	1960	14557960	735	14826896
9/18/12	[redacted]	403675	26819	19941	9134	8413	44353	1790	13726213	689	13977268
9/23/12	[redacted]	267371	30064	22446	7663	7058	49466	2014	15308476	769	15589237
9/24/12	[redacted]	310449	29453	21803	7521	6927	48798	1957	15101724	757	15377347
9/28/12	[redacted]	154692	15176	11991	3814	3513	23713	1076	7338560	377	7478023
10/1/12	[redacted]	371153	35583	26928	9042	8328	57879	2417	17912147	904	18243289
10/2/12	[redacted]	250554	24146	18269	6109	5627	39014	1640	12073725	611	12297440
10/9/12	[redacted]	274706	26119	19537	6670	6143	43046	1753	13321587	669	13565937
10/3/12	[redacted]	1080533	106342	84540	26689	24582	165219	7587	51130929	2633	52106555
10/12/12	[redacted]	215482	20823	15908	5266	4850	33449	1428	10351633	525	10544401
10/13/12	[redacted]	308614	29233	21637	7473	6883	48517	1942	15014708	752	15288631
10/16/12	[redacted]	243981	23530	17831	5951	5481	37968	1600	11750161	595	11968084
10/19/12	[redacted]	394697	25670	20268	8543	7868	39681	1819	12280349	632	12514586
10/14/12	[redacted]	381539	27522	23543	9002	8291	39420	2113	12199567	651	12445704
10/27/12	[redacted]	204565	23339	17953	5909	5442	37430	1611	11583717	589	11799995
10/28/12	[redacted]	312124	29572	21908	7560	6963	49055	1966	15181329	761	15458415
10/31/12	[redacted]	556533	39032	31741	12927	11906	58890	2849	18224890	949	18579017
11/2/12	[redacted]	572472	65118	49598	16500	15198	105091	4451	32522956	1647	33126997
11/5/12	[redacted]	312402	29635	21932	7568	6970	49109	1968	15198084	761	15475426
11/12/12	[redacted]	292087	27916	20921	7101	6540	45694	1878	14140998	712	14401087
11/9/12	[redacted]	291199	27620	20511	7057	6500	45729	1841	14151797	710	14410442
11/14/12	[redacted]	283161	18757	15340	6191	5703	28041	1377	8677975	454	8847526
11/19/12	[redacted]	295520	19523	15886	6452	5943	29331	1426	9077144	473	9253864
11/24/12	[redacted]	355915	33992	25518	8653	7970	55666	2290	17227216	867	17544188
11/25/12	[redacted]	617354	43033	34591	14291	13163	65657	3104	20319061	1053	20710722
11/21/12	[redacted]	557410	39093	31791	12947	11925	58983	2853	18253734	951	18608419
12/2/12	[redacted]	250137	24010	18150	6095	5614	39006	1629	12071384	610	12294560
12/3/12	[redacted]	312523	29646	21940	7571	6973	49129	1969	15204040	762	15481487
12/9/12	[redacted]	299052	28392	21050	7248	6675	46981	1889	14539497	729	14805090
SUM	264										
3-year Average (Yearly)	88										
Average crude delivered per call (bbls/call)											
Maximum crude delivered per call (bbls/call)											
Minimum crude delivered per call (bbls/call)											

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Engine Emissions (g/trip)									
	[redacted]	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
9/7/12	[redacted]	711275	64104	30304	22145	20397	122380	5245	40210595	1690	40844641
9/14/12	[redacted]	691484	54722	25868	18904	17411	104469	4477	34325471	1443	34866719
9/18/12	[redacted]	1000782	90196	42638	31159	28699	172192	7380	56577327	2378	57469445
9/23/12	[redacted]	486982	54086	25568	18684	17209	103256	4425	33926922	1426	34461885
9/24/12	[redacted]	723110	65170	30808	22513	20736	124416	5332	40879639	1718	41524234
9/28/12	[redacted]	466020	42000	19855	14509	13364	80182	3436	26345573	1107	26760993
10/1/12	[redacted]	1000995	90215	42647	31165	28705	172228	7381	56589333	2378	57481640
10/2/12	[redacted]	202392	18241	8623	6301	5804	34823	1492	11441830	481	11622246
10/9/12	[redacted]	199913	18017	8517	6224	5733	34396	1474	11301692	475	11479898
10/3/12	[redacted]	291993	26316	12440	9091	8373	50240	2153	16507274	694	16767563
10/12/12	[redacted]	439553	39615	18727	13685	12605	75628	3241	24849303	1044	25241130
10/13/12	[redacted]	699284	63023	29793	21772	20053	120317	5156	39532659	1662	40156014
10/16/12	[redacted]	198317	17873	8449	6174	5687	34122	1462	11211465	471	11388249
10/19/12	[redacted]	299607	23710	11208	8191	7544	45264	1940	14872589	625	15107102
10/14/12	[redacted]	160147	14433	6823	4986	4592	27554	1181	9053606	381	9196365
10/27/12	[redacted]	421311	46793	22120	16165	14889	89332	3828	29351791	1234	29814613
10/28/12	[redacted]	1056664	95232	45019	32898	30301	181807	7792	59736467	2511	60678398
10/31/12	[redacted]	209164	18851	8911	6512	5998	35988	1542	11824684	497	12011137
11/2/12	[redacted]	825375	91670	43335	31668	29168	175006	7500	57501996	2417	58408695
11/5/12	[redacted]	726653	65490	30959	22624	20838	125026	5358	41079958	1727	41727712
11/12/12	[redacted]	522888	47125	22277	16280	14994	89967	3856	29560485	1242	30026598
11/9/12	[redacted]	221828	19992	9451	6906	6361	38167	1636	12540628	527	12738370
11/14/12	[redacted]	232604	18408	8702	6359	5857	35142	1506	11546554	485	11728621
11/19/12	[redacted]	240332	19019	8991	6570	6052	36309	1556	11930133	501	12118248
11/24/12	[redacted]	705181	63555	30044	21955	20222	121332	5200	39866069	1676	40494682
11/25/12	[redacted]	226200	20386	9637	7043	6487	38919	1668	12787804	537	12989444
11/21/12	[redacted]	209184	18853	8912	6513	5999	35992	1542	11825804	497	12012275
12/2/12	[redacted]	565341	50952	24086	17601	16212	97271	4169	31960498	1343	32464454
12/3/12	[redacted]	727163	65536	30981	22640	20852	125114	5362	41108760	1728	41756968
12/9/12	[redacted]	702713	63332	29939	21878	20151	120907	5182	39726551	1670	40352964
SUM	264										
3-year Average (Yearly)	88										
Average crude delivered per call (bbls/call)											
Maximum crude delivered per call (bbls/call)											
Minimum crude delivered per call (bbls/call)											

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: Sea Buoy - Valero Marine Terminal Auxiliary Boiler Emissions (g/trip)									
	[redacted]	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
9/7/12	[redacted]	122091	12370	6803	12370	12061	188795	1855	59993960	4651	61474759
9/14/12	[redacted]	142417	14429	7936	14429	14069	220227	2164	69981900	5425	71709227
9/18/12	[redacted]	122396	12401	6820	12401	12091	189268	1860	60144163	4663	61628670
9/23/12	[redacted]	127167	12884	7086	12884	12562	196645	1933	62488212	4844	64030576
9/24/12	[redacted]	129203	13090	7200	13090	12763	199793	1964	63488800	4922	65055860
9/28/12	[redacted]	102688	10404	5722	10404	10144	158792	1561	50459563	3912	51705029
10/1/12	[redacted]	188631	19112	10511	19112	18634	291691	2867	92691188	7186	94979036
10/2/12	[redacted]	123679	12531	6892	12531	12217	191251	1880	60774204	4712	62274261
10/9/12	[redacted]	114382	11589	6374	11589	11299	176875	1738	56205860	4357	57593160
10/3/12	[redacted]	140008	14185	7802	14185	13831	216502	2128	68798228	5334	70496338
10/12/12	[redacted]	105153	10654	5860	10654	10387	162603	1598	51670818	4006	52946182
10/13/12	[redacted]	125169	12682	6975	12682	12365	193555	1902	61506424	4768	63024555
10/16/12	[redacted]	121312	12291	6760	12291	11984	187591	1844	59611313	4621	61082668
10/19/12	[redacted]	137915	13973	7685	13973	13624	213265	2096	67769777	5254	69442503
10/14/12	[redacted]	88077	8924	4908	8924	8701	136198	1339	43279915	3355	44348170
10/27/12	[redacted]	123409	12503	6877	12503	12191	190834	1876	60641777	4701	62138566
10/28/12	[redacted]	130118	13183	7251	13183	12854	201209	1977	63938556	4957	65516717
10/31/12	[redacted]	114408	11592	6375	11592	11302	176916	1739	56218894	4358	57606515
11/2/12	[redacted]	189119	19161	10539	19161	18682	292445	2874	92930815	7205	95224578
11/5/12	[redacted]	129801	13151	7233	13151	12822	200718	1973	63782494	4945	65356803
11/12/12	[redacted]	127884	12957	7126	12957	12633	197753	1944	62840556	4872	64391616
11/9/12	[redacted]	125072	12672	6970	12672	12355	193405	1901	61458912	4765	62975870
11/14/12	[redacted]	107669	10909	6000	10909	10636	166495	1636	52907422	4102	54213308
11/19/12	[redacted]	111182	11265	6196	11265	10983	171927	1690	54633692	4236	55982187
11/24/12	[redacted]	166599	16879	9284	16879	16457	257621	2532	81864743	6347	83885367
11/25/12	[redacted]	123560	12519	6885	12519	12206	191068	1878	60715988	4707	62214609
11/21/12	[redacted]	114419	11593	6376	11593	11303	176932	1739	56224126	4359	57611876
12/2/12	[redacted]	118581	12014	6608	12014	11714	183367	1802	58269114	4517	59707340
12/3/12	[redacted]	129905	13162	7239	13162	12833	200879	1974	63833645	4949	65409217
12/9/12	[redacted]	125780	12744	7009	12744	12425	194500	1912	61806749	4792	63332292
SUM	264										
3-year Average (Yearly)	88										
Average crude delivered per call (bbls/call)											
Maximum crude delivered per call (bbls/call)											
Minimum crude delivered per call (bbls/call)											

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Baseline Ocean Going Vessels Emission

Date	[redacted]	Emissions: between California Coastal Water Boundary & Sea Buoy from Main Engines (g/trip)				Emissions: between California Coastal Water Boundary & Sea Buoy from Auxiliary Engines (g/trip)			
		CH_4	CO_2	N_2O	CO_2e	CH_4	CO_2	N_2O	CO_2e
9/7/12	[redacted]	3572	30003912	1480	30537655	1035	7932960	333	8058048
9/14/12	[redacted]	3910	32846612	1620	33430924	665	5095060	214	5175399
9/18/12	[redacted]	3459	29057082	1433	29573982	1539	11799340	496	11985393
9/23/12	[redacted]	4053	34041975	1679	34647552	869	6659990	280	6765005
9/24/12	[redacted]	4037	33912625	1673	34515901	1221	9358186	393	9505747
9/28/12	[redacted]	2034	17085627	843	17389565	410	3145859	132	3195463
10/1/12	[redacted]	4778	40133778	1979	40847723	838	6425336	270	6526651
10/2/12	[redacted]	3738	31398954	1549	31957514	279	2136670	90	2170362
10/9/12	[redacted]	3305	27757979	1369	28251768	288	2208468	93	2243291
10/3/12	[redacted]	14161	118955580	5867	121071694	184	1413546	59	1435835
10/12/12	[redacted]	3002	25214837	1244	25663387	570	4370482	184	4439396
10/13/12	[redacted]	3917	32905654	1623	33491017	1184	9080312	382	9223491
10/16/12	[redacted]	3637	30552445	1507	31095946	271	2079066	87	2111849
10/19/12	[redacted]	4226	35499945	1751	36131458	220	1690075	71	1716724
10/14/12	[redacted]	3903	32787203	1617	33370459	99	760199	32	772186.3
10/27/12	[redacted]	3106	26086936	1287	26551000	506	3879460	163	3940632
10/28/12	[redacted]	3827	32149113	1586	32721018	1661	12736911	535	12937748
10/31/12	[redacted]	5873	49332964	2433	50210554	149	1143827	48	1161863
11/2/12	[redacted]	9265	77824711	3838	79209144	821	6295942	265	6395217
11/5/12	[redacted]	4063	34129859	1683	34736999	1228	9418131	396	9566638
11/12/12	[redacted]	3942	33115284	1633	33704376	739	5666066	238	5755410
11/9/12	[redacted]	3567	29961888	1478	30494884	344	2634718	111	2676262
11/14/12	[redacted]	2973	24975021	1232	25419305	155	1189006	50	1207755
11/19/12	[redacted]	3112	26141260	1289	26606290	162	1244528	52	1264152
11/24/12	[redacted]	4631	38896500	1918	39588434	753	5771848	243	5862859
11/25/12	[redacted]	6558	55083637	2717	56063526	167	1277161	54	1297300
11/21/12	[redacted]	5882	49411138	2437	50290118	149	1143982	48	1162021
12/2/12	[redacted]	3423	28749343	1418	29260768	753	5773907	243	5864951
12/3/12	[redacted]	4065	34143285	1684	34750664	1229	9421836	396	9570401
12/9/12	[redacted]	3886	32645140	1610	33225868	1175	9008423	379	9150469
SUM	264								
3-year Average (Yearly)	88								
Average crude delivered per call (bbls/call)									
Maximum crude delivered per call (bbls/call)									
Minimum crude delivered per call (bbls/call)									

Public Copy

Baseline Ocean Going Vessels Emissions

1. IMO # obtained by searching ship name on www.marinetraffic.com
2. DWT obtained by searching IMO # in POLB Air Emissions Inventory OGV Appendices or in www.marinetraffic.com
3. MY obtained by searching IMO # in POLB Air Emissions Inventorys' OGV Appendices or in www.marinetraffic.com
4. Ship Category based on IMO classification by DWT
5. Assumed number of main engines by ship category

Ship Category	Number of Main Engines
Handymax	1
Panamax	1
Aframax	1
Suezmax	2
VLCCS	2
ULCCS	2

##

Horsepower = 9070 + 0.101*DWT
kW = 0.746*(9070 + 0.101 * DWT)

7. Average number of Auxiliary engines on tankers = 2.7, per California ARB 2005 Oceangoing Ship Survey Summary Of Results, Appendix C, Table 9

##

9. Auxiliary Boiler rating for ships for which data was not available was assumed equal to the average of auxiliary boiler rating for similar category (DWT) of ships provided in POLB 2011 Emissions Inventory, Section 2, Table 2.16

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Tugboat Specifications and Assumptions

Tug requirements - Sec C.3, Benicia Port Information and Terminal Regulations Manual

Vessel Size	SIZE	MOORING*	MOORING*	UNMOORING*	UNMOORING*
DWT		Class A	Class B	Class A	Class B
0	30,000	0	2	0	2
30,000	65,000	1	1	1	1
65,000	130,000	2	1	2	0
130,000	195,000	4	0	3	0
195,000	999,999	4	0	3	1

http://portal.harleymarine.com/vessels/sms/Shared%20Documents/SF%20Bay%20Area%20Terminal%20Guidlines/Valero%20Benicia,%20Ca/Valero%20Benicia%20Terminal%20Manual%20(Final%20July%2027%202012)%20v1%201.pdf

Main Engine Assumptions

Tug Class	Average Power per Engine[1]	Number of Main Engines	Assumed Model Year	Useful Life[2]	Emission Factor x FCF									Assumed Date of MY
	HP				NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O	
A	2172	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
B	1563	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
C	1388	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
D	754	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001

1 - Revised PORT OF OAKLAND 2005 SEAPORT AIR EMISSIONS INVENTORY, Table 3-6
2 - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 4

Aux Engine Assumptions

Tug Class	Average Power per Engine[1]	Number of Aux Engines	Assumed Model Year	Useful Life[2]	Emission Factor x FCF									Assumed Date of MY
	HP				NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O	
A	128	2	2001	23	6.93	2.78	0.58	0.26	0.26	0.01	0.01	486.39	0.02	7/1/2001
B	110	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001
C	92	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001
D	110	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001

1 - Revised PORT OF OAKLAND 2005 SEAPORT AIR EMISSIONS INVENTORY, Table 3-6
2 - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 4

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Copy

Fuel Correction factor for ULSD

Engine Power (HP)		MY		NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
0	24	0	1994	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
25	50	0	1998	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
51	100	0	1997	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
101	175	0	1996	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
176	5000	0	1995	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
0	24	1995	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
25	50	1999	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
51	100	1998	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
101	175	1997	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
176	5000	1996	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
0	5000	2011	9999	0.948	1	0.72	0.852	0.852	1	0.72	1	0.948

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California and POLB 2011 Air Emissions Inventory

Deterioration Factor

HP Range		NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
25	50	0.06	0.41	0.51	0.31	0.31	0	0	0	0
51	250	0.14	0.16	0.28	0.44	0.44	0	0	0	0
251	5000	0.21	0.25	0.44	0.67	0.67	0	0	0	0

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California

Operation Mode	Tug in-Transit	Tug Assist/Mooring/ Unmooring
Load Factor	**Tug Base - Vessel**	**Vessel - Vessel Berth**
Main	0.5	0.31
Auxiliary	0.43	0.43

Ref - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 2

Tug Mooring/Unmooring Activity rate	Tug in-Transit[1]	Tug Mooring/ Unmooring[2]
(hrs/one-way trip)	**Tug Base - Vessel (in/out)**	**Vessel - Vessel Berth**
Main	0.5	0.5
Auxiliary	0.5	0.5

1. Assumption
2. Assumed equal to time for maneuvering mode

Tug Assisting Activity rate	Tug in-Transit[1]	Tug Assist[2]
(hrs/one-way trip)	**Tug Base - Vessel**	**Vessel - Vessel Berth**
Main	2	3.2
Auxiliary	2	3.2

1. Assumption
2. Based on conversation with SF Bar Pilot

Public Copy

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Main	0	1997	25	50	8.14	3.65	1.84	0.72	0.72	0.006	0.0368	486	0.023
Main	1998	1999	25	50	8.14	3.65	1.8	0.72	0.72	0.006	0.036	486	0.023
Main	2000	2004	25	50	7.31	3.65	1.8	0.72	0.72	0.006	0.036	486	0.023
Main	2005	2008	25	50	5.32	3.73	1.8	0.3	0.3	0.006	0.036	486	0.023
Main	2009	2020	25	50	5.32	3.73	1.8	0.22	0.22	0.006	0.036	486	0.023
Main	0	1996	51	120	15.34	3.5	1.44	0.8	0.8	0.006	0.0288	486	0.023
Main	1997	1999	51	120	10.33	2.55	0.99	0.66	0.66	0.006	0.0198	486	0.023
Main	2000	2004	51	120	7.31	2.55	0.99	0.66	0.66	0.006	0.0198	486	0.023
Main	2005	2008	51	120	5.32	3.73	0.99	0.3	0.3	0.006	0.0198	486	0.023
Main	2009	2020	51	120	5.32	3.73	0.99	0.22	0.22	0.006	0.0198	486	0.023
Main	0	1970	121	175	16.52	3.21	1.32	0.73	0.73	0.006	0.0264	486	0.023
Main	1971	1978	121	175	15.34	3.21	1.1	0.63	0.63	0.006	0.022	486	0.023
Main	1979	1983	121	175	14.16	3.21	1	0.52	0.52	0.006	0.02	486	0.023
Main	1984	1986	121	175	12.98	3.14	0.94	0.52	0.52	0.006	0.0188	486	0.023
Main	1987	1995	121	175	12.98	3.07	0.88	0.52	0.52	0.006	0.0176	486	0.023
Main	1996	1999	121	175	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	121	175	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2012	121	175	5.1	3.73	0.68	0.22	0.22	0.006	0.0136	486	0.023
Main	2013	2020	121	175	3.8	3.73	0.68	0.09	0.09	0.006	0.0136	486	0.023
Main	0	1970	176	250	16.52	3.21	1.32	0.73	0.73	0.006	0.0264	486	0.023
Main	1971	1978	176	250	15.34	3.21	1.1	0.63	0.63	0.006	0.022	486	0.023
Main	1979	1983	176	250	14.16	3.21	1	0.52	0.52	0.006	0.02	486	0.023
Main	1984	1986	176	250	12.98	3.14	0.94	0.52	0.52	0.006	0.0188	486	0.023
Main	1987	1994	176	250	12.98	3.07	0.88	0.52	0.52	0.006	0.0176	486	0.023
Main	1995	1999	176	250	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	176	250	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2013	176	250	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2014	2020	176	250	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	251	500	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	251	500	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	251	500	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	251	500	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1994	251	500	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1995	1999	251	500	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	251	500	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2013	251	500	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2014	2020	251	500	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	501	750	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	501	750	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	501	750	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	501	750	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1994	501	750	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1995	1999	501	750	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	501	750	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2012	501	750	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2013	2020	501	750	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	751	1900	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023

Public Copy

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Main	1971	1978	751	1900	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	751	1900	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	751	1900	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	751	1900	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	751	1900	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	751	1900	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2011	751	1900	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2012	2016	751	1900	4.09	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	2017	2020	751	1900	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Main	0	1970	1901	3300	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	1901	3300	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	1901	3300	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	1901	3300	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	1901	3300	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	1901	3300	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	1901	3300	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2012	1901	3300	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2013	2015	1901	3300	4.37	3.73	0.68	0.1	0.1	0.006	0.0136	486	0.023
Main	2016	2020	1901	3300	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Main	0	1970	3301	5000	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	3301	5000	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	3301	5000	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	3301	5000	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	3301	5000	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	3301	5000	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	3301	5000	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2013	3301	5000	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2014	2015	3301	5000	4.94	3.73	0.68	0.25	0.25	0.006	0.0136	486	0.023
Main	2016	2020	3301	5000	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023

Public Copy

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Auxiliary	0	1997	25	50	6.9	5.15	2.19	0.64	0.64	0.006	0.0438	486	0.023
Auxiliary	1998	1999	25	50	6.9	5.15	2.14	0.64	0.64	0.006	0.0428	486	0.023
Auxiliary	2000	2004	25	50	6.9	5.15	2.14	0.64	0.64	0.006	0.0428	486	0.023
Auxiliary	2005	2008	25	50	5.32	3.73	2.14	0.3	0.3	0.006	0.0428	486	0.023
Auxiliary	2009	2020	25	50	5.32	3.73	2.14	0.22	0.22	0.006	0.0428	486	0.023
Auxiliary	0	1996	51	120	13	4.94	1.71	0.71	0.71	0.006	0.0342	486	0.023
Auxiliary	1997	1999	51	120	8.75	3.59	1.18	0.58	0.58	0.006	0.0236	486	0.023
Auxiliary	2000	2004	51	120	7.31	3.59	1.18	0.58	0.58	0.006	0.0236	486	0.023
Auxiliary	2005	2008	51	120	5.32	3.73	1.18	0.3	0.3	0.006	0.0236	486	0.023
Auxiliary	2009	2020	51	120	5.32	3.73	1.18	0.22	0.22	0.006	0.0236	486	0.023
Auxiliary	0	1970	121	175	14	4.53	1.57	0.65	0.65	0.006	0.0314	486	0.023
Auxiliary	1971	1978	121	175	13	4.53	1.31	0.55	0.55	0.006	0.0262	486	0.023
Auxiliary	1979	1983	121	175	12	4.53	1.19	0.46	0.46	0.006	0.0238	486	0.023
Auxiliary	1984	1986	121	175	11	4.43	1.12	0.46	0.46	0.006	0.0224	486	0.023
Auxiliary	1987	1995	121	175	11	4.33	1.05	0.46	0.46	0.006	0.021	486	0.023
Auxiliary	1996	1999	121	175	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	121	175	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2012	121	175	5.1	3.73	0.81	0.22	0.22	0.006	0.0162	486	0.023
Auxiliary	2013	2020	121	175	3.8	3.73	0.81	0.09	0.09	0.006	0.0162	486	0.023
Auxiliary	0	1970	176	250	14	4.53	1.57	0.65	0.65	0.006	0.0314	486	0.023
Auxiliary	1971	1978	176	250	13	4.53	1.31	0.55	0.55	0.006	0.0262	486	0.023
Auxiliary	1979	1983	176	250	12	4.53	1.19	0.46	0.46	0.006	0.0238	486	0.023
Auxiliary	1984	1986	176	250	11	4.43	1.12	0.46	0.46	0.006	0.0224	486	0.023
Auxiliary	1987	1994	176	250	11	4.33	1.05	0.46	0.46	0.006	0.021	486	0.023
Auxiliary	1995	1999	176	250	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	176	250	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2013	176	250	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2014	2020	176	250	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	0	1970	251	500	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	251	500	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	251	500	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	251	500	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1994	251	500	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1995	1999	251	500	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	251	500	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2013	251	500	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2014	2020	251	500	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	0	1970	501	750	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	501	750	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	501	750	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	501	750	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1994	501	750	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1995	1999	501	750	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	501	750	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2012	501	750	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2013	2020	501	750	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023

Public Copy

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Auxiliary	0	1970	751	1900	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	751	1900	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	751	1900	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	751	1900	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	751	1900	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	751	1900	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	751	1900	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2011	751	1900	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2012	2016	751	1900	4.09	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	2017	2020	751	1900	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Auxiliary	0	1970	1901	3300	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	1901	3300	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	1901	3300	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	1901	3300	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	1901	3300	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	1901	3300	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	1901	3300	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2012	1901	3300	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2013	2015	1901	3300	4.37	3.73	0.81	0.1	0.1	0.006	0.0162	486	0.023
Auxiliary	2016	2020	1901	3300	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Auxiliary	0	1970	3301	5000	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	3301	5000	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	3301	5000	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	3301	5000	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	3301	5000	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	3301	5000	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	3301	5000	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2013	3301	5000	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2014	2015	3301	5000	4.94	3.75	0.81	0.25	0.25	0.006	0.0162	486	0.023
Auxiliary	2016	2020	3301	5000	1.3	3.75	0.18	0.03	0.03	0.006	0.0036	486	0.023

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Mooring/Unmooring Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
12/10/09		14024	4138	1085	676	676	10	19	909261	41	922355
12/13/09		14025	4139	1085	676	676	10	19	909261	41	922355
12/25/09		14029	4140	1085	677	677	10	19	909261	41	922355
12/29/09		14031	4141	1086	677	677	10	19	909261	41	922355
12/31/09		14031	4141	1086	677	677	10	19	909261	41	922355
1/10/10		14035	4142	1086	677	677	10	19	909261	41	922355
1/28/10		14041	4144	1087	678	678	10	19	909261	41	922355
1/29/10		14041	4144	1087	678	678	10	19	909261	41	922355
2/7/10		14045	4146	1088	679	679	10	19	909261	41	922355
2/5/10		14044	4145	1088	679	679	10	19	909261	41	922355
2/4/10		14043	4145	1088	679	679	10	19	909261	41	922355
2/9/10		14045	4146	1088	679	679	10	19	909261	41	922355
2/11/10		14046	4146	1088	679	679	10	19	909261	41	922355
2/13/10		14047	4146	1088	679	679	10	19	909261	41	922355
2/21/10		14049	4147	1088	679	679	10	19	909261	41	922355
2/22/10		14050	4147	1088	679	679	10	19	909261	41	922355
2/24/10		14050	4148	1089	679	679	10	19	909261	41	922355
3/6/10		14054	4149	1089	680	680	10	19	909261	41	922355
3/10/10		14055	4149	1089	680	680	10	19	909261	41	922355
3/9/10		14055	4149	1089	680	680	10	19	909261	41	922355
3/14/10		14057	4150	1090	680	680	10	19	909261	41	922355
3/23/10		14060	4151	1090	681	681	10	19	909261	41	922355
2/24/10		14050	4148	1089	679	679	10	19	909261	41	922355
3/30/10		14062	4152	1090	681	681	10	19	909261	41	922355
4/11/10		14066	4153	1091	682	682	10	19	909261	41	922355
4/5/10		14064	4152	1091	681	681	10	19	909261	41	922355
4/16/10		14068	4154	1091	682	682	10	19	909261	41	922355
4/14/10		14067	4153	1091	682	682	10	19	909261	41	922355
4/21/10		14070	4154	1091	682	682	10	19	909261	41	922355
4/27/10		14072	4155	1092	682	682	10	19	909261	41	922355
4/29/10		14073	4155	1092	682	682	10	19	909261	41	922355
5/3/10		14074	4156	1092	683	683	10	19	909261	41	922355
5/13/10		14077	4157	1093	683	683	10	19	909261	41	922355
5/20/10		14080	4158	1093	683	683	10	19	909261	41	922355
5/21/10		14080	4158	1093	683	683	10	19	909261	41	922355
5/25/10		14082	4158	1093	684	684	10	19	909261	41	922355
5/31/10		14084	4159	1094	684	684	10	19	909261	41	922355
6/1/10		14084	4159	1094	684	684	10	19	909261	41	922355
6/4/10		14085	4159	1094	684	684	10	19	909261	41	922355
6/6/10		14086	4160	1094	684	684	10	19	909261	41	922355
6/8/10		14086	4160	1094	684	684	10	19	909261	41	922355
6/15/10		14089	4161	1094	685	685	10	19	909261	41	922355
6/17/10		14090	4161	1094	685	685	10	19	909261	41	922355
6/23/10		14092	4162	1095	685	685	10	19	909261	41	922355
7/13/10		14099	4164	1096	686	686	10	19	909261	41	922355
7/27/10		14103	4166	1096	686	686	10	19	909261	41	922355
7/14/10		14099	4164	1096	686	686	10	19	909261	41	922355
7/27/10		14103	4166	1096	686	686	10	19	909261	41	922355
8/2/10		14106	4166	1097	687	687	10	19	909261	41	922355
8/4/10		14106	4167	1097	687	687	10	19	909261	41	922355
7/29/10		14104	4166	1097	687	687	10	19	909261	41	922355
8/17/10		14111	4168	1098	687	687	10	19	909261	41	922355
8/14/10		14110	4168	1097	687	687	10	19	909261	41	922355
8/24/10		14113	4169	1098	688	688	10	19	909261	41	922355
9/1/10		14116	4170	1098	688	688	10	19	909261	41	922355
9/5/10		14117	4170	1099	688	688	10	19	909261	41	922355
9/7/10		14118	4171	1099	688	688	10	19	909261	41	922355

Baseline Tugboat Emissions

Date	[redacted]	Class B Tug Mooring/Unmooring Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
12/10/09		10201	3104	818	514	514	8	14	661603	30	671141
12/13/09		10202	3104	818	514	514	8	14	661603	30	671141
12/25/09		10205	3105	819	514	514	8	14	661603	30	671141
12/29/09		10206	3105	819	514	514	8	14	661603	30	671141
12/31/09		10206	3105	819	514	514	8	14	661603	30	671141
1/10/10		10209	3106	819	515	515	8	14	661603	30	671141
1/28/10		10213	3108	820	515	515	8	14	661603	30	671141
1/29/10		10214	3108	820	515	515	8	14	661603	30	671141
2/7/10		10216	3109	820	516	516	8	14	661603	30	671141
2/5/10		10215	3109	820	516	516	8	14	661603	30	671141
2/4/10		10215	3109	820	516	516	8	14	661603	30	671141
2/9/10		10216	3109	820	516	516	8	14	661603	30	671141
2/11/10		10217	3109	820	516	516	8	14	661603	30	671141
2/13/10		10217	3109	820	516	516	8	14	661603	30	671141
2/21/10		10219	3110	821	516	516	8	14	661603	30	671141
2/22/10		10220	3110	821	516	516	8	14	661603	30	671141
2/24/10		10220	3110	821	516	516	8	14	661603	30	671141
3/6/10		10223	3111	821	517	517	8	14	661603	30	671141
3/10/10		10224	3112	821	517	517	8	14	661603	30	671141
3/9/10		10223	3111	821	517	517	8	14	661603	30	671141
3/14/10		10225	3112	822	517	517	8	14	661603	30	671141
3/23/10		10227	3113	822	517	517	8	14	661603	30	671141
2/24/10		10220	3110	821	516	516	8	14	661603	30	671141
3/30/10		10229	3113	822	518	518	8	14	661603	30	671141
4/11/10		10232	3114	823	518	518	8	14	661603	30	671141
4/5/10		10230	3114	822	518	518	8	14	661603	30	671141
4/16/10		10233	3115	823	518	518	8	14	661603	30	671141
4/14/10		10232	3115	823	518	518	8	14	661603	30	671141
4/21/10		10234	3115	823	518	518	8	14	661603	30	671141
4/27/10		10236	3116	823	518	518	8	14	661603	30	671141
4/29/10		10236	3116	823	519	519	8	14	661603	30	671141
5/3/10		10237	3116	823	519	519	8	14	661603	30	671141
5/13/10		10240	3117	824	519	519	8	14	661603	30	671141
5/20/10		10241	3118	824	519	519	8	14	661603	30	671141
5/21/10		10242	3118	824	519	519	8	14	661603	30	671141
5/25/10		10243	3118	824	519	519	8	14	661603	30	671141
5/31/10		10244	3119	825	520	520	8	14	661603	30	671141
6/1/10		10244	3119	825	520	520	8	14	661603	30	671141
6/4/10		10245	3119	825	520	520	8	14	661603	30	671141
6/6/10		10246	3119	825	520	520	8	14	661603	30	671141
6/8/10		10246	3119	825	520	520	8	14	661603	30	671141
6/15/10		10248	3120	825	520	520	8	14	661603	30	671141
6/17/10		10248	3120	825	520	520	8	14	661603	30	671141
6/23/10		10250	3121	825	520	520	8	14	661603	30	671141
7/13/10		10255	3123	826	521	521	8	14	661603	30	671141
7/27/10		10259	3124	827	522	522	8	14	661603	30	671141
7/14/10		10255	3123	826	521	521	8	14	661603	30	671141
7/27/10		10259	3124	827	522	522	8	14	661603	30	671141
8/2/10		10260	3124	827	522	522	8	14	661603	30	671141
8/4/10		10261	3124	827	522	522	8	14	661603	30	671141
7/29/10		10259	3124	827	522	522	8	14	661603	30	671141
8/17/10		10264	3126	828	522	522	8	14	661603	30	671141
8/14/10		10263	3125	827	522	522	8	14	661603	30	671141
8/24/10		10266	3126	828	523	523	8	14	661603	30	671141
9/1/10		10268	3127	828	523	523	8	14	661603	30	671141
9/5/10		10269	3127	828	523	523	8	14	661603	30	671141
9/7/10		10269	3127	828	523	523	8	14	661603	30	671141

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Assist Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
12/10/09		68794	20325	5323	3314	3314	51	91	4460719	201	4524956
12/13/09		68799	20327	5324	3315	3315	51	91	4460719	201	4524956
12/25/09		68819	20334	5327	3318	3318	51	91	4460719	201	4524956
12/29/09		68826	20336	5328	3319	3319	51	91	4460719	201	4524956
12/31/09		68830	20337	5328	3319	3319	51	91	4460719	201	4524956
1/10/10		68847	20343	5331	3321	3321	51	91	4460719	201	4524956
1/28/10		68877	20353	5335	3325	3325	51	91	4460719	201	4524956
1/29/10		68879	20354	5336	3326	3326	51	91	4460719	201	4524956
2/7/10		68894	20359	5338	3328	3328	51	91	4460719	201	4524956
2/5/10		68891	20358	5337	3327	3327	51	91	4460719	201	4524956
2/4/10		68889	20357	5337	3327	3327	51	91	4460719	201	4524956
2/9/10		68898	20360	5338	3328	3328	51	91	4460719	201	4524956
2/11/10		68901	20362	5339	3329	3329	51	91	4460719	201	4524956
2/13/10		68904	20363	5340	3329	3329	51	91	4460719	201	4524956
2/21/10		68918	20367	5342	3331	3331	51	91	4460719	201	4524956
2/22/10		68920	20368	5342	3331	3331	51	91	4460719	201	4524956
2/24/10		68923	20369	5342	3332	3332	51	91	4460719	201	4524956
3/6/10		68940	20375	5345	3334	3334	51	91	4460719	201	4524956
3/10/10		68947	20377	5346	3335	3335	51	91	4460719	201	4524956
3/9/10		68945	20377	5346	3334	3334	51	91	4460719	201	4524956
3/14/10		68954	20380	5347	3336	3336	51	91	4460719	201	4524956
3/23/10		68969	20385	5349	3338	3338	51	91	4460719	201	4524956
2/24/10		68923	20369	5342	3332	3332	51	91	4460719	201	4524956
3/30/10		68981	20389	5351	3339	3339	51	91	4460719	201	4524956
4/11/10		69001	20396	5354	3342	3342	51	91	4460719	201	4524956
4/5/10		68991	20392	5352	3340	3340	51	91	4460719	201	4524956
4/16/10		69010	20399	5355	3343	3343	51	91	4460719	201	4524956
4/14/10		69006	20398	5355	3343	3343	51	91	4460719	201	4524956
4/21/10		69018	20402	5356	3344	3344	51	91	4460719	201	4524956
4/27/10		69028	20405	5358	3345	3345	51	91	4460719	201	4524956
4/29/10		69032	20406	5358	3346	3346	51	91	4460719	201	4524956
5/3/10		69039	20409	5359	3347	3347	51	91	4460719	201	4524956
5/13/10		69056	20415	5362	3349	3349	51	91	4460719	201	4524956
5/20/10		69067	20419	5364	3351	3351	51	91	4460719	201	4524956
5/21/10		69069	20419	5364	3351	3351	51	91	4460719	201	4524956
5/25/10		69076	20422	5365	3352	3352	51	91	4460719	201	4524956
5/31/10		69086	20425	5367	3353	3353	51	91	4460719	201	4524956
6/1/10		69088	20426	5367	3353	3353	51	91	4460719	201	4524956
6/4/10		69093	20427	5368	3354	3354	51	91	4460719	201	4524956
6/6/10		69096	20429	5368	3354	3354	51	91	4460719	201	4524956
6/8/10		69100	20430	5369	3355	3355	51	91	4460719	201	4524956
6/15/10		69112	20434	5370	3356	3356	51	91	4460719	201	4524956
6/17/10		69115	20435	5371	3357	3357	51	91	4460719	201	4524956
6/23/10		69125	20438	5372	3358	3358	51	91	4460719	201	4524956
7/13/10		69159	20450	5377	3363	3363	51	91	4460719	201	4524956
7/27/10		69183	20458	5381	3366	3366	51	91	4460719	201	4524956
7/14/10		69161	20451	5378	3363	3363	51	91	4460719	201	4524956
7/27/10		69183	20458	5381	3366	3366	51	91	4460719	201	4524956
8/2/10		69193	20462	5382	3367	3367	51	91	4460719	201	4524956
8/4/10		69197	20463	5383	3368	3368	51	91	4460719	201	4524956
7/29/10		69186	20459	5381	3366	3366	51	91	4460719	201	4524956
8/17/10		69219	20471	5386	3371	3371	51	91	4460719	201	4524956
8/14/10		69214	20469	5386	3370	3370	51	91	4460719	201	4524956
8/24/10		69231	20475	5388	3372	3372	51	91	4460719	201	4524956
9/1/10		69244	20479	5390	3374	3374	51	91	4460719	201	4524956
9/5/10		69251	20482	5391	3375	3375	51	91	4460719	201	4524956
9/7/10		69254	20483	5392	3375	3375	51	91	4460719	201	4524956

Baseline Tugboat Emissions

Date	[redacted]	Total Tug Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
12/10/09		166962	49294	12916	8047	8047	123	220	10825547	488	10981440
12/13/09		166975	49298	12917	8048	8048	123	220	10825547	488	10981440
12/25/09		167024	49315	12925	8055	8055	123	220	10825547	488	10981440
12/29/09		135155	40004	10489	6541	6541	99	179	8759366	395	8885517
12/31/09		167049	49324	12929	8058	8058	123	220	10825547	488	10981440
1/10/10		167090	49338	12935	8063	8063	123	220	10825547	488	10981440
1/28/10		135255	40039	10504	6554	6554	99	179	8759366	395	8885517
1/29/10		167169	49365	12946	8074	8074	123	220	10825547	488	10981440
2/7/10		135288	40050	10509	6558	6558	99	179	8759366	395	8885517
2/5/10		167198	49375	12951	8078	8078	123	220	10825547	488	10981440
2/4/10		135278	40047	10508	6557	6557	99	179	8759366	395	8885517
2/9/10		117421	34870	9155	5717	5717	86	156	7602447	343	7711948
2/11/10		135301	40055	10511	6560	6560	99	179	8759366	395	8885517
2/13/10		135308	40057	10512	6561	6561	99	179	8759366	395	8885517
2/21/10		135335	40066	10516	6564	6564	99	179	8759366	395	8885517
2/22/10		167268	49399	12961	8087	8087	123	220	10825547	488	10981440
2/24/10		167276	49402	12962	8088	8088	123	220	10825547	488	10981440
3/6/10		167317	49416	12968	8093	8093	123	220	10825547	488	10981440
3/10/10		167334	49422	12971	8096	8096	123	220	10825547	488	10981440
3/9/10		177553	52532	13792	8612	8612	130	234	11487150	518	11652581
3/14/10		167350	49427	12973	8098	8098	123	220	10825547	488	10981440
3/23/10		135435	40100	10531	6578	6578	99	179	8759366	395	8885517
2/24/10		167276	49402	12962	8088	8088	123	220	10825547	488	10981440
3/30/10		167416	49450	12983	8106	8106	123	220	10825547	488	10981440
4/11/10		167466	49467	12991	8113	8113	123	220	10825547	488	10981440
4/5/10		167441	49458	12987	8110	8110	123	220	10825547	488	10981440
4/16/10		167486	49474	12994	8116	8116	123	220	10825547	488	10981440
4/14/10		167478	49471	12992	8115	8115	123	220	10825547	488	10981440
4/21/10		135532	40134	10545	6591	6591	99	179	8759366	395	8885517
4/27/10		167532	49490	13000	8122	8122	123	220	10825547	488	10981440
4/29/10		167540	49492	13002	8123	8123	123	220	10825547	488	10981440
5/3/10		135572	40147	10551	6596	6596	99	179	8759366	395	8885517
5/13/10		135605	40159	10556	6600	6600	99	179	8759366	395	8885517
5/20/10		135628	40167	10560	6603	6603	99	179	8759366	395	8885517
5/21/10		117713	34970	9198	5756	5756	86	156	7602447	343	7711948
5/25/10		135645	40173	10562	6606	6606	99	179	8759366	395	8885517
5/31/10		167672	49538	13021	8140	8140	123	220	10825547	488	10981440
6/1/10		135669	40181	10566	6609	6609	99	179	8759366	395	8885517
6/4/10		117753	34984	9204	5762	5762	86	156	7602447	343	7711948
6/6/10		167697	49546	13025	8143	8143	123	220	10825547	488	10981440
6/8/10		135692	40189	10569	6612	6612	99	179	8759366	395	8885517
6/15/10		135715	40197	10573	6615	6615	99	179	8759366	395	8885517
6/17/10		135722	40199	10574	6616	6616	99	179	8759366	395	8885517
6/23/10		167767	49570	13035	8153	8153	123	220	10825547	488	10981440
7/13/10		135809	40229	10587	6627	6627	99	179	8759366	395	8885517
7/27/10		135855	40245	10594	6633	6633	99	179	8759366	395	8885517
7/14/10		135812	40230	10587	6628	6628	99	179	8759366	395	8885517
7/27/10		135855	40245	10594	6633	6633	99	179	8759366	395	8885517
8/2/10		135875	40252	10597	6636	6636	99	179	8759366	395	8885517
8/4/10		135882	40254	10598	6637	6637	99	179	8759366	395	8885517
7/29/10		135862	40247	10595	6634	6634	99	179	8759366	395	8885517
8/17/10		135925	40269	10604	6643	6643	99	179	8759366	395	8885517
8/14/10		135915	40266	10603	6641	6641	99	179	8759366	395	8885517
8/24/10		168023	49658	13073	8186	8186	123	220	10825547	488	10981440
9/1/10		135976	40286	10611	6649	6649	99	179	8759366	395	8885517
9/5/10		135989	40291	10613	6651	6651	99	179	8759366	395	8885517
9/7/10		135996	40293	10614	6652	6652	99	179	8759366	395	8885517

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Mooring/Unmooring Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
9/12/10		14120	4171	1099	689	689	10	19	909261	41	922355
9/14/10		14120	4172	1099	689	689	10	19	909261	41	922355
9/16/10		14121	4172	1099	689	689	10	19	909261	41	922355
10/2/10		14127	4174	1100	690	690	10	19	909261	41	922355
10/6/10		14128	4174	1100	690	690	10	19	909261	41	922355
10/5/10		14128	4174	1100	690	690	10	19	909261	41	922355
10/4/10		14127	4174	1100	690	690	10	19	909261	41	922355
10/16/10		14132	4175	1101	690	690	10	19	909261	41	922355
10/17/10		14132	4175	1101	690	690	10	19	909261	41	922355
10/19/10		14133	4176	1101	690	690	10	19	909261	41	922355
10/22/10		14134	4176	1101	690	690	10	19	909261	41	922355
10/23/10		14134	4176	1101	691	691	10	19	909261	41	922355
10/25/10		14135	4176	1101	691	691	10	19	909261	41	922355
10/27/10		14135	4177	1101	691	691	10	19	909261	41	922355
10/29/10		14136	4177	1101	691	691	10	19	909261	41	922355
11/1/10		14137	4177	1101	691	691	10	19	909261	41	922355
11/7/10		14139	4178	1102	691	691	10	19	909261	41	922355
11/17/10		14143	4179	1102	692	692	10	19	909261	41	922355
11/18/10		14143	4179	1102	692	692	10	19	909261	41	922355
11/19/10		14143	4179	1102	692	692	10	19	909261	41	922355
11/26/10		14146	4180	1103	692	692	10	19	909261	41	922355
11/30/10		14147	4181	1103	692	692	10	19	909261	41	922355
12/4/10		14149	4181	1103	692	692	10	19	909261	41	922355
12/14/10		14152	4182	1104	693	693	10	19	909261	41	922355
12/19/10		14154	4183	1104	693	693	10	19	909261	41	922355
12/19/10		14154	4183	1104	693	693	10	19	909261	41	922355
12/27/10		14157	4184	1104	693	693	10	19	909261	41	922355
12/29/10		14157	4184	1104	694	694	10	19	909261	41	922355
3/4/11		14180	4192	1108	697	697	10	19	909261	41	922355
3/10/11		14182	4193	1108	697	697	10	19	909261	41	922355
2/26/11		14178	4191	1108	696	696	10	19	909261	41	922355
3/2/11		14179	4192	1108	696	696	10	19	909261	41	922355
3/7/11		14181	4192	1108	697	697	10	19	909261	41	922355
3/12/11		14183	4193	1108	697	697	10	19	909261	41	922355
3/17/11		14184	4193	1108	697	697	10	19	909261	41	922355
3/30/11		14189	4195	1109	698	698	10	19	909261	41	922355
3/27/11		14188	4195	1109	698	698	10	19	909261	41	922355
4/6/11		14191	4196	1110	698	698	10	19	909261	41	922355
4/13/11		14194	4197	1110	698	698	10	19	909261	41	922355
4/17/11		14195	4197	1110	699	699	10	19	909261	41	922355
4/16/11		14195	4197	1110	699	699	10	19	909261	41	922355
4/24/11		14197	4198	1110	699	699	10	19	909261	41	922355
4/27/11		14198	4198	1111	699	699	10	19	909261	41	922355
5/2/11		14200	4199	1111	699	699	10	19	909261	41	922355
5/3/11		14201	4199	1111	699	699	10	19	909261	41	922355
5/5/11		14201	4199	1111	699	699	10	19	909261	41	922355
5/9/11		14203	4200	1111	700	700	10	19	909261	41	922355
5/13/11		14204	4200	1111	700	700	10	19	909261	41	922355
5/21/11		14207	4201	1112	700	700	10	19	909261	41	922355
5/23/11		14208	4201	1112	700	700	10	19	909261	41	922355
5/25/11		14208	4202	1112	700	700	10	19	909261	41	922355
5/28/11		14209	4202	1112	700	700	10	19	909261	41	922355
6/3/11		14211	4203	1113	701	701	10	19	909261	41	922355
6/10/11		14214	4204	1113	701	701	10	19	909261	41	922355
6/22/11		14218	4205	1113	702	702	10	19	909261	41	922355
6/26/11		14219	4205	1114	702	702	10	19	909261	41	922355
6/28/11		14220	4206	1114	702	702	10	19	909261	41	922355

Baseline Tugboat Emissions

Date	[redacted]	Class B Tug Mooring/Unmooring Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
9/12/10		10270	3128	829	523	523	8	14	661603	30	671141
9/14/10		10271	3128	829	523	523	8	14	661603	30	671141
9/16/10		10271	3128	829	523	523	8	14	661603	30	671141
10/2/10		10275	3130	829	524	524	8	14	661603	30	671141
10/6/10		10276	3130	829	524	524	8	14	661603	30	671141
10/5/10		10276	3130	829	524	524	8	14	661603	30	671141
10/4/10		10276	3130	829	524	524	8	14	661603	30	671141
10/16/10		10279	3131	830	524	524	8	14	661603	30	671141
10/17/10		10279	3131	830	524	524	8	14	661603	30	671141
10/19/10		10280	3131	830	524	524	8	14	661603	30	671141
10/22/10		10280	3131	830	525	525	8	14	661603	30	671141
10/23/10		10281	3131	830	525	525	8	14	661603	30	671141
10/25/10		10281	3132	830	525	525	8	14	661603	30	671141
10/27/10		10282	3132	830	525	525	8	14	661603	30	671141
10/29/10		10282	3132	830	525	525	8	14	661603	30	671141
11/1/10		10283	3132	830	525	525	8	14	661603	30	671141
11/7/10		10284	3133	831	525	525	8	14	661603	30	671141
11/17/10		10287	3134	831	525	525	8	14	661603	30	671141
11/18/10		10287	3134	831	525	525	8	14	661603	30	671141
11/19/10		10287	3134	831	526	526	8	14	661603	30	671141
11/26/10		10289	3134	831	526	526	8	14	661603	30	671141
11/30/10		10290	3135	832	526	526	8	14	661603	30	671141
12/4/10		10291	3135	832	526	526	8	14	661603	30	671141
12/14/10		10294	3136	832	526	526	8	14	661603	30	671141
12/19/10		10295	3136	832	527	527	8	14	661603	30	671141
12/19/10		10295	3136	832	527	527	8	14	661603	30	671141
12/27/10		10297	3137	833	527	527	8	14	661603	30	671141
12/29/10		10297	3137	833	527	527	8	14	661603	30	671141
3/4/11		10314	3143	835	529	529	8	14	661603	30	671141
3/10/11		10315	3144	835	529	529	8	14	661603	30	671141
2/26/11		10312	3143	835	529	529	8	14	661603	30	671141
3/2/11		10313	3143	835	529	529	8	14	661603	30	671141
3/7/11		10315	3143	835	529	529	8	14	661603	30	671141
3/12/11		10316	3144	835	529	529	8	14	661603	30	671141
3/17/11		10317	3144	836	530	530	8	14	661603	30	671141
3/30/11		10320	3145	836	530	530	8	14	661603	30	671141
3/27/11		10320	3145	836	530	530	8	14	661603	30	671141
4/6/11		10322	3146	836	530	530	8	14	661603	30	671141
4/13/11		10324	3147	837	530	530	8	14	661603	30	671141
4/17/11		10325	3147	837	531	531	8	14	661603	30	671141
4/16/11		10325	3147	837	531	531	8	14	661603	30	671141
4/24/11		10327	3148	837	531	531	8	14	661603	30	671141
4/27/11		10327	3148	837	531	531	8	14	661603	30	671141
5/2/11		10329	3148	837	531	531	8	14	661603	30	671141
5/3/11		10329	3148	837	531	531	8	14	661603	30	671141
5/5/11		10329	3149	838	531	531	8	14	661603	30	671141
5/9/11		10330	3149	838	531	531	8	14	661603	30	671141
5/13/11		10331	3149	838	531	531	8	14	661603	30	671141
5/21/11		10333	3150	838	532	532	8	14	661603	30	671141
5/23/11		10334	3150	838	532	532	8	14	661603	30	671141
5/25/11		10334	3150	838	532	532	8	14	661603	30	671141
5/28/11		10335	3151	838	532	532	8	14	661603	30	671141
6/3/11		10337	3151	839	532	532	8	14	661603	30	671141
6/10/11		10338	3152	839	532	532	8	14	661603	30	671141
6/22/11		10341	3153	839	533	533	8	14	661603	30	671141
6/26/11		10342	3153	840	533	533	8	14	661603	30	671141
6/28/11		10343	3153	840	533	533	8	14	661603	30	671141

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Assist Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
9/12/10		69263	20486	5393	3376	3376	51	91	4460719	201	4524956
9/14/10		69266	20487	5393	3377	3377	51	91	4460719	201	4524956
9/16/10		69270	20488	5394	3377	3377	51	91	4460719	201	4524956
10/2/10		69297	20497	5398	3381	3381	51	91	4460719	201	4524956
10/6/10		69304	20500	5399	3382	3382	51	91	4460719	201	4524956
10/5/10		69302	20499	5399	3382	3382	51	91	4460719	201	4524956
10/4/10		69300	20499	5398	3381	3381	51	91	4460719	201	4524956
10/16/10		69321	20505	5401	3384	3384	51	91	4460719	201	4524956
10/17/10		69322	20506	5402	3384	3384	51	91	4460719	201	4524956
10/19/10		69326	20507	5402	3385	3385	51	91	4460719	201	4524956
10/22/10		69331	20509	5403	3385	3385	51	91	4460719	201	4524956
10/23/10		69332	20510	5403	3386	3386	51	91	4460719	201	4524956
10/25/10		69336	20511	5404	3386	3386	51	91	4460719	201	4524956
10/27/10		69339	20512	5404	3386	3386	51	91	4460719	201	4524956
10/29/10		69343	20513	5405	3387	3387	51	91	4460719	201	4524956
11/1/10		69348	20515	5405	3388	3388	51	91	4460719	201	4524956
11/7/10		69358	20518	5407	3389	3389	51	91	4460719	201	4524956
11/17/10		69375	20524	5410	3391	3391	51	91	4460719	201	4524956
11/18/10		69377	20525	5410	3391	3391	51	91	4460719	201	4524956
11/19/10		69378	20525	5410	3392	3392	51	91	4460719	201	4524956
11/26/10		69390	20529	5412	3393	3393	51	91	4460719	201	4524956
11/30/10		69397	20532	5413	3394	3394	51	91	4460719	201	4524956
12/4/10		69404	20534	5414	3395	3395	51	91	4460719	201	4524956
12/14/10		69421	20540	5416	3397	3397	51	91	4460719	201	4524956
12/19/10		69429	20543	5418	3398	3398	51	91	4460719	201	4524956
12/19/10		69429	20543	5418	3398	3398	51	91	4460719	201	4524956
12/27/10		69443	20547	5420	3400	3400	51	91	4460719	201	4524956
12/29/10		69446	20549	5420	3401	3401	51	91	4460719	201	4524956
3/4/11		69557	20587	5437	3415	3415	51	91	4460719	201	4524956
3/10/11		69567	20590	5438	3416	3416	51	91	4460719	201	4524956
2/26/11		69547	20583	5435	3414	3414	51	91	4460719	201	4524956
3/2/11		69553	20585	5436	3415	3415	51	91	4460719	201	4524956
3/7/11		69562	20588	5437	3416	3416	51	91	4460719	201	4524956
3/12/11		69570	20591	5439	3417	3417	51	91	4460719	201	4524956
3/17/11		69579	20594	5440	3418	3418	51	91	4460719	201	4524956
3/30/11		69601	20602	5443	3421	3421	51	91	4460719	201	4524956
3/27/11		69596	20600	5442	3420	3420	51	91	4460719	201	4524956
4/6/11		69613	20606	5445	3423	3423	51	91	4460719	201	4524956
4/13/11		69625	20610	5447	3424	3424	51	91	4460719	201	4524956
4/17/11		69631	20612	5448	3425	3425	51	91	4460719	201	4524956
4/16/11		69630	20612	5447	3425	3425	51	91	4460719	201	4524956
4/24/11		69643	20616	5449	3427	3427	51	91	4460719	201	4524956
4/27/11		69648	20618	5450	3427	3427	51	91	4460719	201	4524956
5/2/11		69657	20621	5452	3428	3428	51	91	4460719	201	4524956
5/3/11		69659	20621	5452	3429	3429	51	91	4460719	201	4524956
5/5/11		69662	20623	5452	3429	3429	51	91	4460719	201	4524956
5/9/11		69669	20625	5453	3430	3430	51	91	4460719	201	4524956
5/13/11		69676	20627	5454	3431	3431	51	91	4460719	201	4524956
5/21/11		69689	20632	5456	3433	3433	51	91	4460719	201	4524956
5/23/11		69693	20633	5457	3433	3433	51	91	4460719	201	4524956
5/25/11		69696	20634	5457	3434	3434	51	91	4460719	201	4524956
5/28/11		69701	20636	5458	3434	3434	51	91	4460719	201	4524956
6/3/11		69711	20640	5460	3436	3436	51	91	4460719	201	4524956
6/10/11		69723	20644	5461	3437	3437	51	91	4460719	201	4524956
6/22/11		69744	20651	5464	3440	3440	51	91	4460719	201	4524956
6/26/11		69750	20653	5465	3441	3441	51	91	4460719	201	4524956
6/28/11		69754	20654	5466	3441	3441	51	91	4460719	201	4524956

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Total Tug Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
9/12/10		136012	40299	10617	6654	6654	99	179	8759366	395	8885517
9/14/10		136019	40301	10618	6655	6655	99	179	8759366	395	8885517
9/16/10		168118	49690	13088	8199	8199	123	220	10825547	488	10981440
10/2/10		168184	49713	13097	8208	8208	123	220	10825547	488	10981440
10/6/10		136092	40326	10629	6665	6665	99	179	8759366	395	8885517
10/5/10		136089	40325	10628	6664	6664	99	179	8759366	395	8885517
10/4/10		136086	40324	10628	6664	6664	99	179	8759366	395	8885517
10/16/10		136126	40338	10634	6669	6669	99	179	8759366	395	8885517
10/17/10		136129	40339	10634	6670	6670	99	179	8759366	395	8885517
10/19/10		136136	40341	10635	6670	6670	99	179	8759366	395	8885517
10/22/10		136146	40345	10637	6672	6672	99	179	8759366	395	8885517
10/23/10		136149	40346	10637	6672	6672	99	179	8759366	395	8885517
10/25/10		168279	49746	13112	8220	8220	123	220	10825547	488	10981440
10/27/10		136162	40350	10639	6674	6674	99	179	8759366	395	8885517
10/29/10		168295	49751	13114	8222	8222	123	220	10825547	488	10981440
11/1/10		136179	40356	10642	6676	6676	99	179	8759366	395	8885517
11/7/10		168332	49764	13119	8227	8227	123	220	10825547	488	10981440
11/17/10		168374	49778	13126	8233	8233	123	220	10825547	488	10981440
11/18/10		168378	49780	13126	8233	8233	123	220	10825547	488	10981440
11/19/10		136239	40377	10651	6684	6684	99	179	8759366	395	8885517
11/26/10		136263	40385	10654	6687	6687	99	179	8759366	395	8885517
11/30/10		168427	49797	13134	8240	8240	123	220	10825547	488	10981440
12/4/10		136289	40394	10658	6691	6691	99	179	8759366	395	8885517
12/14/10		136323	40405	10663	6695	6695	99	179	8759366	395	8885517
12/19/10		136339	40411	10666	6697	6697	99	179	8759366	395	8885517
12/19/10		168506	49823	13145	8250	8250	123	220	10825547	488	10981440
12/27/10		136366	40420	10670	6701	6701	99	179	8759366	395	8885517
12/29/10		168547	49838	13151	8256	8256	123	220	10825547	488	10981440
3/4/11		136590	40497	10703	6730	6730	99	179	8759366	395	8885517
3/10/11		136610	40504	10706	6733	6733	99	179	8759366	395	8885517
2/26/11		168790	49921	13188	8288	8288	123	220	10825547	488	10981440
3/2/11		168807	49927	13190	8290	8290	123	220	10825547	488	10981440
3/7/11		136600	40500	10705	6732	6732	99	179	8759366	395	8885517
3/12/11		168848	49941	13196	8295	8295	123	220	10825547	488	10981440
3/17/11		168869	49948	13199	8298	8298	123	220	10825547	488	10981440
3/30/11		136676	40527	10716	6742	6742	99	179	8759366	395	8885517
3/27/11		168910	49962	13205	8304	8304	123	220	10825547	488	10981440
4/6/11		168951	49976	13212	8309	8309	123	220	10825547	488	10981440
4/13/11		168980	49986	13216	8313	8313	123	220	10825547	488	10981440
4/17/11		136736	40547	10725	6750	6750	99	179	8759366	395	8885517
4/16/11		168993	49990	13218	8314	8314	123	220	10825547	488	10981440
4/24/11		169026	50002	13223	8319	8319	123	220	10825547	488	10981440
4/27/11		136770	40559	10730	6754	6754	99	179	8759366	395	8885517
5/2/11		136786	40565	10732	6757	6757	99	179	8759366	395	8885517
5/3/11		136790	40566	10733	6757	6757	99	179	8759366	395	8885517
5/5/11		169071	50017	13229	8325	8325	123	220	10825547	488	10981440
5/9/11		136810	40573	10736	6760	6760	99	179	8759366	395	8885517
5/13/11		169104	50029	13234	8329	8329	123	220	10825547	488	10981440
5/21/11		169137	50040	13239	8334	8334	123	220	10825547	488	10981440
5/23/11		136857	40589	10743	6766	6766	99	179	8759366	395	8885517
5/25/11		136863	40591	10744	6767	6767	99	179	8759366	395	8885517
5/28/11		169166	50050	13244	8337	8337	123	220	10825547	488	10981440
6/3/11		169191	50058	13247	8341	8341	123	220	10825547	488	10981440
6/10/11		136917	40609	10752	6774	6774	99	179	8759366	395	8885517
6/22/11		136957	40623	10758	6779	6779	99	179	8759366	395	8885517
6/26/11		136970	40628	10760	6781	6781	99	179	8759366	395	8885517
6/28/11		136977	40630	10761	6782	6782	99	179	8759366	395	8885517

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Mooring/Unmooring Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
6/16/11		14216	4204	1113	701	701	10	19	909261	41	922355
7/4/11		14222	4206	1114	702	702	10	19	909261	41	922355
7/2/11		14221	4206	1114	702	702	10	19	909261	41	922355
7/5/11		14222	4206	1114	702	702	10	19	909261	41	922355
7/7/11		14223	4207	1114	702	702	10	19	909261	41	922355
7/8/11		14223	4207	1114	702	702	10	19	909261	41	922355
7/10/11		14224	4207	1114	702	702	10	19	909261	41	922355
7/17/11		14227	4208	1115	703	703	10	19	909261	41	922355
7/20/11		14228	4208	1115	703	703	10	19	909261	41	922355
7/21/11		14228	4208	1115	703	703	10	19	909261	41	922355
7/23/11		14229	4209	1115	703	703	10	19	909261	41	922355
7/26/11		14230	4209	1115	703	703	10	19	909261	41	922355
8/10/11		14235	4211	1116	704	704	10	19	909261	41	922355
8/13/11		14236	4211	1116	704	704	10	19	909261	41	922355
8/21/11		14239	4212	1117	704	704	10	19	909261	41	922355
8/7/11		14234	4210	1116	704	704	10	19	909261	41	922355
8/1/11		14232	4210	1116	703	703	10	19	909261	41	922355
8/3/11		14232	4210	1116	704	704	10	19	909261	41	922355
8/25/11		14240	4213	1117	705	705	10	19	909261	41	922355
8/27/11		14241	4213	1117	705	705	10	19	909261	41	922355
8/29/11		14241	4213	1117	705	705	10	19	909261	41	922355
9/1/11		14243	4213	1117	705	705	10	19	909261	41	922355
9/5/11		14244	4214	1117	705	705	10	19	909261	41	922355
9/11/11		14246	4215	1118	705	705	10	19	909261	41	922355
9/17/11		14248	4215	1118	706	706	10	19	909261	41	922355
9/21/11		14249	4216	1118	706	706	10	19	909261	41	922355
9/20/11		14249	4216	1118	706	706	10	19	909261	41	922355
10/2/11		14253	4217	1119	706	706	10	19	909261	41	922355
10/3/11		14254	4217	1119	706	706	10	19	909261	41	922355
10/8/11		14255	4218	1119	707	707	10	19	909261	41	922355
10/12/11		14257	4218	1119	707	707	10	19	909261	41	922355
10/15/11		14258	4219	1119	707	707	10	19	909261	41	922355
10/16/11		14258	4219	1119	707	707	10	19	909261	41	922355
10/17/11		14258	4219	1120	707	707	10	19	909261	41	922355
10/19/11		14259	4219	1120	707	707	10	19	909261	41	922355
10/24/11		14261	4220	1120	707	707	10	19	909261	41	922355
10/25/11		14261	4220	1120	707	707	10	19	909261	41	922355
10/26/11		14262	4220	1120	707	707	10	19	909261	41	922355
10/30/11		14263	4220	1120	708	708	10	19	909261	41	922355
11/4/11		14265	4221	1120	708	708	10	19	909261	41	922355
11/1/11		14264	4221	1120	708	708	10	19	909261	41	922355
11/16/11		14269	4222	1121	708	708	10	19	909261	41	922355
11/18/11		14270	4223	1121	708	708	10	19	909261	41	922355
11/21/11		14271	4223	1121	709	709	10	19	909261	41	922355
11/22/11		14271	4223	1121	709	709	10	19	909261	41	922355
11/25/11		14272	4223	1122	709	709	10	19	909261	41	922355
11/24/11		14272	4223	1121	709	709	10	19	909261	41	922355
12/1/11		14274	4224	1122	709	709	10	19	909261	41	922355
12/5/11		14275	4225	1122	709	709	10	19	909261	41	922355
12/11/11		14278	4225	1122	709	709	10	19	909261	41	922355
12/22/11		14281	4227	1123	710	710	10	19	909261	41	922355
12/24/11		14282	4227	1123	710	710	10	19	909261	41	922355
1/4/12		14286	4228	1124	711	711	10	19	909261	41	922355
12/31/11		14284	4228	1123	710	710	10	19	909261	41	922355
1/11/12		14288	4229	1124	711	711	10	19	909261	41	922355
1/14/12		14289	4229	1124	711	711	10	19	909261	41	922355
1/14/12		14289	4229	1124	711	711	10	19	909261	41	922355

Baseline Tugboat Emissions

Date	[redacted]	Class B Tug Mooring/Unmooring Emissions (g/trip)									
	[redacted]	NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
6/16/11	[redacted]	10340	3152	839	533	533	8	14	661603	30	671141
7/4/11	[redacted]	10344	3154	840	533	533	8	14	661603	30	671141
7/2/11	[redacted]	10344	3154	840	533	533	8	14	661603	30	671141
7/5/11	[redacted]	10345	3154	840	533	533	8	14	661603	30	671141
7/7/11	[redacted]	10345	3154	840	533	533	8	14	661603	30	671141
7/8/11	[redacted]	10345	3154	840	533	533	8	14	661603	30	671141
7/10/11	[redacted]	10346	3154	840	533	533	8	14	661603	30	671141
7/17/11	[redacted]	10348	3155	840	534	534	8	14	661603	30	671141
7/20/11	[redacted]	10348	3155	840	534	534	8	14	661603	30	671141
7/21/11	[redacted]	10349	3155	840	534	534	8	14	661603	30	671141
7/23/11	[redacted]	10349	3155	841	534	534	8	14	661603	30	671141
7/26/11	[redacted]	10350	3156	841	534	534	8	14	661603	30	671141
8/10/11	[redacted]	10354	3157	841	535	535	8	14	661603	30	671141
8/13/11	[redacted]	10354	3157	841	535	535	8	14	661603	30	671141
8/21/11	[redacted]	10356	3158	842	535	535	8	14	661603	30	671141
8/7/11	[redacted]	10353	3157	841	534	534	8	14	661603	30	671141
8/1/11	[redacted]	10351	3156	841	534	534	8	14	661603	30	671141
8/3/11	[redacted]	10352	3156	841	534	534	8	14	661603	30	671141
8/25/11	[redacted]	10357	3158	842	535	535	8	14	661603	30	671141
8/27/11	[redacted]	10358	3159	842	535	535	8	14	661603	30	671141
8/29/11	[redacted]	10358	3159	842	535	535	8	14	661603	30	671141
9/1/11	[redacted]	10359	3159	842	535	535	8	14	661603	30	671141
9/5/11	[redacted]	10360	3159	842	535	535	8	14	661603	30	671141
9/11/11	[redacted]	10362	3160	842	536	536	8	14	661603	30	671141
9/17/11	[redacted]	10363	3160	843	536	536	8	14	661603	30	671141
9/21/11	[redacted]	10364	3161	843	536	536	8	14	661603	30	671141
9/20/11	[redacted]	10364	3161	843	536	536	8	14	661603	30	671141
10/2/11	[redacted]	10367	3162	843	536	536	8	14	661603	30	671141
10/3/11	[redacted]	10367	3162	843	536	536	8	14	661603	30	671141
10/8/11	[redacted]	10369	3162	844	537	537	8	14	661603	30	671141
10/12/11	[redacted]	10370	3163	844	537	537	8	14	661603	30	671141
10/15/11	[redacted]	10370	3163	844	537	537	8	14	661603	30	671141
10/16/11	[redacted]	10371	3163	844	537	537	8	14	661603	30	671141
10/17/11	[redacted]	10371	3163	844	537	537	8	14	661603	30	671141
10/19/11	[redacted]	10371	3163	844	537	537	8	14	661603	30	671141
10/24/11	[redacted]	10373	3164	844	537	537	8	14	661603	30	671141
10/25/11	[redacted]	10373	3164	844	537	537	8	14	661603	30	671141
10/26/11	[redacted]	10373	3164	844	537	537	8	14	661603	30	671141
10/30/11	[redacted]	10374	3164	844	537	537	8	14	661603	30	671141
11/4/11	[redacted]	10375	3165	845	537	537	8	14	661603	30	671141
11/1/11	[redacted]	10375	3164	844	537	537	8	14	661603	30	671141
11/16/11	[redacted]	10378	3166	845	538	538	8	14	661603	30	671141
11/18/11	[redacted]	10379	3166	845	538	538	8	14	661603	30	671141
11/21/11	[redacted]	10380	3166	845	538	538	8	14	661603	30	671141
11/22/11	[redacted]	10380	3166	845	538	538	8	14	661603	30	671141
11/25/11	[redacted]	10381	3166	845	538	538	8	14	661603	30	671141
11/24/11	[redacted]	10380	3166	845	538	538	8	14	661603	30	671141
12/1/11	[redacted]	10382	3167	846	538	538	8	14	661603	30	671141
12/5/11	[redacted]	10383	3167	846	539	539	8	14	661603	30	671141
12/11/11	[redacted]	10385	3168	846	539	539	8	14	661603	30	671141
12/22/11	[redacted]	10387	3169	846	539	539	8	14	661603	30	671141
12/24/11	[redacted]	10388	3169	846	539	539	8	14	661603	30	671141
1/4/12	[redacted]	10391	3170	847	540	540	8	14	661603	30	671141
12/31/11	[redacted]	10390	3170	847	539	539	8	14	661603	30	671141
1/11/12	[redacted]	10392	3171	847	540	540	8	14	661603	30	671141
1/14/12	[redacted]	10393	3171	847	540	540	8	14	661603	30	671141
1/14/12	[redacted]	10393	3171	847	540	540	8	14	661603	30	671141

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Assist Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
6/16/11		69733	20647	5463	3438	3438	51	91	4460719	201	4524956
7/4/11		69764	20658	5467	3442	3442	51	91	4460719	201	4524956
7/2/11		69761	20656	5467	3442	3442	51	91	4460719	201	4524956
7/5/11		69766	20658	5468	3443	3443	51	91	4460719	201	4524956
7/7/11		69769	20659	5468	3443	3443	51	91	4460719	201	4524956
7/8/11		69771	20660	5468	3443	3443	51	91	4460719	201	4524956
7/10/11		69774	20661	5469	3444	3444	51	91	4460719	201	4524956
7/17/11		69786	20665	5471	3445	3445	51	91	4460719	201	4524956
7/20/11		69791	20667	5471	3446	3446	51	91	4460719	201	4524956
7/21/11		69793	20668	5472	3446	3446	51	91	4460719	201	4524956
7/23/11		69796	20669	5472	3447	3447	51	91	4460719	201	4524956
7/26/11		69801	20670	5473	3447	3447	51	91	4460719	201	4524956
8/10/11		69827	20679	5477	3451	3451	51	91	4460719	201	4524956
8/13/11		69832	20681	5478	3451	3451	51	91	4460719	201	4524956
8/21/11		69846	20686	5480	3453	3453	51	91	4460719	201	4524956
8/7/11		69822	20677	5476	3450	3450	51	91	4460719	201	4524956
8/1/11		69812	20674	5475	3449	3449	51	91	4460719	201	4524956
8/3/11		69815	20675	5475	3449	3449	51	91	4460719	201	4524956
8/25/11		69852	20688	5481	3454	3454	51	91	4460719	201	4524956
8/27/11		69856	20689	5481	3455	3455	51	91	4460719	201	4524956
8/29/11		69859	20690	5482	3455	3455	51	91	4460719	201	4524956
9/1/11		69864	20692	5482	3456	3456	51	91	4460719	201	4524956
9/5/11		69871	20694	5483	3457	3457	51	91	4460719	201	4524956
9/11/11		69881	20698	5485	3458	3458	51	91	4460719	201	4524956
9/17/11		69891	20701	5486	3459	3459	51	91	4460719	201	4524956
9/21/11		69898	20704	5487	3460	3460	51	91	4460719	201	4524956
9/20/11		69897	20703	5487	3460	3460	51	91	4460719	201	4524956
10/2/11		69917	20710	5490	3463	3463	51	91	4460719	201	4524956
10/3/11		69919	20711	5490	3463	3463	51	91	4460719	201	4524956
10/8/11		69927	20714	5492	3464	3464	51	91	4460719	201	4524956
10/12/11		69934	20716	5493	3465	3465	51	91	4460719	201	4524956
10/15/11		69939	20718	5493	3466	3466	51	91	4460719	201	4524956
10/16/11		69941	20718	5494	3466	3466	51	91	4460719	201	4524956
10/17/11		69942	20719	5494	3466	3466	51	91	4460719	201	4524956
10/19/11		69946	20720	5494	3466	3466	51	91	4460719	201	4524956
10/24/11		69954	20723	5496	3468	3468	51	91	4460719	201	4524956
10/25/11		69956	20723	5496	3468	3468	51	91	4460719	201	4524956
10/26/11		69958	20724	5496	3468	3468	51	91	4460719	201	4524956
10/30/11		69964	20726	5497	3469	3469	51	91	4460719	201	4524956
11/4/11		69973	20729	5499	3470	3470	51	91	4460719	201	4524956
11/1/11		69968	20728	5498	3469	3469	51	91	4460719	201	4524956
11/16/11		69993	20736	5502	3473	3473	51	91	4460719	201	4524956
11/18/11		69997	20737	5502	3473	3473	51	91	4460719	201	4524956
11/21/11		70002	20739	5503	3474	3474	51	91	4460719	201	4524956
11/22/11		70004	20740	5503	3474	3474	51	91	4460719	201	4524956
11/25/11		70009	20742	5504	3475	3475	51	91	4460719	201	4524956
11/24/11		70007	20741	5504	3475	3475	51	91	4460719	201	4524956
12/1/11		70019	20745	5505	3476	3476	51	91	4460719	201	4524956
12/5/11		70026	20747	5506	3477	3477	51	91	4460719	201	4524956
12/11/11		70036	20751	5508	3478	3478	51	91	4460719	201	4524956
12/22/11		70055	20757	5511	3481	3481	51	91	4460719	201	4524956
12/24/11		70058	20758	5511	3481	3481	51	91	4460719	201	4524956
1/4/12		70077	20765	5514	3484	3484	51	91	4460719	201	4524956
12/31/11		70070	20763	5513	3483	3483	51	91	4460719	201	4524956
1/11/12		70089	20769	5516	3485	3485	51	91	4460719	201	4524956
1/14/12		70094	20771	5516	3486	3486	51	91	4460719	201	4524956
1/14/12		70094	20771	5516	3486	3486	51	91	4460719	201	4524956

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Total Tug Emissions (g/trip)									
	[redacted]	NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
6/16/11	[redacted]	169244	50077	13255	8348	8348	123	220	10825547	488	10981440
7/4/11	[redacted]	136997	40637	10764	6784	6784	99	179	8759366	395	8885517
7/2/11	[redacted]	136990	40635	10763	6783	6783	99	179	8759366	395	8885517
7/5/11	[redacted]	137000	40638	10764	6785	6785	99	179	8759366	395	8885517
7/7/11	[redacted]	137007	40640	10765	6786	6786	99	179	8759366	395	8885517
7/8/11	[redacted]	137010	40641	10766	6786	6786	99	179	8759366	395	8885517
7/10/11	[redacted]	137017	40644	10767	6787	6787	99	179	8759366	395	8885517
7/17/11	[redacted]	137040	40652	10770	6790	6790	99	179	8759366	395	8885517
7/20/11	[redacted]	137050	40655	10772	6791	6791	99	179	8759366	395	8885517
7/21/11	[redacted]	137053	40656	10772	6792	6792	99	179	8759366	395	8885517
7/23/11	[redacted]	169397	50129	13278	8368	8368	123	220	10825547	488	10981440
7/26/11	[redacted]	137070	40662	10775	6794	6794	99	179	8759366	395	8885517
8/10/11	[redacted]	137120	40679	10782	6801	6801	99	179	8759366	395	8885517
8/13/11	[redacted]	169484	50159	13291	8379	8379	123	220	10825547	488	10981440
8/21/11	[redacted]	137157	40692	10788	6806	6806	99	179	8759366	395	8885517
8/7/11	[redacted]	137110	40676	10781	6799	6799	99	179	8759366	395	8885517
8/1/11	[redacted]	137090	40669	10778	6797	6797	99	179	8759366	395	8885517
8/3/11	[redacted]	137097	40671	10779	6798	6798	99	179	8759366	395	8885517
8/25/11	[redacted]	137170	40696	10790	6807	6807	99	179	8759366	395	8885517
8/27/11	[redacted]	169541	50179	13299	8387	8387	123	220	10825547	488	10981440
8/29/11	[redacted]	137184	40701	10792	6809	6809	99	179	8759366	395	8885517
9/1/11	[redacted]	137194	40704	10793	6810	6810	99	179	8759366	395	8885517
9/5/11	[redacted]	169578	50191	13305	8392	8392	123	220	10825547	488	10981440
9/11/11	[redacted]	137227	40716	10798	6815	6815	99	179	8759366	395	8885517
9/17/11	[redacted]	137247	40723	10801	6817	6817	99	179	8759366	395	8885517
9/21/11	[redacted]	169644	50214	13315	8401	8401	123	220	10825547	488	10981440
9/20/11	[redacted]	137257	40726	10803	6819	6819	99	179	8759366	395	8885517
10/2/11	[redacted]	137297	40740	10808	6824	6824	99	179	8759366	395	8885517
10/3/11	[redacted]	137300	40741	10809	6824	6824	99	179	8759366	395	8885517
10/8/11	[redacted]	169715	50238	13325	8410	8410	123	220	10825547	488	10981440
10/12/11	[redacted]	169731	50244	13328	8412	8412	123	220	10825547	488	10981440
10/15/11	[redacted]	119195	35481	9420	5953	5953	86	156	7602447	343	7711948
10/16/11	[redacted]	137344	40756	10815	6830	6830	99	179	8759366	395	8885517
10/17/11	[redacted]	137347	40757	10816	6831	6831	99	179	8759366	395	8885517
10/19/11	[redacted]	119207	35485	9422	5954	5954	86	156	7602447	343	7711948
10/24/11	[redacted]	169781	50261	13335	8418	8418	123	220	10825547	488	10981440
10/25/11	[redacted]	137374	40766	10820	6834	6834	99	179	8759366	395	8885517
10/26/11	[redacted]	137377	40768	10820	6835	6835	99	179	8759366	395	8885517
10/30/11	[redacted]	137390	40772	10822	6836	6836	99	179	8759366	395	8885517
11/4/11	[redacted]	137407	40778	10825	6839	6839	99	179	8759366	395	8885517
11/1/11	[redacted]	169814	50272	13340	8423	8423	123	220	10825547	488	10981440
11/16/11	[redacted]	169876	50293	13349	8431	8431	123	220	10825547	488	10981440
11/18/11	[redacted]	137454	40794	10832	6845	6845	99	179	8759366	395	8885517
11/21/11	[redacted]	137464	40797	10833	6846	6846	99	179	8759366	395	8885517
11/22/11	[redacted]	137467	40798	10834	6847	6847	99	179	8759366	395	8885517
11/25/11	[redacted]	137477	40802	10835	6848	6848	99	179	8759366	395	8885517
11/24/11	[redacted]	137474	40801	10835	6847	6847	99	179	8759366	395	8885517
12/1/11	[redacted]	137497	40809	10838	6851	6851	99	179	8759366	395	8885517
12/5/11	[redacted]	137511	40813	10840	6852	6852	99	179	8759366	395	8885517
12/11/11	[redacted]	137531	40820	10843	6855	6855	99	179	8759366	395	8885517
12/22/11	[redacted]	137567	40833	10849	6860	6860	99	179	8759366	395	8885517
12/24/11	[redacted]	170032	50347	13372	8452	8452	123	220	10825547	488	10981440
1/4/12	[redacted]	137611	40848	10855	6866	6866	99	179	8759366	395	8885517
12/31/11	[redacted]	137597	40843	10853	6864	6864	99	179	8759366	395	8885517
1/11/12	[redacted]	137634	40856	10859	6869	6869	99	179	8759366	395	8885517
1/14/12	[redacted]	170119	50377	13385	8463	8463	123	220	10825547	488	10981440
1/14/12	[redacted]	137644	40859	10860	6870	6870	99	179	8759366	395	8885517

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Mooring/Unmooring Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
1/28/12		14294	4231	1125	712	712	10	19	909261	41	922355
1/30/12		14295	4231	1125	712	712	10	19	909261	41	922355
2/5/12		14297	4232	1125	712	712	10	19	909261	41	922355
2/12/12		14299	4233	1126	712	712	10	19	909261	41	922355
2/8/12		14298	4232	1125	712	712	10	19	909261	41	922355
2/10/12		14299	4233	1126	712	712	10	19	909261	41	922355
2/20/12		14302	4234	1126	713	713	10	19	909261	41	922355
2/27/12		14305	4235	1126	713	713	10	19	909261	41	922355
2/29/12		14305	4235	1126	713	713	10	19	909261	41	922355
3/2/12		14306	4235	1127	713	713	10	19	909261	41	922355
3/4/12		14307	4235	1127	713	713	10	19	909261	41	922355
3/6/12		14307	4236	1127	713	713	10	19	909261	41	922355
3/9/12		14308	4236	1127	714	714	10	19	909261	41	922355
3/11/12		14309	4236	1127	714	714	10	19	909261	41	922355
3/16/12		14311	4237	1127	714	714	10	19	909261	41	922355
3/18/12		14312	4237	1127	714	714	10	19	909261	41	922355
3/20/12		14312	4237	1128	714	714	10	19	909261	41	922355
3/21/12		14313	4237	1128	714	714	10	19	909261	41	922355
3/23/12		14313	4238	1128	714	714	10	19	909261	41	922355
3/28/12		14315	4238	1128	714	714	10	19	909261	41	922355
4/1/12		14316	4239	1128	715	715	10	19	909261	41	922355
4/12/12		14320	4240	1129	715	715	10	19	909261	41	922355
4/11/12		14320	4240	1129	715	715	10	19	909261	41	922355
4/18/12		14322	4241	1129	715	715	10	19	909261	41	922355
4/21/12		14323	4241	1129	716	716	10	19	909261	41	922355
4/22/12		14324	4241	1129	716	716	10	19	909261	41	922355
4/24/12		14324	4241	1129	716	716	10	19	909261	41	922355
4/25/12		14325	4242	1129	716	716	10	19	909261	41	922355
4/30/12		14326	4242	1130	716	716	10	19	909261	41	922355
5/3/12		14327	4243	1130	716	716	10	19	909261	41	922355
5/3/12		14327	4243	1130	716	716	10	19	909261	41	922355
5/5/12		14328	4243	1130	716	716	10	19	909261	41	922355
5/11/12		14330	4243	1130	716	716	10	19	909261	41	922355
5/12/12		14331	4244	1130	716	716	10	19	909261	41	922355
5/21/12		14334	4245	1131	717	717	10	19	909261	41	922355
5/25/12		14335	4245	1131	717	717	10	19	909261	41	922355
5/29/12		14336	4246	1131	717	717	10	19	909261	41	922355
6/3/12		14338	4246	1131	717	717	10	19	909261	41	922355
6/7/12		14340	4247	1132	718	718	10	19	909261	41	922355
6/12/12		14341	4247	1132	718	718	10	19	909261	41	922355
6/12/12		14341	4247	1132	718	718	10	19	909261	41	922355
6/15/12		14342	4248	1132	718	718	10	19	909261	41	922355
6/17/12		14343	4248	1132	718	718	10	19	909261	41	922355
6/17/12		14343	4248	1132	718	718	10	19	909261	41	922355
6/15/12		14342	4248	1132	718	718	10	19	909261	41	922355
6/16/12		14343	4248	1132	718	718	10	19	909261	41	922355
6/23/12		14345	4249	1132	718	718	10	19	909261	41	922355
5/31/12		14337	4246	1131	717	717	10	19	909261	41	922355
6/25/12		14346	4249	1133	718	718	10	19	909261	41	922355
7/6/12		14350	4250	1133	719	719	10	19	909261	41	922355
7/13/12		14352	4251	1133	719	719	10	19	909261	41	922355
7/16/12		14353	4251	1134	719	719	10	19	909261	41	922355
7/18/12		14354	4252	1134	720	720	10	19	909261	41	922355
7/20/12		14355	4252	1134	720	720	10	19	909261	41	922355
7/22/12		14355	4252	1134	720	720	10	19	909261	41	922355
7/25/12		14356	4252	1134	720	720	10	19	909261	41	922355
8/23/12		14366	4256	1136	721	721	10	19	909261	41	922355

Baseline Tugboat Emissions

Date	[redacted]	Class B Tug Mooring/Unmooring Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
1/28/12		10397	3172	848	540	540	8	14	661603	30	671141
1/30/12		10397	3172	848	540	540	8	14	661603	30	671141
2/5/12		10399	3173	848	541	541	8	14	661603	30	671141
2/12/12		10400	3173	848	541	541	8	14	661603	30	671141
2/8/12		10399	3173	848	541	541	8	14	661603	30	671141
2/10/12		10400	3173	848	541	541	8	14	661603	30	671141
2/20/12		10402	3174	849	541	541	8	14	661603	30	671141
2/27/12		10404	3175	849	541	541	8	14	661603	30	671141
2/29/12		10405	3175	849	541	541	8	14	661603	30	671141
3/2/12		10405	3175	849	542	542	8	14	661603	30	671141
3/4/12		10406	3175	849	542	542	8	14	661603	30	671141
3/6/12		10406	3175	849	542	542	8	14	661603	30	671141
3/9/12		10407	3176	849	542	542	8	14	661603	30	671141
3/11/12		10407	3176	849	542	542	8	14	661603	30	671141
3/16/12		10409	3176	850	542	542	8	14	661603	30	671141
3/18/12		10409	3176	850	542	542	8	14	661603	30	671141
3/20/12		10410	3177	850	542	542	8	14	661603	30	671141
3/21/12		10410	3177	850	542	542	8	14	661603	30	671141
3/23/12		10410	3177	850	542	542	8	14	661603	30	671141
3/28/12		10412	3177	850	542	542	8	14	661603	30	671141
4/1/12		10413	3178	850	543	543	8	14	661603	30	671141
4/12/12		10416	3179	851	543	543	8	14	661603	30	671141
4/11/12		10415	3179	851	543	543	8	14	661603	30	671141
4/18/12		10417	3179	851	543	543	8	14	661603	30	671141
4/21/12		10418	3179	851	543	543	8	14	661603	30	671141
4/22/12		10418	3180	851	543	543	8	14	661603	30	671141
4/24/12		10419	3180	851	543	543	8	14	661603	30	671141
4/25/12		10419	3180	851	543	543	8	14	661603	30	671141
4/30/12		10420	3180	851	544	544	8	14	661603	30	671141
5/3/12		10421	3180	851	544	544	8	14	661603	30	671141
5/3/12		10421	3180	851	544	544	8	14	661603	30	671141
5/5/12		10421	3181	852	544	544	8	14	661603	30	671141
5/11/12		10423	3181	852	544	544	8	14	661603	30	671141
5/12/12		10423	3181	852	544	544	8	14	661603	30	671141
5/21/12		10425	3182	852	544	544	8	14	661603	30	671141
5/25/12		10426	3182	852	544	544	8	14	661603	30	671141
5/29/12		10427	3183	852	545	545	8	14	661603	30	671141
6/3/12		10429	3183	853	545	545	8	14	661603	30	671141
6/7/12		10430	3184	853	545	545	8	14	661603	30	671141
6/12/12		10431	3184	853	545	545	8	14	661603	30	671141
6/12/12		10431	3184	853	545	545	8	14	661603	30	671141
6/15/12		10432	3184	853	545	545	8	14	661603	30	671141
6/17/12		10432	3184	853	545	545	8	14	661603	30	671141
6/17/12		10432	3184	853	545	545	8	14	661603	30	671141
6/15/12		10432	3184	853	545	545	8	14	661603	30	671141
6/16/12		10432	3184	853	545	545	8	14	661603	30	671141
6/23/12		10434	3185	853	545	545	8	14	661603	30	671141
5/31/12		10428	3183	853	545	545	8	14	661603	30	671141
6/25/12		10434	3185	853	545	545	8	14	661603	30	671141
7/6/12		10437	3186	854	546	546	8	14	661603	30	671141
7/13/12		10439	3187	854	546	546	8	14	661603	30	671141
7/16/12		10439	3187	854	546	546	8	14	661603	30	671141
7/18/12		10440	3187	854	546	546	8	14	661603	30	671141
7/20/12		10440	3187	854	546	546	8	14	661603	30	671141
7/22/12		10441	3187	855	546	546	8	14	661603	30	671141
7/25/12		10442	3188	855	546	546	8	14	661603	30	671141
8/23/12		10449	3190	856	547	547	8	14	661603	30	671141

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Assist Emissions (g/trip)									
	[redacted]	NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
1/28/12	[redacted]	70117	20779	5520	3489	3489	51	91	4460719	201	4524956
1/30/12	[redacted]	70121	20780	5521	3490	3490	51	91	4460719	201	4524956
2/5/12	[redacted]	70131	20784	5522	3491	3491	51	91	4460719	201	4524956
2/12/12	[redacted]	70143	20788	5524	3492	3492	51	91	4460719	201	4524956
2/8/12	[redacted]	70136	20785	5523	3492	3492	51	91	4460719	201	4524956
2/10/12	[redacted]	70139	20786	5523	3492	3492	51	91	4460719	201	4524956
2/20/12	[redacted]	70156	20792	5526	3494	3494	51	91	4460719	201	4524956
2/27/12	[redacted]	70168	20796	5528	3496	3496	51	91	4460719	201	4524956
2/29/12	[redacted]	70172	20798	5528	3496	3496	51	91	4460719	201	4524956
3/2/12	[redacted]	70175	20799	5529	3497	3497	51	91	4460719	201	4524956
3/4/12	[redacted]	70179	20800	5529	3497	3497	51	91	4460719	201	4524956
3/6/12	[redacted]	70182	20801	5530	3498	3498	51	91	4460719	201	4524956
3/9/12	[redacted]	70187	20803	5530	3498	3498	51	91	4460719	201	4524956
3/11/12	[redacted]	70190	20804	5531	3499	3499	51	91	4460719	201	4524956
3/16/12	[redacted]	70199	20807	5532	3500	3500	51	91	4460719	201	4524956
3/18/12	[redacted]	70202	20808	5533	3500	3500	51	91	4460719	201	4524956
3/20/12	[redacted]	70206	20809	5533	3501	3501	51	91	4460719	201	4524956
3/21/12	[redacted]	70207	20810	5533	3501	3501	51	91	4460719	201	4524956
3/23/12	[redacted]	70211	20811	5534	3501	3501	51	91	4460719	201	4524956
3/28/12	[redacted]	70219	20814	5535	3503	3503	51	91	4460719	201	4524956
4/1/12	[redacted]	70226	20816	5536	3503	3503	51	91	4460719	201	4524956
4/12/12	[redacted]	70245	20823	5539	3506	3506	51	91	4460719	201	4524956
4/11/12	[redacted]	70243	20822	5539	3506	3506	51	91	4460719	201	4524956
4/18/12	[redacted]	70255	20826	5541	3507	3507	51	91	4460719	201	4524956
4/21/12	[redacted]	70260	20828	5541	3508	3508	51	91	4460719	201	4524956
4/22/12	[redacted]	70262	20828	5542	3508	3508	51	91	4460719	201	4524956
4/24/12	[redacted]	70265	20830	5542	3509	3509	51	91	4460719	201	4524956
4/25/12	[redacted]	70267	20830	5542	3509	3509	51	91	4460719	201	4524956
4/30/12	[redacted]	70275	20833	5544	3510	3510	51	91	4460719	201	4524956
5/3/12	[redacted]	70280	20835	5544	3511	3511	51	91	4460719	201	4524956
5/3/12	[redacted]	70280	20835	5544	3511	3511	51	91	4460719	201	4524956
5/5/12	[redacted]	70284	20836	5545	3511	3511	51	91	4460719	201	4524956
5/11/12	[redacted]	70294	20839	5546	3512	3512	51	91	4460719	201	4524956
5/12/12	[redacted]	70296	20840	5547	3513	3513	51	91	4460719	201	4524956
5/21/12	[redacted]	70311	20845	5549	3515	3515	51	91	4460719	201	4524956
5/25/12	[redacted]	70318	20848	5550	3516	3516	51	91	4460719	201	4524956
5/29/12	[redacted]	70325	20850	5551	3516	3516	51	91	4460719	201	4524956
6/3/12	[redacted]	70333	20853	5552	3518	3518	51	91	4460719	201	4524956
6/7/12	[redacted]	70340	20855	5553	3518	3518	51	91	4460719	201	4524956
6/12/12	[redacted]	70348	20858	5554	3520	3520	51	91	4460719	201	4524956
6/12/12	[redacted]	70348	20858	5554	3520	3520	51	91	4460719	201	4524956
6/15/12	[redacted]	70354	20860	5555	3520	3520	51	91	4460719	201	4524956
6/17/12	[redacted]	70357	20861	5556	3521	3521	51	91	4460719	201	4524956
6/17/12	[redacted]	70357	20861	5556	3521	3521	51	91	4460719	201	4524956
6/15/12	[redacted]	70354	20860	5555	3520	3520	51	91	4460719	201	4524956
6/16/12	[redacted]	70355	20860	5555	3521	3521	51	91	4460719	201	4524956
6/23/12	[redacted]	70367	20865	5557	3522	3522	51	91	4460719	201	4524956
5/31/12	[redacted]	70328	20851	5551	3517	3517	51	91	4460719	201	4524956
6/25/12	[redacted]	70371	20866	5558	3523	3523	51	91	4460719	201	4524956
7/6/12	[redacted]	70389	20872	5560	3525	3525	51	91	4460719	201	4524956
7/13/12	[redacted]	70401	20876	5562	3527	3527	51	91	4460719	201	4524956
7/16/12	[redacted]	70406	20878	5563	3527	3527	51	91	4460719	201	4524956
7/18/12	[redacted]	70410	20879	5564	3528	3528	51	91	4460719	201	4524956
7/20/12	[redacted]	70413	20880	5564	3528	3528	51	91	4460719	201	4524956
7/22/12	[redacted]	70416	20881	5565	3529	3529	51	91	4460719	201	4524956
7/25/12	[redacted]	70422	20883	5565	3529	3529	51	91	4460719	201	4524956
8/23/12	[redacted]	70471	20900	5573	3536	3536	51	91	4460719	201	4524956

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Total Tug Emissions (g/trip)									
	[redacted]	NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
1/28/12	[redacted]	119499	35585	9465	5993	5993	86	156	7602447	343	7711948
1/30/12	[redacted]	137698	40878	10868	6877	6877	99	179	8759366	395	8885517
2/5/12	[redacted]	137718	40884	10871	6880	6880	99	179	8759366	395	8885517
2/12/12	[redacted]	137741	40892	10875	6883	6883	99	179	8759366	395	8885517
2/8/12	[redacted]	170222	50412	13401	8477	8477	123	220	10825547	488	10981440
2/10/12	[redacted]	137734	40890	10874	6882	6882	99	179	8759366	395	8885517
2/20/12	[redacted]	137768	40902	10879	6886	6886	99	179	8759366	395	8885517
2/27/12	[redacted]	170301	50439	13412	8487	8487	123	220	10825547	488	10981440
2/29/12	[redacted]	170309	50442	13414	8488	8488	123	220	10825547	488	10981440
3/2/12	[redacted]	170317	50445	13415	8489	8489	123	220	10825547	488	10981440
3/4/12	[redacted]	170325	50447	13416	8490	8490	123	220	10825547	488	10981440
3/6/12	[redacted]	137818	40919	10886	6893	6893	99	179	8759366	395	8885517
3/9/12	[redacted]	137828	40922	10888	6894	6894	99	179	8759366	395	8885517
3/11/12	[redacted]	170354	50457	13420	8494	8494	123	220	10825547	488	10981440
3/16/12	[redacted]	170375	50464	13423	8497	8497	123	220	10825547	488	10981440
3/18/12	[redacted]	170383	50467	13425	8498	8498	123	220	10825547	488	10981440
3/20/12	[redacted]	170391	50470	13426	8499	8499	123	220	10825547	488	10981440
3/21/12	[redacted]	170395	50472	13426	8500	8500	123	220	10825547	488	10981440
3/23/12	[redacted]	170404	50474	13428	8501	8501	123	220	10825547	488	10981440
3/28/12	[redacted]	137891	40944	10897	6903	6903	99	179	8759366	395	8885517
4/1/12	[redacted]	170441	50487	13433	8506	8506	123	220	10825547	488	10981440
4/12/12	[redacted]	170486	50503	13440	8512	8512	123	220	10825547	488	10981440
4/11/12	[redacted]	170482	50501	13439	8511	8511	123	220	10825547	488	10981440
4/18/12	[redacted]	137961	40968	10907	6912	6912	99	179	8759366	395	8885517
4/21/12	[redacted]	170523	50515	13445	8516	8516	123	220	10825547	488	10981440
4/22/12	[redacted]	137975	40973	10909	6914	6914	99	179	8759366	395	8885517
4/24/12	[redacted]	119751	35672	9503	6027	6027	86	156	7602447	343	7711948
4/25/12	[redacted]	137985	40976	10911	6915	6915	99	179	8759366	395	8885517
4/30/12	[redacted]	138001	40982	10913	6917	6917	99	179	8759366	395	8885517
5/3/12	[redacted]	138011	40985	10915	6919	6919	99	179	8759366	395	8885517
5/3/12	[redacted]	119777	35681	9507	6030	6030	86	156	7602447	343	7711948
5/5/12	[redacted]	170581	50535	13454	8524	8524	123	220	10825547	488	10981440
5/11/12	[redacted]	138038	40994	10919	6922	6922	99	179	8759366	395	8885517
5/12/12	[redacted]	138041	40996	10919	6922	6922	99	179	8759366	395	8885517
5/21/12	[redacted]	170647	50558	13464	8533	8533	123	220	10825547	488	10981440
5/25/12	[redacted]	138085	41011	10926	6928	6928	99	179	8759366	395	8885517
5/29/12	[redacted]	138098	41015	10928	6930	6930	99	179	8759366	395	8885517
6/3/12	[redacted]	138115	41021	10930	6932	6932	99	179	8759366	395	8885517
6/7/12	[redacted]	138128	41025	10932	6934	6934	99	179	8759366	395	8885517
6/12/12	[redacted]	138145	41031	10935	6936	6936	99	179	8759366	395	8885517
6/12/12	[redacted]	138145	41031	10935	6936	6936	99	179	8759366	395	8885517
6/15/12	[redacted]	170750	50593	13479	8546	8546	123	220	10825547	488	10981440
6/17/12	[redacted]	138161	41037	10937	6938	6938	99	179	8759366	395	8885517
6/17/12	[redacted]	170759	50596	13480	8548	8548	123	220	10825547	488	10981440
6/15/12	[redacted]	170750	50593	13479	8546	8546	123	220	10825547	488	10981440
6/16/12	[redacted]	170754	50595	13480	8547	8547	123	220	10825547	488	10981440
6/23/12	[redacted]	138181	41044	10940	6941	6941	99	179	8759366	395	8885517
5/31/12	[redacted]	138105	41017	10929	6931	6931	99	179	8759366	395	8885517
6/25/12	[redacted]	138188	41046	10941	6942	6942	99	179	8759366	395	8885517
7/6/12	[redacted]	138225	41059	10947	6947	6947	99	179	8759366	395	8885517
7/13/12	[redacted]	138248	41067	10950	6950	6950	99	179	8759366	395	8885517
7/16/12	[redacted]	138258	41070	10952	6951	6951	99	179	8759366	395	8885517
7/18/12	[redacted]	170886	50640	13500	8564	8564	123	220	10825547	488	10981440
7/20/12	[redacted]	138272	41075	10954	6953	6953	99	179	8759366	395	8885517
7/22/12	[redacted]	138278	41077	10955	6954	6954	99	179	8759366	395	8885517
7/25/12	[redacted]	138288	41080	10956	6955	6955	99	179	8759366	395	8885517
8/23/12	[redacted]	138385	41114	10971	6968	6968	99	179	8759366	395	8885517

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Mooring/Unmooring Emissions (g/trip)									
		NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
8/29/12	[redacted]	14368	4257	1136	721	721	10	19	909261	41	922355
8/29/12	[redacted]	14368	4257	1136	721	721	10	19	909261	41	922355
9/1/12	[redacted]	14369	4257	1136	722	722	10	19	909261	41	922355
9/2/12	[redacted]	14370	4257	1136	722	722	10	19	909261	41	922355
9/4/12	[redacted]	14370	4257	1136	722	722	10	19	909261	41	922355
9/6/12	[redacted]	14371	4257	1136	722	722	10	19	909261	41	922355
9/7/12	[redacted]	14372	4258	1136	722	722	10	19	909261	41	922355
9/14/12	[redacted]	14374	4258	1137	722	722	10	19	909261	41	922355
9/18/12	[redacted]	14375	4259	1137	722	722	10	19	909261	41	922355
9/23/12	[redacted]	14377	4260	1137	723	723	10	19	909261	41	922355
9/24/12	[redacted]	14377	4260	1137	723	723	10	19	909261	41	922355
9/28/12	[redacted]	14379	4260	1137	723	723	10	19	909261	41	922355
10/1/12	[redacted]	14380	4260	1138	723	723	10	19	909261	41	922355
10/2/12	[redacted]	14380	4261	1138	723	723	10	19	909261	41	922355
10/9/12	[redacted]	14383	4261	1138	723	723	10	19	909261	41	922355
10/3/12	[redacted]	14381	4261	1138	723	723	10	19	909261	41	922355
10/12/12	[redacted]	14384	4262	1138	723	723	10	19	909261	41	922355
10/13/12	[redacted]	14384	4262	1138	724	724	10	19	909261	41	922355
10/16/12	[redacted]	14385	4262	1138	724	724	10	19	909261	41	922355
10/19/12	[redacted]	14386	4263	1139	724	724	10	19	909261	41	922355
10/14/12	[redacted]	14384	4262	1138	724	724	10	19	909261	41	922355
10/27/12	[redacted]	14389	4264	1139	724	724	10	19	909261	41	922355
10/28/12	[redacted]	14389	4264	1139	724	724	10	19	909261	41	922355
10/31/12	[redacted]	14390	4264	1139	724	724	10	19	909261	41	922355
11/2/12	[redacted]	14391	4264	1139	724	724	10	19	909261	41	922355
11/5/12	[redacted]	14392	4265	1139	725	725	10	19	909261	41	922355
11/12/12	[redacted]	14394	4265	1140	725	725	10	19	909261	41	922355
11/9/12	[redacted]	14393	4265	1140	725	725	10	19	909261	41	922355
11/14/12	[redacted]	14395	4266	1140	725	725	10	19	909261	41	922355
11/19/12	[redacted]	14397	4266	1140	725	725	10	19	909261	41	922355
11/24/12	[redacted]	14399	4267	1140	725	725	10	19	909261	41	922355
11/25/12	[redacted]	14399	4267	1140	725	725	10	19	909261	41	922355
11/21/12	[redacted]	14398	4267	1140	725	725	10	19	909261	41	922355
12/2/12	[redacted]	14401	4268	1141	726	726	10	19	909261	41	922355
12/3/12	[redacted]	14402	4268	1141	726	726	10	19	909261	41	922355
12/9/12	[redacted]	14404	4269	1141	726	726	10	19	909261	41	922355

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Class B Tug Mooring/Unmooring Emissions (g/trip)									
	[redacted]	NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
8/29/12	[redacted]	10450	3191	856	548	548	8	14	661603	30	671141
8/29/12	[redacted]	10450	3191	856	548	548	8	14	661603	30	671141
9/1/12	[redacted]	10451	3191	856	548	548	8	14	661603	30	671141
9/2/12	[redacted]	10451	3191	856	548	548	8	14	661603	30	671141
9/4/12	[redacted]	10452	3191	856	548	548	8	14	661603	30	671141
9/6/12	[redacted]	10452	3192	856	548	548	8	14	661603	30	671141
9/7/12	[redacted]	10453	3192	856	548	548	8	14	661603	30	671141
9/14/12	[redacted]	10454	3192	857	548	548	8	14	661603	30	671141
9/18/12	[redacted]	10455	3193	857	548	548	8	14	661603	30	671141
9/23/12	[redacted]	10457	3193	857	549	549	8	14	661603	30	671141
9/24/12	[redacted]	10457	3193	857	549	549	8	14	661603	30	671141
9/28/12	[redacted]	10458	3193	857	549	549	8	14	661603	30	671141
10/1/12	[redacted]	10459	3194	857	549	549	8	14	661603	30	671141
10/2/12	[redacted]	10459	3194	857	549	549	8	14	661603	30	671141
10/9/12	[redacted]	10461	3194	858	549	549	8	14	661603	30	671141
10/3/12	[redacted]	10459	3194	857	549	549	8	14	661603	30	671141
10/12/12	[redacted]	10461	3195	858	549	549	8	14	661603	30	671141
10/13/12	[redacted]	10462	3195	858	549	549	8	14	661603	30	671141
10/16/12	[redacted]	10462	3195	858	549	549	8	14	661603	30	671141
10/19/12	[redacted]	10463	3195	858	549	549	8	14	661603	30	671141
10/14/12	[redacted]	10462	3195	858	549	549	8	14	661603	30	671141
10/27/12	[redacted]	10465	3196	858	550	550	8	14	661603	30	671141
10/28/12	[redacted]	10466	3196	858	550	550	8	14	661603	30	671141
10/31/12	[redacted]	10466	3196	858	550	550	8	14	661603	30	671141
11/2/12	[redacted]	10467	3197	858	550	550	8	14	661603	30	671141
11/5/12	[redacted]	10468	3197	859	550	550	8	14	661603	30	671141
11/12/12	[redacted]	10469	3197	859	550	550	8	14	661603	30	671141
11/9/12	[redacted]	10469	3197	859	550	550	8	14	661603	30	671141
11/14/12	[redacted]	10470	3198	859	550	550	8	14	661603	30	671141
11/19/12	[redacted]	10471	3198	859	550	550	8	14	661603	30	671141
11/24/12	[redacted]	10472	3198	859	551	551	8	14	661603	30	671141
11/25/12	[redacted]	10473	3199	859	551	551	8	14	661603	30	671141
11/21/12	[redacted]	10472	3198	859	551	551	8	14	661603	30	671141
12/2/12	[redacted]	10474	3199	860	551	551	8	14	661603	30	671141
12/3/12	[redacted]	10475	3199	860	551	551	8	14	661603	30	671141
12/9/12	[redacted]	10476	3200	860	551	551	8	14	661603	30	671141

Baseline Tugboat Emissions

Date	[redacted]	Class A Tug Assist Emissions (g/trip)									
	[redacted]	NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
8/29/12	[redacted]	70481	20904	5574	3537	3537	51	91	4460719	201	4524956
8/29/12	[redacted]	70481	20904	5574	3537	3537	51	91	4460719	201	4524956
9/1/12	[redacted]	70486	20905	5575	3538	3538	51	91	4460719	201	4524956
9/2/12	[redacted]	70488	20906	5575	3538	3538	51	91	4460719	201	4524956
9/4/12	[redacted]	70491	20907	5576	3538	3538	51	91	4460719	201	4524956
9/6/12	[redacted]	70495	20908	5576	3539	3539	51	91	4460719	201	4524956
9/7/12	[redacted]	70496	20909	5576	3539	3539	51	91	4460719	201	4524956
9/14/12	[redacted]	70508	20913	5578	3541	3541	51	91	4460719	201	4524956
9/18/12	[redacted]	70515	20915	5579	3542	3542	51	91	4460719	201	4524956
9/23/12	[redacted]	70523	20918	5580	3543	3543	51	91	4460719	201	4524956
9/24/12	[redacted]	70525	20919	5581	3543	3543	51	91	4460719	201	4524956
9/28/12	[redacted]	70532	20921	5582	3544	3544	51	91	4460719	201	4524956
10/1/12	[redacted]	70537	20923	5582	3545	3545	51	91	4460719	201	4524956
10/2/12	[redacted]	70539	20923	5583	3545	3545	51	91	4460719	201	4524956
10/9/12	[redacted]	70551	20927	5584	3546	3546	51	91	4460719	201	4524956
10/3/12	[redacted]	70540	20924	5583	3545	3545	51	91	4460719	201	4524956
10/12/12	[redacted]	70556	20929	5585	3547	3547	51	91	4460719	201	4524956
10/13/12	[redacted]	70557	20930	5586	3547	3547	51	91	4460719	201	4524956
10/16/12	[redacted]	70563	20932	5586	3548	3548	51	91	4460719	201	4524956
10/19/12	[redacted]	70568	20933	5587	3549	3549	51	91	4460719	201	4524956
10/14/12	[redacted]	70559	20930	5586	3547	3547	51	91	4460719	201	4524956
10/27/12	[redacted]	70581	20938	5589	3550	3550	51	91	4460719	201	4524956
10/28/12	[redacted]	70583	20939	5589	3551	3551	51	91	4460719	201	4524956
10/31/12	[redacted]	70588	20940	5590	3551	3551	51	91	4460719	201	4524956
11/2/12	[redacted]	70591	20941	5591	3552	3552	51	91	4460719	201	4524956
11/5/12	[redacted]	70597	20943	5591	3552	3552	51	91	4460719	201	4524956
11/12/12	[redacted]	70608	20947	5593	3554	3554	51	91	4460719	201	4524956
11/9/12	[redacted]	70603	20946	5592	3553	3553	51	91	4460719	201	4524956
11/14/12	[redacted]	70612	20948	5594	3554	3554	51	91	4460719	201	4524956
11/19/12	[redacted]	70620	20951	5595	3555	3555	51	91	4460719	201	4524956
11/24/12	[redacted]	70629	20954	5596	3557	3557	51	91	4460719	201	4524956
11/25/12	[redacted]	70630	20955	5596	3557	3557	51	91	4460719	201	4524956
11/21/12	[redacted]	70624	20953	5595	3556	3556	51	91	4460719	201	4524956
12/2/12	[redacted]	70642	20959	5598	3558	3558	51	91	4460719	201	4524956
12/3/12	[redacted]	70644	20960	5598	3559	3559	51	91	4460719	201	4524956
12/9/12	[redacted]	70654	20963	5600	3560	3560	51	91	4460719	201	4524956

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
3/17/2014

Public Version

Baseline Tugboat Emissions

Date	[redacted]	Total Tug Emissions (g/trip)									
	[redacted]	NOx	CO	HC	PM10	PM2.5	SO2	CH4	CO2	N2O	CO2e
8/29/12	[redacted]	138405	41121	10974	6971	6971	99	179	8759366	395	8885517
8/29/12	[redacted]	138405	41121	10974	6971	6971	99	179	8759366	395	8885517
9/1/12	[redacted]	138415	41124	10975	6972	6972	99	179	8759366	395	8885517
9/2/12	[redacted]	171076	50705	13528	8589	8589	123	220	10825547	488	10981440
9/4/12	[redacted]	138425	41127	10977	6973	6973	99	179	8759366	395	8885517
9/6/12	[redacted]	138432	41130	10978	6974	6974	99	179	8759366	395	8885517
9/7/12	[redacted]	138435	41131	10978	6975	6975	99	179	8759366	395	8885517
9/14/12	[redacted]	138458	41139	10982	6978	6978	99	179	8759366	395	8885517
9/18/12	[redacted]	138472	41143	10984	6979	6979	99	179	8759366	395	8885517
9/23/12	[redacted]	138488	41149	10986	6982	6982	99	179	8759366	395	8885517
9/24/12	[redacted]	120194	35824	9569	6085	6085	86	156	7602447	343	7711948
9/28/12	[redacted]	138505	41155	10989	6984	6984	99	179	8759366	395	8885517
10/1/12	[redacted]	171196	50746	13546	8605	8605	123	220	10825547	488	10981440
10/2/12	[redacted]	138518	41160	10991	6986	6986	99	179	8759366	395	8885517
10/9/12	[redacted]	138542	41168	10994	6989	6989	99	179	8759366	395	8885517
10/3/12	[redacted]	171204	50749	13547	8606	8606	123	220	10825547	488	10981440
10/12/12	[redacted]	138552	41171	10996	6990	6990	99	179	8759366	395	8885517
10/13/12	[redacted]	120249	35843	9577	6093	6093	86	156	7602447	343	7711948
10/16/12	[redacted]	138565	41176	10998	6992	6992	99	179	8759366	395	8885517
10/19/12	[redacted]	138575	41179	10999	6993	6993	99	179	8759366	395	8885517
10/14/12	[redacted]	171250	50764	13554	8612	8612	123	220	10825547	488	10981440
10/27/12	[redacted]	138602	41188	11003	6997	6997	99	179	8759366	395	8885517
10/28/12	[redacted]	138605	41189	11003	6997	6997	99	179	8759366	395	8885517
10/31/12	[redacted]	171320	50788	13564	8622	8622	123	220	10825547	488	10981440
11/2/12	[redacted]	171328	50791	13565	8623	8623	123	220	10825547	488	10981440
11/5/12	[redacted]	120315	35866	9587	6101	6101	86	156	7602447	343	7711948
11/12/12	[redacted]	138655	41207	11011	7004	7004	99	179	8759366	395	8885517
11/9/12	[redacted]	138645	41203	11009	7002	7002	99	179	8759366	395	8885517
11/14/12	[redacted]	138662	41209	11012	7005	7005	99	179	8759366	395	8885517
11/19/12	[redacted]	138679	41215	11014	7007	7007	99	179	8759366	395	8885517
11/24/12	[redacted]	138695	41220	11017	7009	7009	99	179	8759366	395	8885517
11/25/12	[redacted]	171423	50824	13579	8635	8635	123	220	10825547	488	10981440
11/21/12	[redacted]	171406	50818	13577	8633	8633	123	220	10825547	488	10981440
12/2/12	[redacted]	138722	41229	11021	7013	7013	99	179	8759366	395	8885517
12/3/12	[redacted]	120397	35894	9599	6112	6112	86	156	7602447	343	7711948
12/9/12	[redacted]	120414	35900	9602	6115	6115	86	156	7602447	343	7711948

Appendix E.3

Air Permit Application, February 2013

ESA

Crude by Rail
Air Permit Application

Valero Benicia Refinery
Benicia, California

Public Document

February 2013

www.erm.com

The world's leading sustainability consultancy.

Valero Refining Co. - California

Crude by Rail
Air Permit Application

Valero Benicia Refinery
Benicia, California
BAAQMD Plant No. B2626

February 2013

Project No. 0186851

Environmental Resources Management
1277 Treat Boulevard
Suite 500
Walnut Creek, CA 94597
T: (925) 946-0455
F: (925) 946-9968

TABLE OF CONTENTS

LIST OF FIGURES		**IV**
LIST OF TABLES		**IV**
LIST OF ACRONYMS		**V**
1.0	**INTRODUCTION**	**1**
1.1	Facility Contact Information	1
1.2	Overview	1
1.3	Schedule	1
1.4	Application Summary	2
2.0	**FACILITY AND PROJECT DESCRIPTION**	**3**
2.1	Facility Description	3
2.2	Project Description	5
2.2.1	*Unloading Racks*	*7*
2.2.2	*Tank 1776 (District Source S-97)*	*7*
2.2.3	*Train Activity*	*8*
3.0	**EMISSION ESTIMATES**	**9**
3.1	Tank Emissions	9
3.1.1	*POC Emissions*	*10*
3.1.2	*TAC Emissions*	*10*
3.2	Fugitive Component Emissions	11
3.2.1	*POC Emissions*	*11*
3.2.2	*TAC Emissions*	*12*
3.3	Cargo Carrier Emissions	12
3.3.1	*Criteria Pollutant Emissions*	*12*
4.0	**APPLICABLE REGULATIONS**	**14**
4.1	District Rules and Regulations	14
4.1.1	*Regulation 1 – General Provisions and Definitions*	*14*
4.1.2	*Regulation 2 – Permits*	*14*
4.1.2.1	*Rule 2-1 – General Requirements*	*14*
4.1.2.2	*Rule 2-2 – New Source Review*	*15*
4.1.2.3	*Rule 2-5 – New Source Review of Toxic Air Contaminants*	*17*
4.1.2.4	*Rule 2-6 – Major Facility Review*	*18*

4.1.3 Regulation 3 – Fees 18
4.1.4 Regulation 6 – Odorous Substances 18
4.1.5 Regulation 7 – Odorous Substances 19
4.1.6 Regulation 8 – Organic Compounds 19

4.1.6.1 Rule 8-5 – Storage of Organic Liquids 19
4.1.6.2 Rule 8-18 – Equipment Leaks 19
4.1.6.3 Rule 8-28 – Episodic Releases from Pressure Relief Valves at Petroleum Refineries and Chemical Plants 19

4.1.7 Regulation 10 – Standards of Performance for New Stationary Sources 19
4.1.8 Rule 11-12 – National Emission Standard for Benzene Emissions 19

4.2 California Environmental Quality Act 19
4.3 Federal Rules and Regulations 20

4.3.1 40 CFR 52.21 – Prevention of Significant Deterioration of Air Quality 20
4.3.2 40 CFR 60 Subpart A – General Provisions 20
4.3.3 40 CFR 60 Subpart Kb – Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984 20
4.3.4 40 CFR 60 Subpart GGGa – Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006 20
4.3.5 40 CFR 61 Subpart A – General Provisions 21
4.3.6 40 CFR 61 Subpart FF – Benzene Waste Operations NESHAP 21
4.3.7 40 CFR 63 Subpart A – General Provisions 21
4.3.8 40 CFR 63 Subpart CC – National Emission Standards for Petroleum Refineries 21

5.0 ESTIMATED PERMIT FEES 22

6.0 REFERENCES 23

APPENDIX A – PROJECT DRAWINGS AND SPECIFICATIONS
Attachment A-1 – Process Flow Diagram
Attachment A-2 – Plot Plan

APPENDIX B –EMISSION CALCULATIONS
Attachment B-1 – Tank 1776 Baseline Throughput and Emissions
Attachment B-2 – Tank 1776 Post-CBR Emissions
Attachment B-3 – Fugitive Component Emissions
Attachment B-4 – Cargo Carrier Emissions

APPENDIX C – DISTRICT ATC APPLICATION FORMS

LIST OF FIGURES

Figure 2-1	*Valero Benicia Refinery Location Map*	*4*
Figure 2-2	*Location Map*	*6*

LIST OF TABLES

Table 2-1	*Fugitive Component Counts*	*7*
Table 2-2	*Tank 1776 Capacity and Dimensions*	*8*
Table 3-1	*Emissions Summary*	*9*
Table 3-2	*Tank 1776 POC Emissions*	*10*
Table 3-3	*Tank 1776 TAC Emissions*	*11*
Table 3-4	*Fugitive Component POC Emissions*	*11*
Table 3-5	*Fugitive Component TAC Emissions*	*12*
Table 3-6	*Cargo Carrier Criteria Pollutant Emissions*	*12*
Table 4-1	*BACT for EFR Tanks*	*15*
Table 4-2	*Emission Offsets*	*16*
Table 4-3	*TAC Emissions and District Trigger Levels*	*18*
Table 5-1	*Estimated Permit Fees*	*22*

LIST OF ACRONYMS

ATC	Authority to Construct
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
bbl	barrel
BWON	Benzene Waste Operations NESHAP
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO2e	carbon dioxide equivalent
District	Bay Area Air Quality Management District
EFR	external floating roof
GHG	greenhouse gas
HAP	hazardous air pollutant
HRSA	Health Risk Screening Assessment
LDAR	Leak Detection and Repair
MACT	Maximum Achievable Control Technology
MMbbl	million barrels
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOx	oxides of nitrogen
NPOC	non-precursor organic compound
PM	particulate matter
POC	precursor organic compound
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psia	pounds per square inch absolute
PTE	Potential to Emit
RVP	Reid Vapor Pressure
SO_2	sulfur dioxide
TAC	toxic air contaminant
TBACT	Best Available Control Technology for Toxics
UP	Union Pacific Railroad Company
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

1.0 INTRODUCTION

Valero Refining Co. - California (Valero) owns and operates a petroleum refinery located in Benicia, California. Valero is proposing the Crude by Rail project ("CBR" or "project"), which would allow the refinery to receive crude oil by train. The project would require a Bay Area Air Quality Management District (BAAQMD or "District") Authority to Construct (ATC) permit. The purpose of this document and its appendices is to provide information to the District in support of the project and issuance of an ATC.

The project would also require a land-use permit from the City of Benicia. Approval of the land-use permit would require compliance with the California Environmental Quality Act (CEQA), including preparation of an Initial Study. An application for a land-use permit was submitted to the City of Benicia in December 2012. The City is acting as lead agency.

1.1 Facility Contact Information

Name/Address:	Valero Refining Co. - California 3400 East Second Street Benicia, CA 94510-1097
District Facility No.:	B2626
Facility Contact:	Susan Gustofson, P.E. Staff Environmental Engineer (707) 745-7011 susan.gustofson@valero.com

1.2 Overview

Valero currently receives crude oil by pipeline and by ship. The project would install two rail car unloading racks, re-purpose an existing tank to include crude oil service, and construct associated infrastructure, including rail lines, to allow Valero to receive crude oil by train. The project would permit Valero to receive crude oil in quantities up to 70,000 barrels (bbl) per day (100 rail cars per day), but it would not increase the volume of crude oil delivered to the refinery because crude oil quantities delivered by train would replace crude oil quantities received by ship. The refinery's crude oil processing rate, which is limited by District permit to an annual average of 165,000 bbl per day (daily maximum of 180,000 bbl per day), would remain unchanged. No modifications would be made to refinery process equipment.

1.3 Schedule

Valero plans to begin construction in 2013 and to commence operating the crude by rail unloading facility in late 2013 or early 2014. Construction is expected to take approximately 6 months.

1.4 Application Summary

This application package, including the attached appendices, provides necessary information for the District to evaluate the project. The remainder of this document is organized as follows:

- Section 2.0 (Facility and Project Description) provides an overview of the facility and presents the various elements of the project, including descriptions of project components;
- Section 3.0 (Emissions Estimates) provides a summary of project emissions for storage tank, fugitive components associated with the rail car unloading facilities, and cargo carrier emissions;
- Section 4.0 (Applicable Regulations) addresses compliance with applicable District and federal regulatory requirements;
- Section 5.0 (Estimated Permit Fees) provides an estimate of District New Source Review fees;
- Section 6.0 (References);
- Appendix A – Project Drawings and Specifications;
- Appendix B – Emission Calculations;
- Appendix C – District Permit Application Forms.

2.0 FACILITY AND PROJECT DESCRIPTION

2.1 Facility Description

The refinery occupies approximately 330 acres of the 880-acre Valero property, which is located at 3400 East Second Street in the eastern portion of the city of Benicia, along the northern edge of Suisun Bay. Figure 2-1 shows an aerial photograph of the refinery, property boundaries, and surrounding area.

The refinery converts crude oil into many finished products, including California Air Resources Board (CARB) cleaner-burning gasoline and diesel fuels, liquefied petroleum gas, jet fuel, fuel oil, and asphalt. Major equipment used for processing crude oil into finished products includes distillation columns, storage tanks, reactors, vessels, heaters, boilers, and other ancillary equipment. Valero also operates its own wastewater treatment plant and a marine terminal, which services crude oil, refinery product, and feedstock deliveries and exports via ships and barges. The marine terminal is located approximately 1 mile south of the refinery, near the northern landing of the Benicia Bridge. The refinery also uses rail to transport refinery feedstocks and products. All rail traffic enters and exits along the southeastern boundary of the refinery near the intersection of Park Road and Bayshore Road.

The refinery site and project location are zoned General Industrial. Present land use at the project location is petroleum refining and storage. The elements of the project will be compatible with the existing land use, and will not result in substantial alterations of the planned land use in the area. Construction and operation of facilities associated with this project will be within the Valero property boundaries.

Figure 2-1 Valero Benicia Refinery Location Map

Imagery date: 9/1/2012, Google Earth Pro 6.2.2.6613.

2.2 Project Description

Valero currently receives crude oil by pipeline and by ship. The proposed project would allow Valero to receive crude oil by train and consist of the following primary components:

- Unloading racks. Two unloading racks would be installed to allow crude oil to be transferred from rail cars (up to 100 rail cars per day, 70,000 bbl per day) to existing external floating roof tank 1776 (District Source S-97). The racks would be installed in the northeastern portion of the main refinery property, between the eastern side of the lower tank farm and the fence adjacent to Sulphur Springs Creek.
- Tank 1776 (District Source S-97). Existing external floating roof tank 1776 would be used to store all crude oil transferred from the rail car unloading racks. Tank 1776 is currently permitted to store jet fuel and other refinery products. It would be changed to crude oil service as part of this project, but it would retain the capability to store jet fuel and other refinery products in the future if required. There would be no physical modifications to tank 1776 that would impact emissions. The bottom interior surface of the tank would be coated as required for crude water draw service.
- Pipeline and associated components. Approximately 4,000 feet of primarily 16-inch-diameter piping and associated components (pumps, valves, flanges, and connectors) would be installed between the rail car unloading racks and tank 1776 and from tank 1776 to the existing crude supply piping.
- Rail tracks. Two rail spurs and a parallel rail car storage track would be constructed on refinery property to allow receipt of rail cars at the unloading racks. The rail spurs and parallel rail car storage track would be located between the eastern side of the lower tank farm and the western side of the fence along Sulphur Springs Creek.
- Other infrastructure modifications. Approximately 1,800 feet of tank farm dike walls and an existing firewater pipeline and compressor station would be relocated to accommodate the new rail tracks.

Figure 2-2 shows the location of the rail car unloading racks and tank 1776. Detailed project drawings showing rail track locations, pipeline routes, and other project details, are provided in Appendix A.

Figure 2-2 Location Map

Imagery date: 9/1/2012, Google Earth Pro 6.2.2.6613.

2.2.1 Unloading Racks

The project would install two parallel rail car unloading racks. Each rail car unloading rack would accommodate up to 25 rail cars at a time (two, 50-rail car "switches" per day would be transported to the racks by train). Each rack would have 25 unloading stations, which would bottom-unload "closed dome" rail cars using a 4-inch-diameter hose, with dry disconnect couplings, connected to a common header routed between the two racks (a check valve, connected to the top of each rail car via 2-inch-diameter hose, would open to allow ambient air to enter during unloading and immediately close when unloading was finished). Two new pumps, operating in parallel, would pump the crude oil from the unloading rack header via a new 16-inch-pipeline to tank 1776 (see Section 2.2.2 for tank details). Once emptied, the 50 rail cars would be disconnected from the racks, moved off site (or to an interim storage location on site), and then replaced by another 50-rail car switch (see Section 2.2.3 for a description of train and rail car movements, including duration).

The unloading racks would be used only for unloading crude oil, up to 70,000 bbl per day (25.55 million barrels [MMbbl] per year); there would be no loading of crude oil or other materials at the racks. As a result, the only emissions associated with the unloading racks would be fugitive emissions from flanges, connectors, valves, and pumps (at the unloading rack, between the unloading rack and tank 1776, and from tank 1776 to the existing crude supply piping). The estimated number of new fugitive components associated with the project is presented in Table 2-1.

Table 2-1 Fugitive Component Counts

Component Type	Estimated Count*
Pumps	3
Valves	518
Flanges	1036
Connectors	259
Atmospheric Pressure Relief Devices	0

All components in light liquid service.
Estimated counts include contingency factor of 15% for valves. Flanges estimated using 2.0:1 flange/valve ratio. Connectors estimated using 0.5:1 connector/valve ratio. A third pump is a proposed installed spare for the two primary pumps.

Final component counts would be determined upon completion of construction.
A process flow diagram and project drawings are provided in Appendix A.

2.2.2 Tank 1776 (District Source S-97)

Tank 1776 is an existing external floating roof (EFR) tank that would be used to store all crude oil transferred from the rail car unloading racks, up to 70,000 bbl per day (25.55 MMbbl per year). Tank 1776 is a grandfathered source currently permitted to store various refinery products such as jet fuel, diesel, and gasoline. It shares a 62.8 MMbbl per year combined throughput limit with seven other storage tanks (S-63, S-73, S-74, S-75, S-76, S-78, and S-163). As part of this project, no physical modification would be made to tank 1776 that would increase breathing emissions, but the tank would be re-purposed for crude oil storage. To that end, the tank will be outfitted with additional nozzles for crude service and for potential future connections as found on typical crude storage tanks. Table 2-2 provides the dimensions and capacity of tank 1776.

Table 2-2 Tank 1776 Capacity and Dimensions

Valero Tank ID (District ID)	Type	Diameter (feet)	Height (feet)	Capacity [1] (bbl)
TK-1776 (S-97)	External Floating Roof	128	48	110,000

[1] Working (useable) capacity is 101,400 bbl.

Tank 1776 has a welded steel shell and its EFR is equipped with primary and tight-fitting secondary seals to minimize emissions. The roof fittings comply with the current District Rule 8-5 requirements for floating roof tanks.

Crude oil stored in tank 1776 would be transferred to an existing header where it would be blended with crude oil from other storage tanks before being piped to refinery process units.

2.2.3 Train Activity

Up to 100 rail cars per day would be unloaded at the refinery. Typically, two 50-rail-car switches per day would occur between the unloading racks and the Union Pacific Railroad Company (UP) tracks southeast of the refinery and highway 680. A UP locomotive would transport up to 50 rail cars at a time to the unloading rack. All locomotives would enter and exit along the southern refinery boundary, near the intersection of Park Road and Bayshore Road (see Figure 2-2 for location of the locomotive entrance/exit).

After the 50 rail cars are emptied at the unloading rack, they would be moved to the adjacent storage track. A UP locomotive would then retrieve the empty rail cars parked on the storage track and transport them off site. This unloading cycle would then be repeated for the remaining 50 loaded rail cars.

The duration of this unloading process, from entry of 50 loaded rail cars to refinery property, unloading of the 50 rail cars, to exit of 50 empty rail cars from refinery property, would take approximately 8 to 10 hours (16 to 20 hours for 100 rail cars).

Track layouts are provided in Appendix A.

3.0 EMISSION ESTIMATES

Estimated annual emissions have been calculated for the project to determine District permitting and emission offset requirements. Annual mass emissions are calculated based on 24-hour-per-day and 365-day-per-year operation. Net emissions are presented as the increase associated with the project based on post-project emissions minus baseline emissions. Consistent with District Rule 2-2-605, a baseline of the last 3 years (December 2009 through November 2012) best represents recent emissions at the refinery.

A summary of project net emissions is presented in Table 3-1. Emissions estimates for tank 1776 represent the net increase in potential emissions at maximum annual crude throughput (25.55 MMbbl per year). Fugitive emissions from components reflect the increased number of components associated with the unloading rack and related components, including pumps, valves, flanges, and connectors. Train emissions reflect the potential emissions increase at maximum annual crude throughput of 25.55 MMbbl per year, while marine vessel emissions reflect the potential emissions decrease associated with a 25.55 MMbbl reduction in crude oil delivered by marine vessels.

Net emissions of precursor organic compounds (POCs) from tank 1776 and fugitive component emissions (unloading rack, pumps, etc.) are the only pollutant increases associated with the project subject to District permitting requirements.

Table 3-1 Emissions Summary

Source	Project Emissions, Net Change from Baseline (ton/yr)						
	POC	NOx	CO	PM_{10}	$PM_{2.5}$	SO_2	GHG
Tank 1776 (S-97)	4.33	-	-	-	-	-	-
Unloading Rack and Pipeline Fugitive Components	1.71	-	-	-	-	-	-
Trains	1.70	33.04	5.60	0.83	0.81	0.02	5,593
Marine Vessels	(5.18)	(91.84)	(10.69)	(3.58)	(3.40)	(26.79)	(9,498)
Total	2.56	(58.80)	(5.09)	(2.75)	(2.59)	(26.77)	(3,905)

Project emissions estimates @ 25.55 MMbbl per year crude oil by rail. "()" indicates decrease.

POC = precursor organic compounds
NOx = oxides of nitrogen
CO = carbon monoxide
PM_{10} = particulate matter (10 microns or less)
$PM_{2.5}$ = particulate matter (2.5 microns or less)
SO_2 = sulfur dioxide
GHG = greenhouse gases, calculated as CO2 equivalent (CO2e)

3.1 Tank Emissions

The change in tank 1776 service to include crude oil storage would result in a net increase in POC and toxic air contaminant (TAC) emissions at the source. To minimize emissions, tank 1776's external floating roof is equipped double seals with zero-gap secondary seals, consistent with District Rule 8-5, Best Available Control Technology (BACT) performance requirements, and Title 40 of the Code of Federal Regulations (CFR) 60 Subpart Kb.

3.1.1 POC Emissions

POC emissions are calculated using the United States Environmental Protection Agency (USEPA) TANKS 4.09d software. Crude oil storage tank emissions for the project are presented in Table 3-2, including baseline, post-project, and net emissions. Pre-project (baseline) emissions are based on actual emissions from product storage at tank 1776 for the 3-year baseline period from December 2009 through November 2012.

Table 3-2 Tank 1776 POC Emissions

Valero Tank ID (District ID)	POC Emissions (lb/day)			POC Emissions (ton/yr)		
	Baseline	Post-Project	Net	Baseline	Post-Project	Net
TK-1776 (S-97)	15.6	39.3	23.7	2.85	7.18	4.33

Post-project emissions assume annual crude oil throughput of 25.55 MMbbl/yr (70,000 bbl/day x 365 day/yr) and the following crude oil properties: Reid Vapor Pressure (RVP) = 9.4 pounds per square inch absolute (psia), density = 6.74 lb/gal (43.5 API).

Appendix B provides documentation of the emission estimation methodology including tank characteristics, material properties, USEPA TANKS 4.09d software input assumptions and output results, and actual tank throughput data for the 3-year baseline period.

Tank 1776 is currently permitted for jet fuel (JP4) as a grandfathered source under Valero's Title V permit, and shares a combined throughput limit of 62.8 MMbbl per year with the following tanks: S-63, S-73, S-74, S-75, S-76, S-78, and S-163 (S-74 is operated under NuStar Logistics' Title V permit, Facility B5574, while the other tanks are operated under the refinery's Title V permit. NuStar is a contiguous facility that is operated pursuant to a service agreement between NuStar Logistics and Valero Refining Company--California). Valero requests that S-97 receive a new throughput limit of 25.55 MMbbl per year applicable to storage of crude oil only, but that S-97 should also remain subject to the shared 62.8 MMbbl per year throughput limit for S-63, S-73, S-74, S-75, S-76, S-78, S-97, and S-163 to the extent S-97 is used for storage of products other than crude.

While the post-project PTE calculated for S-97 would be greater than baseline emissions, crude oil throughput at S-97 would be offset by a corresponding decrease in crude oil throughput at the facility's other crude oil storage tanks that are currently served by ship and by pipeline (S-57 through S-62, S-1047, and S-1048 [S-57 through S-62 are operated under NuStar Logistics' Title V permit]). As a result, post-project combined crude oil throughput at tanks S-57 through S-62, S-97, S-1047, and S-1048 would not exceed 62.6 MMbbl per year, which is the current combined throughput limit specified by Condition 20820 for tanks S-57 through S-62, S-1047, and S-1048.

3.1.2 TAC Emissions

POC emissions from crude oil storage include compounds classified as TACs. For the TAC emissions estimates, post-project POC emissions were speciated into TAC constituents based on the default speciation data obtained from USEPA TANKS 4.09d software for crude oil at the conditions assumed for each tank. Pre-project (baseline) emissions are based on actual emissions from product storage at tank 1776 for the 3-year

baseline period from December 2009 through November 2012. TAC emissions are summarized in Table 3-3.

Table 3-3 Tank 1776 TAC Emissions

TAC	Hourly Emissions (lb/hr)			Annual Emissions (lb/yr)		
	Baseline	Post-Project	Net	Baseline	Post-Project	Net
Benzene	5.3E-03	8.6E-03	3.2E-03	46.6	74.9	28.3
Ethylbenzene	6.1E-04	3.7E-03	3.1E-03	5.4	32.3	26.9
Hexane (n-)	4.7E-03	7.1E-03	2.4E-03	41.3	62.3	21.0
Toluene	6.8E-03	1.0E-02	3.5E-03	59.5	90.0	30.5
Xylenes (m-)	2.8E-03	1.3E-02	1.0E-02	24.7	111.9	87.2

Hourly TAC emissions are average hourly emissions based on annual emissions estimates. TAC emissions estimates based on TANKS4.09d default speciation profiles (except for benzene in crude oil: 0.6%wt benzene assumed for crude oil, which is higher than default benzene content in TANKS4.09d).

See Appendix B for detailed assumptions and TANKS 4.09d input parameters.

3.2 Fugitive Component Emissions

3.2.1 POC Emissions

Project fugitive POC emissions are based on the total count of new components associated with the Crude by Rail project. POC emission increases are based on emission factors developed using the Correlation Equation Method (California Air Pollution Control Officers Association [CAPCOA]/CARB, 1999), with the District Rule 8-18 component emission definitions as the screening values. Total fugitive emissions are estimated by multiplying the emission factor for each component type by the estimated count of each component type. For the proposed project, total POC emissions from fugitive components are estimated to be 1.71 tons per year as presented in Table 3-4.

Table 3-4 Fugitive Component POC Emissions

Component Type	POC Emissions (ton/yr)
Pumps	0.07
Valves	0.35
Flanges	1.17
Connectors	0.11
Atmospheric Pressure Relief Devices	0.00
Total	**1.71**

All components in light liquid (crude oil) service.
POC emissions estimates represent net post-project potential emissions.

Detailed fugitive emission calculations including the correlation equations, screening values, and resulting emission factors are presented in Appendix B.

3.2.2 TAC Emissions

Fugitive POC emissions contain compounds that are classified as TACs. Using the same liquid fraction for the same crude oil speciation as for the storage tanks, TAC emissions were calculated from project component fugitive POC emissions and are presented in Table 3-5.

Table 3-5 Fugitive Component TAC Emissions

TAC	CAS #	Wt. Percent in Crude Oil	TAC Emissions (net)	
			lb/hr	lb/yr
Benzene	00071-43-2	0.06	2.3E-04	2.0
Ethylbenzene	00100-41-4	0.4	1.6E-03	13.7
Hexane (n-)	00110-54-3	0.4	1.6E-03	13.7
Toluene	00108-88-3	1.0	3.9E-03	34.2
Xylenes (m-)	01330-20-7	1.4	5.5E-03	47.8

Consistent with District Rule 2-5-601, fugitive components are considered new sources. Hourly and annual TAC emissions are based on the post-project emissions (i.e., the potential to emit). Detailed fugitive TAC emission calculations are documented in Appendix B.

3.3 Cargo Carrier Emissions

3.3.1 Criteria Pollutant Emissions

Cargo carrier emissions would decrease because emission rates per bbl of crude delivered would be lower for trains than for ships, and increases in crude volume delivered by train would result in decreases in crude volume delivered by ship. Emissions from cargo carriers include all emissions while operating in the District. A summary of cargo carrier emissions is presented in Table 3-6.

Table 3-6 Cargo Carrier Criteria Pollutant Emissions

Source	Post-Project Emissions, Net Change from Baseline (ton/yr)						
	POC	NOx	CO	PM_{10}	$PM_{2.5}$	SO_2	GHG
Trains	1.70	33.04	5.60	0.83	0.81	0.02	5,593
Marine Vessels	(5.18)	(91.84)	(10.69)	(3.58)	(3.40)	(26.79)	(9,498)
Total	(3.48)	(58.80)	(5.09)	(2.75)	(2.59)	(26.77)	(3,905)

Train emissions are post-project potential emissions @ 25.55 MMbbl per year; marine vessel emissions (negative) are post-project emissions @ -25.55 MMbbl per year (reduced crude oil deliveries).

Detailed calculations are presented in Appendix B. The baseline period is defined as the 3-year period ending November 30, 2012.

Cargo carrier emissions, specifically ship and barge emissions, associated with the import of crude and gas oil at Valero's marine terminal are currently subject to annual calendar year limits, as specified in Part 23 of Condition 20820. No changes are proposed to these limits; post-project cargo carrier emissions would remain within these limits.

4.0 APPLICABLE REGULATIONS

Prior to issuance of an ATC, the District must determine that the proposed project will comply with applicable air quality rules and regulations, including both District and federal requirements. This section presents a discussion of each applicable air quality requirement and documentation that the project complies with all requirements.

4.1 District Rules and Regulations

4.1.1 Regulation 1 – General Provisions and Definitions

Section 1-301 of Regulation 1 prohibits discharge from any source such quantities of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public; or that endangers the comfort, repose, health or safety of any such person or the public; or that causes or has a natural tendency to cause injury or damage to business or property.

The project will be operated in accordance with all federal and District rules and regulations, and is not expected to cause a public nuisance.

4.1.2 Regulation 2 – Permits

4.1.2.1 Rule 2-1 – General Requirements

Section 2-1-301 – Authority to Construct

Unless otherwise exempted, an ATC must be obtained from the District prior to building, modifying, or replacing any emissions unit or control device. The project would emit regulated air contaminants. Therefore, the project is subject to the requirements of Section 2-1-301 to obtain an ATC from the District prior to project implementation. District ATC permit application forms are presented in Appendix B, Attachment B-1, in accordance with Section 2-1-402.

Per Section 2-1-114.2.4, cargo carrier emissions must be included in the facility's emissions. As discussed in Section 3.3, post-project, facility-wide cargo carrier emissions would remain unchanged or decrease because emissions rates per barrel of crude delivered would be lower for trains than for ships, and increases in crude volume delivered by train would replace crude volume delivered by ships.

Criteria pollutant emissions from cargo carriers would not exceed the existing "Cargo Carrier and Dock" emission limits contained Parts 23 and 24 of Condition 20820. Cargo carrier TAC emissions would not be emitted in a quantity greater than that previously emitted (Section 2-1-234.4.). While cargo carrier emissions would remain unchanged or decrease, the distribution of cargo carrier emissions would shift from the marine terminal south of the refinery to the rail lines east and south of the refinery.

Section 2-1-302 – Permit to Operate

In accordance with Section 2-1-302, a Permit to Operate must be obtained from the District prior to using or operating any article, machine, equipment, or other contrivance, the use of which may cause, reduce or control emissions of air contaminants. After construction of any equipment associated with the proposed project is complete in accordance with the ATC, Valero would notify the District when ready to commence

operation. Operation of the new project would only commence once Valero receives a Permit to Operate or a temporary authorization to operate in accordance with the ATC.

Section 2-1-412 – Public Notice, Schools

Section 2-1-412 requires public notice if the new or modified source is located within 1,000 feet of any K-12 school. The project will not be located within 1,000 feet of the boundary of any school.

4.1.2.2 Rule 2-2 – New Source Review

District Rule 2-2, New Source Review, applies to all new and modified sources that are subject to ATC requirements. The proposed project is potentially subject to several sections of Rule 2-2.

Section 2-2-301 – Best Available Control Technology

Section 2-2-301 requires BACT to control emissions from any new source with the potential to emit 10 pounds per day or more of non-precursor organic compounds (NPOCs), POCs, NOx, SO_2, PM_{10}, or CO. Tank 1776 would be subject to BACT because post-project POC emissions would exceed 10 pounds per day (see Table 3-2 for emissions estimates). Fugitive components (pumps, valves, flanges, connectors) would not be subject to BACT because post-project POC emissions would be below 10 pounds per day. Cargo carriers (trains) are not subject to BACT per Section 2-2-206.

District BACT guidelines for POC emissions from EFR tanks are summarized in Table 4-1.

Table 4-1 BACT for EFR Tanks

Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	Typical Technology
POC	1. Vapor recovery system w/ an overall system efficiency >98% [a],[T] 2. BAAQMD Approved roof w/ liquid mounted primary seal and zero gap secondary seal, all meeting design criteria of Reg. 8, Rule 5. Also, no ungasketed roof penetrations, no slotted pipe guide pole unless equipped with float and wiper seals, and no adjustable roof legs unless fitted w/ vapor seal boots or equivalent. [a],[T] Additionally, a dome is required for tanks that meet all of the following: 1) capacity greater than or equal to 19,815 gallons 2) located at a facility with greater than 20 tons per year volatile organic compound (VOC) emissions since the year 2000 and 3) storing a material with a vapor pressure equal to or greater than 3 psia (except for crude oil tanks that are permitted to contain more than 97% by volume crude oil).[b]	1. Thermal Incinerator; or Carbon Adsorber; or Refrigerated Condenser; or BAAQMD approved equivalent. [a],[T] 2. BAAQMD Approved Roof and Seal Design. [a],[T]

References:

District BACT Guideline Document 167.1.2, Source: Storage tank – External Floating Roof, Organic Liquids, Class: All, Revision 2, Date: 9/19/2011. Only POC BACT information is shown because BACT is only triggered for POC emissions.
[a] BAAQMD
[T] TBACT (Best Available Control Technology for Toxics)
[b] BAAQMD Application 22722, SCAQMD Regulation 1178 (1/1/04)

BACT1 for EFR tanks specifies a vapor recovery system with an overall efficiency greater than 98 percent. While technologically feasible, a vapor recovery system is not typically used in practice on large EFR tanks because it would be cost-prohibitive, well above the District's cost-effectiveness threshold of $17,500 per ton of POC reduced.

BACT2 for EFR tanks is a liquid-mounted primary seal, zero-gap secondary seal, and gasketed fittings, all meeting the design criteria of Rule 8-5. Tank 1776 would satisfy these BACT2 requirements (it would not be subject to the BACT2 dome requirement because it would be permitted to store more than 97 percent by volume crude oil).

Section 2-2-302 and 2-2-303 – Project Emission Offsets

In accordance with Section 2-2-302, emission offsets must be provided for a new or modified source at a facility that emits or will be permitted to emit 35 tons per year or more of POC or NOx (minus any contemporaneous emission reduction credits) at a 1.15 to 1.0 ratio. The refinery is permitted to emit POC and NOx in excess of 35 tons per year. For new and modified sources, emission increases must be calculated in accordance with Sections 2-2-604 and 2-2-605. As presented in Table 4-2, the project results in an increase in POC emissions from tank 1776 and from fugitive component emissions. Valero plans to provide emission reduction credits at the prescribed ratio of 1.15 to 1.0 to offset the net project emission increase.

Table 4-2 Emission Offsets

Emission Source	POC Emissions (ton/yr)	NOx Emissions (ton/yr)	PM_{10} Emissions (ton/yr)	SO_2 Emissions (ton/yr)
Project Emissions				
Tank 1776	4.33	0	0	0
Fugitive Components	1.71	0	0	0
Cargo Carriers (Trains, Marine Vessels)	*	*	*	*
Subtotal	*6.04*	*0*	*0*	*0*
Contemporaneous Emission Reductions				
None	0	0	0	0
Subtotal	*0*	*0*	*0*	*0*
Net Project Emission Increase	**6.04**	**0**	**0**	**0**
Emission Offset Requirement	**6.95**	**-**	**-**	**-**

Emissions are post-project net emissions (post-project potential emissions minus baseline emissions). Emission offset ratio is 1.15:1. Only POC, NOx, PM_{10}, and SO_2 are subject to emission offset requirements.
* There would be no increase in cargo carrier emissions (trains, marine vessels). See Table 3-6 for the estimated net change in emissions from cargo carriers. Cargo carrier emissions would continue to comply with the existing cargo carrier emission limits in Condition 20820, Parts 23-25.

See Appendix B for detailed calculations and assumptions.

Valero would surrender emission reduction credits for the required emission offsets upon confirmation by the District.

Section 2-2-304 through 2-2-306 – PSD Requirement

The tanks and fugitive components would only emit POC, which is not a regulated Prevention of Significant Deterioration (PSD) pollutant. Cargo carrier emissions are not considered as part of the facility emissions when determining PSD applicability per Section 2-2-215.2.

Section 2-2-317 – Maximum Achievable Control Technology Requirement

In accordance with Section 2-2-317, the District shall not issue an ATC for a new or modified source at a Major Facility of hazardous air pollutants (HAPs) unless the source will meet Best Available Control Technology for Toxics (TBACT), except as provided in Section 2-2-114. Section 2-2-114 allows an exemption from Section 2-2-317 when the combined increase in Potential to Emit (PTE) from all related sources in a proposed construction or modification is less than 10 tons per year of any HAP and less than 25 tons per year of any combination of HAPs. The increase in HAP emissions from tank 1776 and associated project fugitive components would be less than 10 tons per year of any HAP and less than 25 tons per year of all HAPs combined. Therefore, TBACT is not required for tank 1776 or the associated project fugitive components pursuant to Section 2-2-317.

4.1.2.3 Rule 2-5 – New Source Review of Toxic Air Contaminants

In accordance with District Regulation 2-5-100, if the project's emissions of any TAC, which are identified in Table 2-5-1 of Regulation 2, Rule 5, exceed the indicated trigger level, then a risk analysis is required. "Project emissions" include emissions from new sources and increased emissions from modified sources. The rule requires that emissions of all TACs associated with a project be included in the risk analysis if any single TAC exceeds its hourly or annual trigger level.

According to Section 2-5-216, project emissions must include all approved projects within the 2-year period preceding an application, unless the emissions are demonstrated to be unrelated to those in the application. There are no approved projects within the 2-year period prior to this application that are related to this application. Therefore, no adjustment to project emissions is necessary.

Project TAC emissions are summarized in Table 4-3. Hourly TAC emissions are below acute trigger levels. Annual TAC emissions are below the chronic trigger level for all pollutants except benzene. Because benzene exceeds the District's chronic trigger level, Valero has included a completed District Health Risk Screening Assessment (HRSA) form in Appendix C.

Table 4-3 TAC Emissions and District Trigger Levels

Pollutant	CAS Number	Emissions, Net Change from Baseline		Trigger Levels (District Table 2-5-1)		Exceed Acute Trigger Level?	Exceed Chronic Trigger Level?
		lb/hr	lb/yr	lb/hr (acute)	lb/yr (chronic)		
Tank 1776							
Benzene	71-43-2	3.2E-03	28.3	2.9	6.4	No	**Yes**
Ethylbenzene	100-41-4	3.1E-03	26.9	NA	77,000	No	No
Hexane (n-)	110-54-3	2.4E-03	21.0	NA	270,000	No	No
Toluene	108-88-3	3.5E-03	30.5	82.0	12,000	No	No
Xylenes (m-)	1330-20-7	1.0E-02	87.2	49.0	27,000	No	No
Fugitive Components							
Benzene	71-43-2	2.3E-04	2.0	2.9	6.4	No	No
Ethylbenzene	100-41-4	1.6E-03	13.7	NA	77,000	No	No
Hexane (n-)	110-54-3	1.6E-03	13.7	NA	270,000	No	No
Toluene	108-88-3	3.9E-03	34.2	82.0	12,000	No	No
Xylenes (m-)	1330-20-7	5.5E-03	47.8	49.0	27,000	No	No

Net TAC emissions from Tables 3-3 and 3-5.

4.1.2.4 Rule 2-6 – Major Facility Review

The refinery is a major facility and currently holds a Major Facility Review Permit, also referred to as a Title V operating permit. The project will require a Minor Permit Revision of the Title V permit in accordance with Regulation 2-6-215 because it is not an administrative or significant permit revision. The proposed revisions are not considered to be administrative or significant because there are no proposed revisions that meet the definition for administrative revisions under 2-6-201 or that meet the definition for significant revisions under Section 2-6-226.

Valero will submit a Title V permit modification application following receipt of the ATC for this project.

4.1.3 Regulation 3 – Fees

District Regulation 3 specifies the fee structure for projects subject to District permitting review. Estimated fees for the project are presented in Section 5.0.

4.1.4 Regulation 6 – Odorous Substances

Regulation 6, Rule 1 limits particulate matter and visible emissions. Tank 1776, the offloading racks, and fugitive components would not be sources of PM or visible emissions. The locomotives used to transport rail cars would emit PM, but Rule 6-1 does not apply to cargo carriers.

4.1.5 Regulation 7 – Odorous Substances

District Regulation 7 places general limitations on odorous substances and specific emission limitations on certain odorous compounds. This rule only becomes applicable if the District receives odor complaints from 10 or more complainants within a 90-day period. Because the District has not received 10 or more complaints with a 90-day period concerning refinery emissions, the Valero refinery is not subject to this rule.

4.1.6 Regulation 8 – Organic Compounds

4.1.6.1 Rule 8-5 – Storage of Organic Liquids

Rule 8-5 limits emissions of organic compounds from storage tanks. S-97 would continue to be subject to this rule. The tank would continue to comply with Rule 8-5; the project would not change the applicability of Rule 8-5 to tank 1776.

4.1.6.2 Rule 8-18 – Equipment Leaks

Rule 8-18, specific to equipment leaks, limits POC emissions from equipment components such as valves, flanges, connectors, and pumps. The limits on these fugitive POC emissions are specific to each component type. The new fugitive components installed as part of this project would be added to the Valero's existing Leak Detection and Repair (LDAR) program to ensure compliance with Rule 8-18.

4.1.6.3 Rule 8-28 – Episodic Releases from Pressure Relief Valves at Petroleum Refineries and Chemical Plants

Section 8-28-302 requires that any person installing a new refinery source or modifying an existing refinery source that is equipped with at least one pressure relief device in organic compound service must meet all applicable requirements of Rule 2-2, including BACT. Any pressure relief devices installed as part this project would meet BACT.

4.1.7 Regulation 10 – Standards of Performance for New Stationary Sources

Regulation 10 adopts the provisions of 40 CFR 60 by reference. The applicable subparts of 40 CFR 60 are identified in Section 4.3 of this application.

4.1.8 Rule 11-12 – National Emission Standard for Benzene Emissions

Rule 11-12 adopts the provisions of 40 CFR 61 Subpart BB and Subpart FF by reference. The applicability of and compliance with 40 CFR 61 is reviewed in Section 4.3 of this application.

4.2 California Environmental Quality Act

CEQA requires a review of potential significant environmental impacts from proposed projects. This project has been determined to be subject to CEQA review by the City of Benicia and will require a Land Use Permit. An application for a Land Use Permit was submitted to the City of Benicia in December 2012. The City of Benicia will serve as Lead Agency.

4.3 Federal Rules and Regulations

4.3.1 40 CFR 52.21 – Prevention of Significant Deterioration of Air Quality

District has been delegated authority by USEPA for implementation and enforcement of the federal PSD requirements as referenced in District Regulation 2-2-304. As previously discussed in Sections 1.5 and 4.1.2.2, the project is not subject to PSD review because project emissions increases are not considered to be a "modification" that would exceed "major modification" applicability thresholds for any pollutant listed in District Rules 2-2-304 through 2-2-306.

Cargo carriers are not subject to PSD applicability review per District Rule 2-2-215.

4.3.2 40 CFR 60 Subpart A – General Provisions

Any source subject to an applicable standard under 40 CFR 60 is also subject to the general provisions of Subpart A. Because the replacement, new, and refurbished storage tanks are subject to 40 CFR 60 Subpart Kb, the requirements of Subpart A apply. Subpart A contains requirements for notification of construction or modification and startup, monitoring, recordkeeping and reporting, and performance testing. Valero will provide notification to the USEPA administrator at least 60 days prior to construction of equipment subject to Subpart Kb and notification of startup, as required. Valero currently complies with the monitoring, recordkeeping, and reporting requirements of Subpart A and will continue to do so following implementation of the proposed project.

4.3.3 40 CFR 60 Subpart Kb – Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

This subpart applies to each storage vessel with a capacity greater than or equal to 75 cubic meters that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984. Subpart Kb requires tanks storing organic liquids to be equipped with an appropriate vapor loss control device (internal floating roof with seals, EFR with seals, or fixed roof tank with vapor recovery and control device).

Tank 1776 would be subject to Subpart Kb because the proposed operational change is considered a modification under Section 60.14 (an operational change that would result in an increase in the emission rate of a pollutant to which a standard applies). Tank 1776 would comply with the requirements of Subpart Kb.

4.3.4 40 CFR 60 Subpart GGGa – Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006

The project's group of equipment (valves, pumps, connectors, and flanges in POC service) is not within a process unit, as defined in §60.590a, and is therefore not an affected facility and not subject to 40 CFR 60 Subpart GGGa.

4.3.5 40 CFR 61 Subpart A – General Provisions

Any source subject to an applicable standard under 40 CFR 61 is also subject to the general provisions of Subpart A. Because the proposed project will be subject to Subpart FF, the requirements of Subpart A apply. Valero currently complies with the monitoring, recordkeeping, and reporting requirements of Subpart A and would continue to do so following implementation of the proposed project.

4.3.6 40 CFR 61 Subpart FF – Benzene Waste Operations NESHAP

Commonly referred to as BWON, or the Benzene Waste Operations national emission standards for hazardous air pollutants (NESHAP), 40 CFR 61 Subpart FF applies to chemical manufacturing plants, coke by-product recovery plants, and petroleum refineries. The proposed project would generate benzene-containing wastes. Valero has in place a BWON program that would ensure continued compliance with this rule.

4.3.7 40 CFR 63 Subpart A – General Provisions

Any source subject to an applicable standard under 40 CFR 63 is also subject to the general provisions of Subpart A. Because the proposed project will be subject to Subpart CC, the requirements of Subpart A apply. Valero currently complies with the monitoring, recordkeeping, and reporting requirements of Subpart A and would continue to do so following implementation of the proposed project.

4.3.8 40 CFR 63 Subpart CC – National Emission Standards for Petroleum Refineries

Commonly referred to as "Refinery MACT," Subpart CC applies to petroleum refining process units and related emission sources that emit or have equipment containing or contacting one or more HAPs listed in Subpart CC, and are located in a petroleum refinery that is a major source of HAPs. Subpart CC establishes standards for miscellaneous process vents, storage vessels, wastewater streams and treatment operations, equipment leaks, gasoline loading racks, and marine vessel loading operations. Tank 1776 and the project's fugitive component equipment leaks would be subject to this rule.

Storage tanks subject to Subpart CC are classified as either Group 1 or Group 2 storage vessels. "Group 1 storage vessel" means a storage vessel at an existing source that has a design capacity greater than or equal to 177 cubic meters (46,758 gallons) and stored-liquid maximum true vapor pressure greater than or equal to 10.4 kilopascals (1.5 pounds per square inch [psi]) and stored-liquid annual average true vapor pressure greater than or equal to 8.3 kilopascals (1.2 psi) and annual average HAP liquid concentration greater than 4 percent by weight total organic HAP. "Group 2 storage vessel" means a storage vessel that does not meet the definition of a Group 1 storage vessel.

Tank 1776 is a Group 1 storage vessel. A Group 1 storage vessel that is also subject to 40 CFR 60 Subpart Kb is subject to the overlap in Subpart CC at 63.640(n)(1) that specifies that such tanks are subject only to the requirements of 40 CFR 60 Subpart Kb with exceptions in Subpart CC at 63.640(n)(8). This will be the case for tank 1776.

5.0 ESTIMATED PERMIT FEES

Estimated permit fees for this ATC application are $16,818. Table 5-1 presents a breakdown of the estimated fees based on tank 1776's capacity. Valero requests District confirmation of these permit fee estimates.

Table 5-1 Estimated Permit Fees

Fee Type	Fee ($)
Filing Fee	$416
Initial Fee	$7,993
Risk Screening Fee	$8,409
Permit to Operate Fee [1]	-
Toxic Surcharge Fee [1]	-
Total	**$16,818**

Fee estimate based on District Regulation 3 (June 6, 2012) and Schedule C (Stationary Containers for the Storage of Organic Liquids).
Initial fee = 0.173 cents per gallon
Risk Screening Fee (RSF) = $416 plus 0.173 cent per gallon (first TAC source in application)
[1] This is a permit modification application for an existing source and there is no incremental increase in Permit to Operate or Toxic Surcharge fees because the tank's capacity will remain unchanged.
Fee estimate assumes a container volume of 4,620,000 gallons (110,000 bbl), as listed in Table II A of Valero's Title V permit. Note that the actual working (useable) volume of the tank is 4,258,000 gallons (101,400 bbl).

6.0 REFERENCES

Bay Area Air Quality Management District (District). 2013. *Best Available Control Technology (BACT) Guideline*. http://hank.baaqmd.gov/pmt/bactworkbook/default.htm.

Bay Area Air Quality Management District (District). 2010. Final Major Facility Review Permit, Valero Refining Co. – California, Facility #B2626. December 20, 2010.

Bay Area Air Quality Management District (District). 1994. Application 12467. S-97 External Floating Roof Tank: TK-1776, storing JP-4 and mogas, 110 thousand barrel capacity. January 21, 1994.

California Air Pollution Control Officers Association (CAPCOA)/California Air Resources Board (CARB). 1999. *California Implementation Guidelines for Estimating Mass Emissions from Fugitive Hydrocarbon Leaks at Petroleum Facilities*. http://www.arb.ca.gov/fugitive/fugitive.htm.

Appendix A
Drawings and Specifications

Attachment A-1 – Process Flow Diagram

Attachment A-2 – Plot Plan

Appendix A contains confidential business information

Appendix B
Emission Calculations

Attachment B-1 – Tank 1776 Baseline Throughput and Emissions

Attachment B-2 – Tank 1776 Post-Project Emissions

Attachment B-3 – Fugitive Component Emissions

Attachment B-4 – Cargo Carrier Emissions

Appendix B, Attachments B-1, B-2, and portions of B-4 contains confidential business information

Attachment B-3
Fugitive Component Emissions

Crude By Rail Project
Fugitive Component Emissions Estimates
2/27/2013

Emission Factors

Component Type	Screening Value (SV)	Correlation Equation	Hourly Emissions	Daily Emissions
	max ppm	kg/hr/comp	lb/hr/comp	lb/day/comp
Pumps	500	5.07E-05(SV)^0.622	5.33E-03	0.12803
Valves	100	2.27E-06(SV)^0.747	1.56E-04	0.00375
Flanges	100	4.53E-06(SV)^0.706	2.58E-04	0.00619
Connectors	100	1.53E-06(SV)^0.736	1.00E-04	0.00240
PSVs/Other	500	8.69E-06(SV)^0.642	1.04E-03	0.02485

Correlation Equation from Table IV-3a (CAPCOA-Revised 1995 EPA Correlation Equations and Factors for Refineries and Marketing Terminals), California Implementation Guidelines for Estimating Mass Emissions from Fugitive Hydrocarbon Leaks at Petroleum Facilities, February 1999.

Screening Value (SV) from BAAQMD Regulation 8, Rule 18 component emission limits

Component Count Estimates

Component Type	Component Count Estimate		
	Total	% Contin	Total (w/Contin)
Pumps	3	0	**3**
Valves	450	15%	**518**
Flanges	2 * valves	2 * valves	**1,036**
Connectors	0.5 * valves	0.5 * valves	**259**
PSVs	0	0%	**0**
Total			**1,816**

Equipment counts per Valero, Feb 2013. Flange count assumes 2.0:1 flange to valve ratio, and 0.5:1 connector to valve ratio. Total component counts for valves includes 15% contingency.

POC and TAC Emissions

Component Type	Total Count	POC Emission Factor (lb/day/comp)	POC Emissions		TAC Emissions				
					Benzene	Ethylbenzene	Hexane (-n)	Toluene	Xylenes (-m)
					0.06%	0.4%	0.4%	1.00%	1.4%
			Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)
Pumps	3	0.12803	0.38	140.2	0.08	0.56	0.56	1.40	1.96
Valves	518	0.00375	1.94	708.3	0.42	2.83	2.83	7.08	9.92
Flanges	1,036	0.00619	6.41	2340.4	1.40	9.36	9.36	23.40	32.77
Connectors	259	0.00240	0.62	226.9	0.14	0.91	0.91	2.27	3.18
PSVs	0	0.02485	0.00	0.0	0.00	0.00	0.00	0.00	0.00
Total	1,816	-	**9.36**	**3415.7**	**2.05**	**13.66**	**13.66**	**34.16**	**47.82**

TAC speciation percentages for crude oil based on EPA TANKS 4.09d default values (same as used for tank emissions).

Emissions Summary (ton/yr)

Component Type	POC	Benzene	Ethylbenzene	Hexane (-n)	Toluene	Xylenes (-m)
Pumps	0.07	0.00	0.00	0.00	0.00	0.00
Valves	0.35	0.00	0.00	0.00	0.00	0.00
Flanges	1.17	0.00	0.00	0.00	0.01	0.02
Connectors	0.11	0.00	0.00	0.00	0.00	0.00
PSVs	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.71	0.00	0.01	0.01	0.02	0.02

Attachment B-4
Cargo Carrier Emissions

Train Criteria Pollutant and GHG Emissions

Marine Vessel Criteria Pollutant and GHG Baseline Emissions

Train
Criteria Pollutant and GHG Emissions

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Summary

Incremental Locomotive Annual Emissions (100 Rail Cars per Day, 25.55 MMbbl Crude Oil per Year)

Type	Annual Emissions (tons/year)						
	CO	ROG	NOx	SOx	PM10	PM2.5	CO_2e
Small Line Haul	0.336	0.178	3.490	0.001	0.081	0.078	149
Large Line Haul	4.224	1.019	21.416	0.015	0.571	0.554	5,058
Switching	1.043	0.501	8.134	0.004	0.180	0.175	387
Total Emissions	**5.602**	**1.698**	**33.04**	**0.020**	**0.832**	**0.807**	**5,593**

Locomotive Emission Factors (100 Rail Cars per Day)

	Emission Factor (lb/kbbl)						
Locomotive Emission Factor	CO	ROG	NOx	SOx	PM10	PM2.5	CO_2e
	0.4385	0.1329	2.5863	0.0016	0.0651	0.0632	437.8

lb/kbbl = pounds per thousand barrels of crude oil delivered

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Input Data

Maximum Daily and Annual Tank Rail Cars and Crude Oil

Project Scenario	Maximum Daily Tank Rail Cars (cars/day)	Maximum Annual Tank Rail Cars (cars/yr)	Maximum Daily Crude (bbl/day)	Maximum Annual Crude (bbl/yr)	Reference
100 railcars per day	100	36,500	70,000	25,550,000	Project Description

Fuel Consumption Index* Calculation (for year 2011)

Railroads Operating in CA	Fuel Consumption (gallons)	Gross-Ton Miles w/ Locomotive (1000 ton-miles)	Gross-Ton Miles w/o Locomotive (1000 ton-miles)	Fuel Consumption Index (gross ton-miles/gal)
BNSF	1,291,164,605	1,200,654,478	101,512,077	851
UP	980,687,454	1,072,705,764	86,678,504	1005
Average	-	-	-	928
Data Source	Form R-1 schedule 750 Line 1	Form R-1 schedule 755 Line 104	Form R-1 schedule 755 Line 98	-

* Based on methodology described in *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources* , EPA420-R-92-009, December 1992

Track Length/Trip Distance Calculation (Miles)

Track Segment	Haul Type	Total Distance (miles)	Distance within BAAQMD (miles)	Reference
Track Length from Roseville Yard to UPRR Mainline Track near Valero Refinery	Large Line Haul	68	22	Google Earth - Roseville Yard to Benecia Refinery
Track Length of Siding Track in Valero Refinery	Small Line Haul	2	2	Google Maps - Tracks 700, 732, 710
R-A-R/Industry Track	Switching	NA	NA	

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Daily Emissions

Year 2014 Daily Locomotive Criteria Pollutant Emissions - 100 Railcars per Day

Parameter	Value	Units	Reference
Maximum Additional Daily Tank Car due to Project	100	Cars/day	Based on Project Description
Maximum Freight Weight	106	short tons/car	TRN Spec Sheet-1
Daily Freight Transported due to Project	10,580	short tons/day	Based on Project Description
Weight of Empty Tank Car	37	short tons/car	TRN Spec Sheet-1
Maximum Total Daily Weight of Empty Tank Cars	3,720	short tons/day	
Maximum Daily Gross Weight Hauled	14,300	short tons/day	Freight Weight + Empty Railcar Weight
Assuming the Facility is Serviced Once daily	1	train/day	
Therefore Daily Number of Railcars per Train	100	Cars/train	
Total Siding Track Length within Valero Facility	2	miles	Google Earth and diagram provided by Valero
Total Mainline Track Length in California	68	miles	Google Earth - UPRR tack from Roseville Yard to Benecia Refinery
Total Mainline Track Length in BAAQMD	22	miles	Google Earth - Portion of UPRR tack from Roseville Yard to Benecia Refinery within BAAQMD
Conversion Factors			
UPRR Fuel Consumption Index (Gross Weight - Locomotive Weight)	1,005	Gross ton-miles/gal	Calculated based on methodology described in Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA420-R-92-009, December 1992
Sulfur Content of Fuel	15	ppmw	California Diesel Fuel Standard
Density of Diesel	3,200	g/gal	Emission Factors for Locomotives, EPA-420-F-09-025, April 2009
Number of Locomotives required for Switching	1	per train	Assumption
Switching Time	2	hr/train	Assumption
Average Train Size	25	cars/train	Project Description
Fuel Consumed during Yard Operation	9.4	gal/hr/locomotive	Revised Inventory Guidance for Locomotive Emissions, Sierra Research, pg 14, footnote 2, June 2004, http://www.metro4-sesarm.org/pubs/railroad/FinalGuidance.pdf
Average Locomotive Power over typical Switch Duty Cycle	177	bhp	Locomotive Emission Standards, Regulatory Support Document, Appendix B, EPA-420-R-98-101, April 1998
Power to Fuel Consumption Conversion Factor	15.2	bhp-hr/gal	Table 3, Emission Factors for Locomotives, EPA-420-F-09-025, April 2009

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Daily Emissions

Year 2014 Locomotive Emission Factors

	Emision Factor (g/gal fuel)[1]						
Operation Type	**CO**	**POC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO_2e[1,2]**
Large Line Haul	26.62	6.42	135	0.096	3.6	3.5	10,314
Switch	27.82	13.37	217	0.096	4.8	4.7	10,314
Small Line Haul	23.30	12.32	242	0.096	5.6	5.4	10,314

1. Emission Factors for Locomotives, EPA-420-F-09-025, April 2009

2. N_2O and CH_4 factors for locomotive from 2012 Climate Registry Default Emission Factors, Released: January 6, 2012. http://www.theclimateregistry.org/downloads/2012/01/2012-Climate-Registry-Default-Emissions-Factors.pdf

Year 2014 Daily Line Haul Emissions (Within BAAQMD)

	Emissions (lb/day)						
Segment	**Operation Type**	**CO**	**ROG**	**NOx**	**SOx**	**PM10**	**PM2.5**
Within Valero Refinery	Small Line Haul	1.84	0.97	19.12	0.01	0.44	0.43
BAAQMD Border to Valero Refinery	Large Line Haul	23.14	5.58	117.35	0.08	3.13	3.04
Total Line Haul Emissions		**24.98**	**6.56**	**136.47**	**0.09**	**3.57**	**3.46**

Year 2014 Daily Switching Emissions

	Emissions (lb/day)						
Segment	**Operation Type**	**CO**	**ROG**	**NOx**	**SOx**	**PM10**	**PM2.5**
From Unloading Rack to Empty Railcar Parking Location (Using Fuel Usage Method)	Switch	4.62	2.22	36.04	0.02	0.80	0.77
From Unloading Rack to Empty Railcar Parking Location (Using Average Power Method)	Switch	5.71	2.75	44.57	0.02	0.99	0.96
Total Switch Emissions		**5.71**	**2.75**	**44.57**	**0.02**	**0.99**	**0.96**

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Annual Emissions

Year 2014 Annual Locomotive Criteria Pollutant Emissions - 100 Railcars per Day

Parameter	Value	Unit	Reference
Additional Annual Tank Car due to Project	36,500	Cars/year	Based on Project Description
Maximum Freight Weight	106	short tons/car	TRN Spec Sheet-1
Annual Freight Transported due to Project	3,861,700	short tons/year	Based on Project Description
Weight of Empty Tank Car	37	short tons/car	TRN Spec Sheet-1
Total Annual Weight of Empty Tank Cars	1,357,800	short tons/year	
Annual Gross Weight Hauled	5,219,500	short tons/year	Freight Weight + Empty Railcar Weight
Assuming the Facility is Serviced Once daily	1	train/day	
Therefore daily Number of Railcars per Train	100	Cars/train	
Total Siding Track Length within Valero Facility	2	miles	Google Earth and diagram provided by Valero
Total Mainline Track Length in California	68	miles	Google Earth - UPRR tack from Roseville Yard to Benecia Refinery
Total Mainline Track Length in BAAQMD	22	miles	Google Earth - Portion of UPRR tack from Roseville Yard to Benecia Refinery within BAAQMD
Conversion Factors			
UPRR Fuel Consumption Index (Gross Weight - Locomotive Weight)	1,005	Gross ton-miles/gal	Calculated based on methodology described in Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, EPA420-R-92-009, December 1992
Sulfur Content of Fuel	15	ppmw	California Diesel Fuel Standard
Density of Diesel	3,200	g/gal	Emission Factors for Locomotives, EPA-420-F-09-025, April 2009
Number of Locomotives required for Switching	1	per train	Assumption
Switching Time	2	hr/train	Assumption
Average Train Size	25	cars/train	Project Description
Fuel Consumed during Yard Operation	9.4	gal/hr/ locomotive	Revised Inventory Guidance for Locomotive Emissions, Sierra Research, pg 14, footnote 2, June 2004, http://www.metro4-sesarm.org/pubs/railroad/FinalGuidance.pdf
Average Locomotive Power over typical Switch Duty Cycle	177	bhp	Locomotive Emission Standards, Regulatory Support Document, Appendix B, EPA-420-R-98-101, April 1998
Power to Fuel Consumption Conversion Factor	15.2	bhp-hr/gal	Table 3, Emission Factors for Locomotives, EPA-420-F-09-025, April 2009

Crude by Rail Project
Locomotive Criteria Pollutant and GHG Emissions
2/22/2013
Annual Emissions

Year 2014 Locomotive Emission Factors

	Emision Factor (g/gal fuel)[1]						
Operation Type	**CO**	**POC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO_2e[1,2]**
Large Line Haul	26.624	6.4233	135	0.096	3.6	3.5	10314
Switch	27.816	13.3731	217	0.096	4.8	4.7	10314
Small Line Haul	23.296	12.3201	242	0.096	5.6	5.4	10314

1. Emission Factors for Locomotives, EPA-420-F-09-025, April 2009
2. N_2O and CH_4 factors for locomotive from 2012 Climate Registry Default Emission Factors, Released: January 6, 2012. http://www.theclimateregistry.org/downloads/2012/01/2012-Climate-Registry-Default-Emissions-Factors.pdf

Year 2014 Annual Line Haul Emissions (Within BAAQMD for Criteria Pollutants and Within California for CO2e)

		Emissions (tons/year)							Fuel Usage
Segment	**Operation Type**	**CO**	**ROG**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO_2e**	**(gal/day)**
Within Valero Refinery	Small Line Haul	0.34	0.18	3.49	0.001	0.081	0.078	149	13,083
BAAQMD Border to Valero Refinery	Large Line Haul	4.22	1.02	21.42	0.015	0.571	0.554	5058	444,834
Total Line Haul Emissions		**4.56**	**1.20**	**24.91**	**0.017**	**0.652**	**0.632**	**5,206**	**457,918**

Year 2014 Annual Switching Emissions

		Emissions (tons/year)							Fuel Usage
Segment	**Operation Type**	**CO**	**ROG**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO_2e**	**(gal/day)**
From Unloading Rack to Empty Railcar Parking Location (Using Fuel Usage Method)	Switch	0.843	0.405	6.577	0.003	0.145	0.141	313	75
From Unloading Rack to Empty Railcar Parking Location (Using Average Power Method)	Switch	1.043	0.501	8.134	0.004	0.180	0.175	387	93
Total Switch Emissions		**1.043**	**0.501**	**8.134**	**0.004**	**0.180**	**0.175**	**387**	**93**

Marine Vessel
Criteria Pollutant and GHG
Baseline Emissions

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Total Emissions Over 3-Year Baseline Period

Sources	Total Emissions Over Baseline Period (lb)									
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
OGV - Main Engine	218,239	18,710	14,480	5,221	4,809	29,772	1,299	9,213,764	469	9,386,595
OGV - Auxiliary Engine	292,408	26,445	12,501	9,136	8,414	50,486	2,164	16,588,373	697	16,849,940
OGV - Auxiliary Boiler	74,692	7,568	4,162	7,568	7,378	115,501	1,135	36,702,931	2,845	37,608,850
Tugboats	85,823	25,437	6,739	4,248	4,248	62	112	5,485,412	247	5,564,409
Total	**671,162**	**78,161**	**37,882**	**26,172**	**24,849**	**195,822**	**4,710**	**67,990,480**	**4,259**	**69,409,794**
Emission Factor (lb/kbbl)	**7.19**	**0.84**	**0.41**	**0.28**	**0.27**	**2.10**	**0.05**	**728**	**0.05**	**743**

Total crude delivered by marine vessel during 3-year baseline period: 93,361,985 barrels

Annual Average Emissions Over Baseline Period

Sources	Annual Average Emissions Over Baseline Period (tons/year)									
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
OGV - Main Engine	36	3	2	1	1	5	0	1,536	0	1,564
OGV - Auxiliary Engine	49	4	2	2	1	8	0	2,765	0	2,808
OGV - Auxiliary Boiler	12	1	1	1	1	19	0	6,117	0	6,268
Tugboats	14	4	1	1	1	0	0	914	0	927
Total	**112**	**13**	**6**	**4**	**4**	**33**	**1**	**11,332**	**1**	**11,568**

Average Emissions per Visit Over Baseline Period

Sources	Average Emissions Over Baseline Period (lb/visit)									
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
OGV - Main Engine	827	71	55	20	18	113	5	34,901	2	35,555
OGV - Auxiliary Engine	1,108	100	47	35	32	191	8	62,835	3	63,826
OGV - Auxiliary Boiler	283	29	16	29	28	438	4	139,026	11	142,458
Tugboats	325	96	26	16	16	0.2	0	20,778	1	21,077
OGV - Total	2,217	200	118	83	78	742	17	236,762	15	241,839

Projected Emissions Offset by Proposed Crude By Rail Project

	Emissions Offset by 25.55 MMbbls/year of Crude by Rail									
	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
Emissions (tpy)	91.8	10.7	5.2	3.6	3.4	26.8	0.6	9,303	0.6	9,498

Note: - Greenhouse gases (GHGs) are calculated as carbon dioxide equivalent (CO_2e) = CO_2 + 21*CH_4 + 310*N_2O

21 is the Global Warming Potential of CH_4

310 is the Global Warming Potential of N_2O

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Default or Average Tanker Ship Specifications

Ship/Tanker Type	Crude Capacity (barrels)	DWT	Average Aux Engine Rating of ships visiting the Valero Wharf (kW)	Average Max Speed of ships visiting the Valero Wharf (kW)
Handymax		0 to 49,999	2328	14.5
Panamax	500,000	50,000 to 79,999	2616	14.9
Aframax	750,000	80,000 to 119,999	2492	15.0
Suezmax	1,000,000	120,000 to 199,999	3277	15.6
VLCC	2,000,000	200,000 to 299,999	4,502	15.3
ULCC	4,000,000	300,000+	4,502	15.6

VLCC - VERY LARGE CRUDE CARRIER
ULCC - ULTRA LARGE CRUDE CARRIER

Crude Tanker Specific Cargo Capacity Estimate

Description	DWT[1]	Cargo tank capacity (m^3)[1]	Cargo capacity per DWT (m3/DWT)	Specific Cargo Capacity (bbl/DWT)
Suezmax Oil Tanker	166,300	185,447	1.1151	7.01
Oil Tanker	108,000	126,211	1.1686	7.35
Oil Tanker	114,000	126,210	1.1071	6.96
Oil Tanker	70,700	80,400	1.1372	7.15
Oil Tanker	52,600	58,691	1.1158	7.02
Oil Tanker	45,999	53,100	1.1544	7.26
Chemicals and Oil Products Tanker	46,764	52,969	1.1327	7.12
Oil and Chemical Tanker	47,400	53,100	1.1203	7.05
Alaskan class tankers	193,048	210,902	1.0925	6.87
Average				**7.09**

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

conversion factor:	264.172	gal/m3
conversion factor:	42	gal/bbl

Notes:
1. DWT and cargo tank capacity for oil tankers were obtained from the following websites~
http://www.hb.hr/LinkClick.aspx?fileticket=RetQFnntemc%3D&tabid=74
http://www.nassco.com/products-and-services/comm-dc/bp-tanker-fa
http://www.marinetraffic.com/ais/shipdetails.aspx?MMSI=303656000
2. Emissions from slow cruise and maneuvering mode are apportioned by the ratio of crude delivered for Valero to the total cargo capacity of the oil tanker. It was assumed that the oil
3. Maximum cargo capacity = Average specific cargo capacity x DWT

Default Discharge Rate

DWT	Average Discharge Rate (bbl/hr)
0 -109,999	22707
110,000 - 169,999	22707
170,000 -	22707

POLB Air Emissions Inventory for 2011 -Tanker Specifications

Size	Average Model Year	Avg Age (2011 - Model year)	AVG DWT	Max Speed (knots)	Main Eng Rating (kW)	Aux Eng Rating (kW)
Handysize	2004	7	46,314	14.6	8,257	2,328
Panamax	2004	7	70,912	14.8	11,060	2,627
Aframax	2005	6	109,227	15.1	13,319	2,432
Suezmax	2005	6	178,271	15.3	18,587	5,056
VLCC	2003	8	298,571	15.3	25,288	4,502
ULCC	2004	7	311,294	15.6	28,625	4,502

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Main Engine Emission Factors

Fuel Switching Regulation

Phase	Effective Date	% Sulfur Content for OGV		Comment
		MGO	MDO	
1	7/1/2009	1.5%	0.5%	No HFO to be used
	8/1/2012	1.0%	0.5%	
2	1/1/2014	0.1%	0.1%	

All main engines on oil tankers are slow speed, category 3 engines with displacement > 30 dm3 and power rating b/w 2,500 kw and 70,000 kW

Main Engine Emission Standards

Tier	For US Flagged Vessels (USEPA Standard for Category 3 Engines)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
1	2004	17	$45 \cdot n^{-0.2}$	9.8
2	2011	14.4	$44 \cdot n^{-0.23}$	7.7
3	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Tier	For Foreign Flagged Vessels (MARPOL Annex VI - not based on category)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
I	2000	17	$45 \cdot n^{-0.2}$	9.8
II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
III	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Tier	For All Flagged Vessels (Combination of USEPA and MARPOL)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0	≤1999			
1	2000 - 2010	17	$45 \cdot n^{-0.2}$	9.8
2	2011 - 2015	14.4	$44 \cdot n^{-0.23}$	7.7
3	2016 -	3.4	$9 \cdot n^{-0.2}$	1.96

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Main Engine Emission Factors

Main Engine Emission Factor (g/kW-hr)															
Engine Speed	**RPM**	**Tier**	**Ship Built Year From**	**Ship Built Year To**	**Fuel**	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
Slow	<130	0	0	1999	0.5%S MDO	18.1	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	I	2000	2010	0.5%S MDO	17	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	II	2011	2015	0.5%S MDO	14.4	1.1	0.78	0.38	0.35	1.9	0.07	588	0.029	598
Slow	<130	0	0	1999	0.1%S MDO	18.1	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	I	2000	2010	0.1%S MDO	17	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	II	2011	2015	0.1%S MDO	14.4	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598
Slow	<130	III	2016	9999	0.1%S MDO	3.4	1.1	0.78	0.25	0.23	0.36	0.07	588	0.029	598

All emission factors, except Tier-based NOx and N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Tables II-6 and II-7
Tier-based Nox emission factors are from on MARPOL Annex IV regulations
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.6) x Fuel Correction Factor
(POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Low Load Adjustment Multipliers (Used when Load factor < 20%)

Load Factor (%)	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**
2	4.63	9.7	21.18	7.29	7.29	1	21.18	1	4.63
3	2.92	6.49	11.68	4.33	4.33	1	11.68	1	2.92
4	2.21	4.86	7.71	3.09	3.09	1	7.71	1	2.21
5	1.83	3.9	5.61	2.44	2.44	1	5.61	1	1.83
6	1.6	3.26	4.35	2.04	2.04	1	4.35	1	1.6
7	1.45	2.8	3.52	1.79	1.79	1	3.52	1	1.45
8	1.35	2.45	2.95	1.61	1.61	1	2.95	1	1.35
9	1.27	2.18	2.52	1.48	1.48	1	2.52	1	1.27
10	1.22	1.97	2.18	1.38	1.38	1	2.18	1	1.22
11	1.17	1.79	1.96	1.3	1.3	1	1.96	1	1.17
12	1.14	1.64	1.76	1.24	1.24	1	1.76	1	1.14
13	1.11	1.52	1.6	1.19	1.19	1	1.6	1	1.11
14	1.08	1.41	1.47	1.15	1.15	1	1.47	1	1.08
15	1.06	1.32	1.36	1.11	1.11	1	1.36	1	1.06
16	1.05	1.24	1.26	1.08	1.08	1	1.26	1	1.05
17	1.03	1.17	1.18	1.06	1.06	1	1.18	1	1.03
18	1.02	1.11	1.11	1.04	1.04	1	1.11	1	1.02
19	1.01	1.05	1.05	1.02	1.02	1	1.05	1	1.01
20	1	1	1	1	1	1	1	1	1

POLB 2011 Emisisons Inventory, Section 2, Table 2.9

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Auxiliary Engine Emission Factors

Fuel Switching Regulation

Phase	Effective Date	% Sulfur Content for OGV		Comment
		MGO	MDO	
1	7/1/2009	1.5%	0.5%	No HFO to be used
	8/1/2012	1.0%	0.5%	
2	1/1/2014	0.1%	0.1%	

All auxiliary engines are assumed to be medium speed engines

According to USEPA's "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, April 2009", Table 2-2 - Auxiliary engines in OGVs are Category 2 engines

Auxiliary Engine Emission Standards

Tier	For Foreign Flagged Vessels (MARPOL Annex VI - not based on category)			
	Effective Date	Speed (rpm)		
		Slow (n < 130)	Medium (130 ≤ n < 2000)	High (n ≥ 2000)
0				
I	2000	17	$45 \cdot n^{-0.2}$	9.8
II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
III	2016	3.4	$9 \cdot n^{-0.2}$	1.96

Auxiliary Engine Emission Factors

USEPA Category 2 engine Standards

Tier	Effective Date	Displacement (L/cylinder)	Power (kW)	Speed (rpm)	Nox (g/kW-hr)	HC + Nox (g/kW-hr)	PM (g/kW-hr)
1	2004	≥ 2.5	≥ 37	rpm < 130	17	-	-
				130 ≤ rpm < 2,000	$45 \cdot n^{-0.2}$	-	-
				rpm ≥ 2,000	9.8	-	-
2	2007	5.0 ≤ Disp < 15	all	-	-	7.8	0.27
		15.0 ≤ Disp < 20	< 3,300	-	-	8.7	0.50
		15.0 ≤ Disp < 20	≥ 3,300	-	-	9.8	0.50
		20.0 ≤ Disp < 25	all	-	-	9.8	0.50
		25.0 ≤ Disp < 30	all	-	-	11.0	0.50
3	2013+	7.0 ≤ Disp < 15	< 2,000	-	-	6.2	0.14
			2,000 ≤ kW < 3,700	-	-	7.8	0.14
	2014+	15.0 ≤ Disp < 20	< 2,000	-	-	7	0.34
		20.0 ≤ Disp < 25	< 2,000	-	-	9.8	0.27
		25.0 ≤ Disp < 30	< 2,000	-	-	11.0	0.27
4	2017+	All	600 ≤ kW < 1,400	-	1.8	0.19 HC only	0.04
	2016+	All	1400 ≤ kW < 2,000	-	1.8	0.19 HC only	0.04
	2014+	All	2,000 ≤ kW < 3,700	-	1.8	0.19 HC only	0.04
	2014-2015	< 15.0	≥ 3,700	-	1.8	0.19 HC only	0.12
	2014-2015	15.0 ≤ Disp < 30		-	1.8	0.19 HC only	0.25
	2016+	All		-	1.8	0.19 HC only	0.06

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Auxiliary Engine Emission Factors

Auxiliary Engine Emission Factors for Foreign Flagged Ships (g/kW-hr)															
Engine Speed	**RPM**	**Tier**	**Ship Built Year From**	**Ship Built Year To**	**Fuel**	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
Medium	130 - 2000	0	0	1999	0.5%S MDO	13.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2010	0.5%S MDO	12.2	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	II	2011	2015	0.5%S MDO	9.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	0	0	1999	0.1%S MDO	13.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2010	0.1%S MDO	12.2	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	II	2011	2015	0.1%S MDO	9.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	III	2016	9999	0.1%S MDO	2.6	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701

Engine Category 2
speed (rpm) 500

All emission factors, except Tier-based NOx and N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-8
Tier-based Nox emission factors are from MARPOL Annex IV regulations. Tier 0, I, and II factors are multiplied by fuel correction factor. Tier III emission factors were not multiplied by fuel correction factors as HFO will not be availale and used in 2016 and thre after.
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.11) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Auxiliary Engine Emission Factors for US Flagged Ships (g/kW-hr)															
Engine Speed	**RPM**	**Tier**	**Ship Built Year From**	**Ship Built Year To**	**Fuel**	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
Medium	130 - 2000	0	0	1999	0.5%S MDO	13.9	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2006	0.5%S MDO	12.2	1.1	0.52	0.38	0.35	2.1	0.09	690	0.029	701
Medium	130 - 2000	II	2007	2013	0.5%S MDO	8.4	1.1	0.47	0.11	0.11	2.1	0.09	690	0.029	701
Medium	130 - 2000	0	0	1999	0.1%S MDO	13.9	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	I	2000	2006	0.1%S MDO	12.2	1.1	0.52	0.25	0.23	0.4	0.09	690	0.029	701
Medium	130 - 2000	II	2007	2013	0.1%S MDO	8.4	1.1	0.47	0.08	0.08	0.4	0.09	690	0.029	701

Engine Category	2
Displacement (dm3/cyl)	5 ≤ Disp < 30
speed (rpm)	500

All emission factors, except Tier-based NOx and N2O and Tier II ROG and PM, are from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-8
Tier-based NOx and Tier II ROG and PM emission factors are from USEPA commercial marine engine regulations for Category 2 engines. The USEPA Tier II emission standards are based on engine displacement and as the engine displacement is not available, the emission factors are assumed to be an average of emission standards for all displacement categories under Category 2 engines. Tier II NOx and ROG emission factors assumed a 95% to 5% split for the combined NOx+HC standard. Tier 0, I and II NOx factors and Tier II ROG and PM factors are multiplied by fuel correction factor.
Tier II PM 2.5 emissions factors assumed equal to Tier II PM10 factors
N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Tables 2.5 and 2.6) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Fuel Correction factor

Actual fuel	**S Content**	**PM**	**NOx**	**SOx**	**CO**	**HC**	**CO2**	**N2O**	**CH4**
HFO	1.50%	0.82	1	0.555	1	1	1	1	1
MDO	1.50%	0.47	0.94	0.555	1	1	1	0.94	1
MGO	0.50%	0.25	0.94	0.185	1	1	1	0.94	1
MGO	0.30%	0.21	0.94	0.111	1	1	1	0.94	1
MGO	0.20%	0.19	0.94	0.074	1	1	1	0.94	1
MGO	0.10%	0.17	0.94	0.037	1	1	1	0.94	1

POLB 2011 Emisisons Inventory, Section 2, Tables 2.17

Auxiliary Boiler Emissions Factors

Auxiliary Boiler Emission Factors (g/kW-hr)										
Fuel	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
2.7% S HFO	2.1	0.2	0.11	0.8	0.78	16.5	0.03	970	0.08	995
0.5%S MDO	1.97	0.20	0.11	0.20	0.195	3.05	0.03	970.00	0.08	993.9
0.1%S MDO	1.97	0.20	0.11	0.136	0.1326	0.61	0.03	970.00	0.08	993.9

All emission factors, except N2O from California ARB, May 2011, Appendix D, Emissions Estimation Methodology for Ocean-Going Vessels, Table II-9

N2O emission factor at 0.5% S or 0.1 % S = N2O emission factor at 2.7% S in HFO (from POLB 2011 Emisisons Inventory, Section 2, Table 2.15) x Fuel Correction Factor (POLB 2011 Emisisons Inventory, Section 2, Tables 2.17)

Auxiliary Boiler Emission Factors (kg/tonne)										
Fuel	**NO_x**	**CO**	**ROG**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**CH_4**	**CO_2**	**N_2O**	**CO_2e**
2.7% S HFO	6.89	0.66	0.36	2.62	2.56	54.10	0.10	3180	0.26	3264
0.5%S MDO	6.47	0.66	0.36	0.66	0.64	10.0	0.10	3180	0.25	3259
0.1%S MDO	6.47	0.66	0.36	0.45	0.43	2.00	0.10	3180	0.25	3259

Fuel Correction factor

Actual fuel	S Content	NOx	CO	HC	PM10	PM2.5	SOx	CH4	CO2	N2O
HFO	1.50%	1	1	1	0.82	0.82	0.555	1	1	1
MDO	1.50%	0.94	1	1	0.47	0.47	0.555	1	1	0.94
MGO	0.50%	0.94	1	1	0.25	0.25	0.185	1	1	0.94
MGO	0.30%	0.94	1	1	0.21	0.21	0.111	1	1	0.94
MGO	0.20%	0.94	1	1	0.19	0.19	0.074	1	1	0.94
MGO	0.10%	0.94	1	1	0.17	0.17	0.037	1	1	0.94

POLB 2011 Emisisons Inventory, Section 2, Tables 2.17

Auxiliary Boiler Emissions Factors

Fuel Consumption Rates (ARB OGV 2011 Appendix D, Table II-10)

Engine	Engine Speed	Mode	Fuel	Fuel Use Rate (g of fuel/kW-hr)
Auxiliary Engine	All	All	Marine Distillate	217
	All	All	HFO	227
Boiler	NA	All	HFO	305
Main	Slow	Transit	Marine Distillate	185
	Slow	Transit	HFO	195
	Medium	Transit	Marine Distillate	203
	Medium	Transit	HFO	213
	High	Transit	HFO	213
	Slow	Maneuvering	Marine Distillate	185
	Slow	Maneuvering	HFO	195
	Medium	Maneuvering	Marine Distillate	203
	Medium	Maneuvering	HFO	213
	High	Maneuvering	HFO	213

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

OGV and Tugboat Operation in SF Bay Area and Port of Benicia

Speed Requirements per SF Bar Pilot - Steve Teague

Segment	Speed	Distance	Time	Tug assist	
	knots	nm	hrs	Loaded (incoming)	Ballasted (outgoing)
Sea buoy - Mile rock (1 mi west of GG Bridge)	12	10	0.83		
Mile rock (1 mi west of GG Bridge) - SPB Light #5	10	19	1.90	Tug 1	
SPB light #5 - SPB light #15	10	7	0.70		
SPB light #15 - Buoy 25	8	4.5	0.56		
Buoy 25 - Berth	5	2.5	0.50	Additional Tugs	Tugs
Berth - Sea Buoy (out)	12	43	3.58		
Total Round Trip		86	8.08		

Tug Operations and Typical Specs per Capt. Shawn Bennett at Bay Delta Maritime

Segment	Tug Requirement	Incoming - Loaded	Outgoing - Ballasted
Mile rock (1 mi west of GG Bridge) - Near Berth (assumed Buoy 25)	1 Tug	3.2	0.5
Near Berth (assumed Buoy 25) - Berth	Tug 1 and Additional Tugs as required per ship DWT	0.5	0.5

Tug Fleet Main Engine Operating in Bay Area	5000 HP
Tug Fleet Aux Engine Operating in Bay Area	150 HP
Tug Fleet Avg Age	10 years

Conclusion - typical tugboats are Class A

Bay Delta Maritime tugs are docked at SF Pier 17 and Valero dock in Port of Benicia

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Ocean Going Vessels Activity Data

	Mode of Operation					
	Slow Cruise -1	**Slow Cruise - 2**	**Slow Cruise/ Maneuvering**	**Maneuvering/Mooring/Unmooring**	**Hotelling w/o Discharge**	**Hotelling /w Discharge**
Segment Name	Pilot Sea Buoy[1] - GG Bridge and Berth - Pilot Sea Buoy	GG Bridge - San Pablo Bay Light #15	San Pablo Bay Light #15 - Sea Buoy 25	Sea Buoy 25 - Berth	At Berth	At Berth
Speed (knots)	12	10	8	5	---	---
Round-trip distance (nm)	53.0	26.0	4.5	2.5	---	---
Round-Trip Time (hrs)	4.42	2.60	0.56	0.50	6	Crude delivered/ Discharge Rate
Main Engine Load Factor	(12/Max Speed)^3	(10/Max Speed)^3	(8/Max Speed)^3	2%	0%	0%
Auxiliary Engine Load Factor	24%	24%	33%	33%	26%	26%
Auxiliary Boiler Load Factor	0%	0%	12%	12%	100%	100%
Reference	Port of Richmond, 2005 Seaport Air Emissions Inventory, Table, 2-6		Distance measured using Google Earth from Valero Wharf	POLB, CARB, Port of Richmond Emissions Inventory	Assumed 3 hours before and after unloading the crude	

1. Per Alison Kirk of BAAQMD, emissions must be estimated from the point the pilot boards the ship at Sea Buoy

Ocean Going Vessels Activity Data

Operating Modes of Emission Sources			
Source	**Operating Mode**		
	Transit	**Maneuvering**	**Hotelling**
Main Engine	x	x	Not Used
Auxiliary Engine	x	x	x
Auxiliary Boiler	Operate if main Engine LF < 20%	x	x

Emission reduction technology control efficiency (Only for main engine)
2004 and newer main engines assumed to be equipped with fuel slide valves

	NO_x	CO	ROG	PM_{10}	$PM_{2.5}$	SO_2	CH_4	CO_2	N_2O	CO_2e
Control Efficiency	30%	0%	0%	25%	25%	0%	0%	0%	0%	0%

POLB 2011 Emissions Inventory

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Baseline Ocean Going Vessels Emissions

1. IMO # obtained by searching ship name on www.marinetraffic.com
2. DWT obtained by searching IMO # in POLB Air Emissions Inventory OGV Appendices or in www.marinetraffic.com
3. MY obtained by searching IMO # in POLB Air Emissions Inventorys' OGV Appendices or in www.marinetraffic.com
4. Ship Category based on IMO classification by DWT
5. Assumed number of main engines by ship category

Ship Category	Number of Main Engines
Handymax	1
Panamax	1
Aframax	1
Suezmax	2
VLCCS	2
ULCCS	2

6. Main engines power obtained by searching IMO # in POLB Air Emissions Inventorys' OGV Appendices for various years and if not available then estimated using the regression analysis equation provided in EPA "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data" (EPA420-R-00-002, February 2000), Table 4-5.

Horsepower = 9070 + 0.101*DWT

kW = 0.746*(9070 + 0.101 * DWT)

7. Average number of Auxiliary engines on tankers = 2.7, per California ARB 2005 Oceangoing Ship Survey Summary Of Results, Appendix C, Table 9
8. Auxiliary engine rating for ships for which data was not available is equal to the average of auxiliary engine rating for similar category (DWT) of ships that visited the valero Wharf during the baseline period or the average auxiliary engine rating for similar category of ships provided in POLB 2011 Emissions Inventory, Appendix A, Table A.3
9. Auxiliary Boiler rating for ships for which data was not available was assumed equal to the average of auxiliary boiler rating for similar category (DWT) of ships provided in POLB 2011 Emissions Inventory, Section 2, Table 2.16

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Tugboat Specifications and Assumptions

Tug requirements - Sec C.3, Benicia Port Information and Terminal Regulations Manual

Vessel Size	SIZE	MOORING*	MOORING*	UNMOORING*	UNMOORING*
DWT		Class A	Class B	Class A	Class B
0	30,000	0	2	0	2
30,000	65,000	1	1	1	1
65,000	130,000	2	1	2	0
130,000	195,000	4	0	3	0
195,000	999,999	4	0	3	1

http://portal.harleymarine.com/vessels/sms/Shared%20Documents/SF%20Bay%20Area%20Terminal%20Guidlines/Valero%20Benicia,%20Ca/Valero%20Benicia%20Terminal%20Manual%20(Final%20July%2027%202012)%2

Main Engine Assumptions

Tug Class	Average Power per Engine[1]	Number of Main Engines	Assumed Model Year	Useful Life[2]	Emission Factor x FCF (g/HP-hr)									Assumed Date of MY
	HP				NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O	
A	2172	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
B	1563	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
C	1388	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001
D	754	2	2001	21	6.93	1.97	0.49	0.29	0.29	0.01	0.01	486.39	0.02	7/1/2001

1 - Revised PORT OF OAKLAND 2005 SEAPORT AIR EMISSIONS INVENTORY, Table 3-6
2 - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 4

Aux Engine Assumptions

Tug Class	Average Power per Engine[1]	Number of Aux Engines	Assumed Model Year	Useful Life[2]	Emission Factor x FCF (g/HP-hr)									Assumed Date of MY
	HP				NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O	
A	128	2	2001	23	6.93	2.78	0.58	0.26	0.26	0.01	0.01	486.39	0.02	7/1/2001
B	110	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001
C	92	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001
D	110	2	2001	23	6.93	3.59	0.85	0.46	0.46	0.01	0.02	486.39	0.02	7/1/2001

1 - Revised PORT OF OAKLAND 2005 SEAPORT AIR EMISSIONS INVENTORY, Table 3-6
2 - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 4

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

Fuel Correction factor for ULSD

Engine Power (HP)		MY		NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
0	24	0	1994	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
25	50	0	1998	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
51	100	0	1997	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
101	175	0	1996	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
176	5000	0	1995	0.93	1	0.72	0.72	0.72	1	0.72	1	0.93
0	24	1995	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
25	50	1999	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
51	100	1998	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
101	175	1997	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
176	5000	1996	2010	0.948	1	0.72	0.8	0.8	1	0.72	1	0.948
0	5000	2011	9999	0.948	1	0.72	0.852	0.852	1	0.72	1	0.948

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California and POLB 2011 Air Emissions Inventory

Deterioration Factor

HP Range		NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
25	50	0.06	0.41	0.51	0.31	0.31	0	0	0	0
51	250	0.14	0.16	0.28	0.44	0.44	0	0	0	0
251	5000	0.21	0.25	0.44	0.67	0.67	0	0	0	0

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California

Operation Mode	Tug in-Transit	Tug Assist/Mooring/ Unmooring
Load Factor	**Tug Base - Vessel**	**Vessel - Vessel Berth**
Main	0.5	0.31
Auxiliary	0.43	0.43

Ref - Port of Richmond 2005 Emissions Inventory, Appendix A, Table 2

Tug Mooring/Unmooring Activity rate	Tug in-Transit[1]	Tug Mooring/ Unmooring[2]
(hrs/one-way trip)	**Tug Base - Vessel (in/out)**	**Vessel - Vessel Berth**
Main	0.5	0.5
Auxiliary	0.5	0.5

1. Assumption
2. Assumed equal to time for maneuvering mode

Tug Assisting Activity rate	Tug in-Transit[1]	Tug Assist[2]
(hrs/one-way trip)	**Tug Base - Vessel**	**Vessel - Vessel Berth**
Main	2	3.2
Auxiliary	2	3.2

Crude by Rail Project
Marine Vessel Criteria Pollutant and GHG Baseline Emissions
2/22/2013

1. Assumption
2. Based on conversation with SF Bar Pilot

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Main	0	1997	25	50	8.14	3.65	1.84	0.72	0.72	0.006	0.0368	486	0.023
Main	1998	1999	25	50	8.14	3.65	1.8	0.72	0.72	0.006	0.036	486	0.023
Main	2000	2004	25	50	7.31	3.65	1.8	0.72	0.72	0.006	0.036	486	0.023
Main	2005	2008	25	50	5.32	3.73	1.8	0.3	0.3	0.006	0.036	486	0.023
Main	2009	2020	25	50	5.32	3.73	1.8	0.22	0.22	0.006	0.036	486	0.023
Main	0	1996	51	120	15.34	3.5	1.44	0.8	0.8	0.006	0.0288	486	0.023
Main	1997	1999	51	120	10.33	2.55	0.99	0.66	0.66	0.006	0.0198	486	0.023
Main	2000	2004	51	120	7.31	2.55	0.99	0.66	0.66	0.006	0.0198	486	0.023
Main	2005	2008	51	120	5.32	3.73	0.99	0.3	0.3	0.006	0.0198	486	0.023
Main	2009	2020	51	120	5.32	3.73	0.99	0.22	0.22	0.006	0.0198	486	0.023
Main	0	1970	121	175	16.52	3.21	1.32	0.73	0.73	0.006	0.0264	486	0.023
Main	1971	1978	121	175	15.34	3.21	1.1	0.63	0.63	0.006	0.022	486	0.023
Main	1979	1983	121	175	14.16	3.21	1	0.52	0.52	0.006	0.02	486	0.023
Main	1984	1986	121	175	12.98	3.14	0.94	0.52	0.52	0.006	0.0188	486	0.023
Main	1987	1995	121	175	12.98	3.07	0.88	0.52	0.52	0.006	0.0176	486	0.023
Main	1996	1999	121	175	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	121	175	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2012	121	175	5.1	3.73	0.68	0.22	0.22	0.006	0.0136	486	0.023
Main	2013	2020	121	175	3.8	3.73	0.68	0.09	0.09	0.006	0.0136	486	0.023
Main	0	1970	176	250	16.52	3.21	1.32	0.73	0.73	0.006	0.0264	486	0.023
Main	1971	1978	176	250	15.34	3.21	1.1	0.63	0.63	0.006	0.022	486	0.023
Main	1979	1983	176	250	14.16	3.21	1	0.52	0.52	0.006	0.02	486	0.023
Main	1984	1986	176	250	12.98	3.14	0.94	0.52	0.52	0.006	0.0188	486	0.023
Main	1987	1994	176	250	12.98	3.07	0.88	0.52	0.52	0.006	0.0176	486	0.023
Main	1995	1999	176	250	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	176	250	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2013	176	250	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2014	2020	176	250	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	251	500	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	251	500	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	251	500	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	251	500	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1994	251	500	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1995	1999	251	500	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2003	251	500	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2004	2013	251	500	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2014	2020	251	500	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	501	750	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	501	750	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	501	750	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	501	750	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1994	501	750	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1995	1999	501	750	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	501	750	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2012	501	750	5.1	3.73	0.68	0.15	0.15	0.006	0.0136	486	0.023
Main	2013	2020	501	750	3.99	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	0	1970	751	1900	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Main	1971	1978	751	1900	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	751	1900	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	751	1900	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	751	1900	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	751	1900	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	751	1900	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2011	751	1900	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2012	2016	751	1900	4.09	3.73	0.68	0.08	0.08	0.006	0.0136	486	0.023
Main	2017	2020	751	1900	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Main	0	1970	1901	3300	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	1901	3300	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	1901	3300	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	1901	3300	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	1901	3300	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	1901	3300	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	1901	3300	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2012	1901	3300	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2013	2015	1901	3300	4.37	3.73	0.68	0.1	0.1	0.006	0.0136	486	0.023
Main	2016	2020	1901	3300	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Main	0	1970	3301	5000	16.52	3.07	1.26	0.7	0.7	0.006	0.0252	486	0.023
Main	1971	1978	3301	5000	15.34	3.07	1.05	0.6	0.6	0.006	0.021	486	0.023
Main	1979	1983	3301	5000	14.16	3.07	0.95	0.5	0.5	0.006	0.019	486	0.023
Main	1984	1986	3301	5000	12.98	3.07	0.9	0.5	0.5	0.006	0.018	486	0.023
Main	1987	1998	3301	5000	12.98	2.99	0.84	0.5	0.5	0.006	0.0168	486	0.023
Main	1999	1999	3301	5000	9.64	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2000	2006	3301	5000	7.31	1.97	0.68	0.36	0.36	0.006	0.0136	486	0.023
Main	2007	2013	3301	5000	5.53	3.73	0.68	0.2	0.2	0.006	0.0136	486	0.023
Main	2014	2015	3301	5000	4.94	3.73	0.68	0.25	0.25	0.006	0.0136	486	0.023
Main	2016	2020	3301	5000	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Auxiliary	0	1997	25	50	6.9	5.15	2.19	0.64	0.64	0.006	0.0438	486	0.023
Auxiliary	1998	1999	25	50	6.9	5.15	2.14	0.64	0.64	0.006	0.0428	486	0.023
Auxiliary	2000	2004	25	50	6.9	5.15	2.14	0.64	0.64	0.006	0.0428	486	0.023
Auxiliary	2005	2008	25	50	5.32	3.73	2.14	0.3	0.3	0.006	0.0428	486	0.023
Auxiliary	2009	2020	25	50	5.32	3.73	2.14	0.22	0.22	0.006	0.0428	486	0.023
Auxiliary	0	1996	51	120	13	4.94	1.71	0.71	0.71	0.006	0.0342	486	0.023
Auxiliary	1997	1999	51	120	8.75	3.59	1.18	0.58	0.58	0.006	0.0236	486	0.023
Auxiliary	2000	2004	51	120	7.31	3.59	1.18	0.58	0.58	0.006	0.0236	486	0.023
Auxiliary	2005	2008	51	120	5.32	3.73	1.18	0.3	0.3	0.006	0.0236	486	0.023
Auxiliary	2009	2020	51	120	5.32	3.73	1.18	0.22	0.22	0.006	0.0236	486	0.023
Auxiliary	0	1970	121	175	14	4.53	1.57	0.65	0.65	0.006	0.0314	486	0.023
Auxiliary	1971	1978	121	175	13	4.53	1.31	0.55	0.55	0.006	0.0262	486	0.023
Auxiliary	1979	1983	121	175	12	4.53	1.19	0.46	0.46	0.006	0.0238	486	0.023
Auxiliary	1984	1986	121	175	11	4.43	1.12	0.46	0.46	0.006	0.0224	486	0.023
Auxiliary	1987	1995	121	175	11	4.33	1.05	0.46	0.46	0.006	0.021	486	0.023
Auxiliary	1996	1999	121	175	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	121	175	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2012	121	175	5.1	3.73	0.81	0.22	0.22	0.006	0.0162	486	0.023
Auxiliary	2013	2020	121	175	3.8	3.73	0.81	0.09	0.09	0.006	0.0162	486	0.023
Auxiliary	0	1970	176	250	14	4.53	1.57	0.65	0.65	0.006	0.0314	486	0.023
Auxiliary	1971	1978	176	250	13	4.53	1.31	0.55	0.55	0.006	0.0262	486	0.023
Auxiliary	1979	1983	176	250	12	4.53	1.19	0.46	0.46	0.006	0.0238	486	0.023
Auxiliary	1984	1986	176	250	11	4.43	1.12	0.46	0.46	0.006	0.0224	486	0.023
Auxiliary	1987	1994	176	250	11	4.33	1.05	0.46	0.46	0.006	0.021	486	0.023
Auxiliary	1995	1999	176	250	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	176	250	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2013	176	250	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2014	2020	176	250	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	0	1970	251	500	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	251	500	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	251	500	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	251	500	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1994	251	500	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1995	1999	251	500	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2003	251	500	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2004	2013	251	500	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2014	2020	251	500	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	0	1970	501	750	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	501	750	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	501	750	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	501	750	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1994	501	750	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1995	1999	501	750	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	501	750	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2012	501	750	5.1	3.73	0.81	0.15	0.15	0.006	0.0162	486	0.023
Auxiliary	2013	2020	501	750	3.99	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023

Tugboat Zero Hour Emissions Factors

Engine Type	Year		Engine Power (HP)		Zero Hour Emission Factor (g/HP-hr)								
	Min	Max	Min	Max	NOx	CO	HC	PM10	PM2.5	SO2 at 15 ppm	CH4	CO2	N2O
Auxiliary	0	1970	751	1900	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	751	1900	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	751	1900	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	751	1900	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	751	1900	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	751	1900	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	751	1900	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2011	751	1900	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2012	2016	751	1900	4.09	3.73	0.81	0.08	0.08	0.006	0.0162	486	0.023
Auxiliary	2017	2020	751	1900	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Auxiliary	0	1970	1901	3300	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	1901	3300	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	1901	3300	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	1901	3300	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	1901	3300	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	1901	3300	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	1901	3300	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2012	1901	3300	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2013	2015	1901	3300	4.37	3.73	0.81	0.1	0.1	0.006	0.0162	486	0.023
Auxiliary	2016	2020	1901	3300	1.3	3.73	0.18	0.03	0.03	0.006	0.0036	486	0.023
Auxiliary	0	1970	3301	5000	14	4.33	1.5	0.62	0.62	0.006	0.03	486	0.023
Auxiliary	1971	1978	3301	5000	13	4.33	1.25	0.53	0.53	0.006	0.025	486	0.023
Auxiliary	1979	1983	3301	5000	12	4.33	1.13	0.45	0.45	0.006	0.0226	486	0.023
Auxiliary	1984	1986	3301	5000	11	4.33	1.07	0.45	0.45	0.006	0.0214	486	0.023
Auxiliary	1987	1998	3301	5000	11	4.22	1	0.45	0.45	0.006	0.02	486	0.023
Auxiliary	1999	1999	3301	5000	8.17	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2000	2006	3301	5000	7.31	2.78	0.81	0.32	0.32	0.006	0.0162	486	0.023
Auxiliary	2007	2013	3301	5000	5.53	3.73	0.81	0.2	0.2	0.006	0.0162	486	0.023
Auxiliary	2014	2015	3301	5000	4.94	3.75	0.81	0.25	0.25	0.006	0.0162	486	0.023
Auxiliary	2016	2020	3301	5000	1.3	3.75	0.18	0.03	0.03	0.006	0.0036	486	0.023

Ref - CARB 2007, Appendix B Emissions Estimation Methodology for Commercial Harbor Craft Operating in California

Appendix C
District ATC Application Forms

Form P-101B

Form T

Form HRSA

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

1. Application Information

BAAQMD Plant No. B2626 Company Name Valero Refining Co. - California

Equipment/Project Description Crude By Rail Project

2. Plant Information

If you have not previously been assigned a Plant Number by the District or if you want to update any plant data that you have previously supplied to the District, please complete this section.

Equipment Location 3400 East Second Street

City Benicia Zip Code 94510

Mail Address 3400 East Second Street

City Benicia State CA Zip Code 94510

Plant Contact Donald Cuffel Title Manager - Environmental Engineering

Telephone (707) 745 - 7545 Fax ( ) Email don.cuffel@valero.com

NAICS (North American Industry Classification System) see www.census.gov/epcd/naics02/naico602.htm 324110

3. Proximity to a School (K-12)

The sources in this permit application (*check one*) ☐ Are ☒ Are not within 1,000 ft of the outer boundary of the nearest school.

4. Application Contact Information

All correspondence from the District regarding this application will be sent to the plant contact unless you wish to designate a different contact for this application.

Application Contact Susan Gustofson Title Staff Environmental Engineer

Mail Address 3400 East Second Street

City Benicia State CA Zip Code XXXX

Telephone (707) 745 - 7011 Fax ( ) Email susan.gustofson@valero.com

5. Additional Information

The following additional information is required for all permit applications and should be included with your submittal. Failure to provide this information may delay the review of your application. Please indicate that each item has been addressed by checking the box. Contact the Engineering Division if you need assistance.

- ☐ If a new Plant, a local street map showing the location of your business
- ☒ A facility map, drawn roughly to scale, that locates the equipment and its emission points
- ☒ Completed data form(s) and a pollutant flow diagram for each piece of equipment. (See www.baaqmd.gov/Forms/Engineering.aspx)
- ☒ Project/equipment description, manufacturer's data
- ☒ Discussion and/or calculations of the emissions of air pollutants from the equipment

6. Trade Secrets

Under the California Public Records Act, all information in your permit application will be considered a matter of public record and may be disclosed to a third party. If you wish to keep certain items separate as specified in Regulation 2, Rule 1, Section 202.7, please complete the following steps.

- ☐ Each page containing trade secret information must be labeled "trade secret" with the trade secret information clearly marked.
- ☐ A second copy, with trade secret information blanked out, marked "public copy" must be provided.
- ☐ For each item asserted to be trade secret, you must provide a statement which provides the basis for your claim.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

7. Small Business Certification *You are entitled to a reduced permit fee if you qualify as a small business as defined in Regulation 3. In order to qualify, you must certify that your business meets all of the following criteria:*

- ☐ The business does not employ more than 10 persons and its gross annual income does not exceed $750,000.
- ☐ And the business is not an affiliate of a non-small business. (Note: a non-small business employs more than 10 persons and/or its gross income exceeds $750,000.)

8. Green Business Certification *You are entitled to a reduced permit fee if you qualify as a green business as defined in Regulation 3. In order to qualify, you must certify that your business meets all of the following criteria:*

- ☐ The business has been certified under the Bay Area Green Business Program coordinated by the Association of Bay Area Governments and implemented by participating counties.
- ☐ A copy of the certification is included.

9. Accelerated Permitting *The Accelerated Permitting Program entitles you to install and operate qualifying sources of air pollution and abatement equipment* ***without waiting for the District to issue a Permit to Operate****. To participate in this program you must certify that your project will meet all of the following criteria. Please acknowledge each item by checking each box.*

- ☐ Uncontrolled emissions of any single pollutant are each less than 10 lb/highest day, or the equipment has been precertified by the BAAQMD.
- ☐ Emissions of toxic compounds do not exceed the trigger levels identified in Table 2-5-1 (see Regulation 2, Rule 5).
- ☐ The source is not a diesel engine.
- ☐ The project is not subject to public notice requirements (the source is either more than 1000 ft. from the nearest school, or the source does not emit any toxic compound in Table 2-5-1).
- ☐ For replacement of abatement equipment, the new equipment must have an equal or greater overall abatement efficiency for all pollutants than the equipment being replaced.
- ☐ For alterations of existing sources, for all pollutants the alteration does not result in an increase in emissions.
- ☐ Payment of applicable fees (the minimum permit fee to install and operate each source). See Regulation 3 or contact the Engineering Division for help in determining your fees.

10. CEQA *Please answer the following questions pertaining to CEQA (California Environmental Quality Act).*

A. Has another public agency prepared, required preparation of, or issued a notice regarding preparation of a California Environmental Quality Act (CEQA) document (initial study, negative declaration, environmental impact report, or other CEQA document) that analyzes impacts of this project or another project of which it is a part or to which it is related? ☒YES ☐NO If no, go to section 10B.

Describe the document or notice, preparer, and date of document or expected date of completion:

A Land Use Permit application for this project was submitted to the City of Benicia in December 2012.

The City of Benicia will serve as Lead Agency.

B. List and describe any other permits or agency approvals required for this project by city, regional, state or federal agencies:

None.

C. List and describe all other prior or current projects for which either of the following statements is true: (1) the project that is the subject of this application could not be undertaken without the project listed below, (2) the project listed below could not be undertaken without the project that is the subject of this application:

None.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, CA 94109
Engineering Division (415) 749-4990
www.baaqmd.gov fax (415) 749-5030

Form P-101B
Authority to Construct/
Permit to Operate

11. Certification *I hereby certify that all information contained herein is true and correct. (Please sign and date this form)*

Donald Cuffel	Manager - Environmental Engineering	Susan K Gustofson for Don Cuffel	2/28/2013
Name of person certifying (print)	Title of person certifying	Signature of person certifying	Date

Send all application materials to the **BAAQMD Engineering Division, 939 Ellis Street, San Francisco, CA 94109.**

DATA FORM T
Organic Liquid Evaporation
(tankage, loading and handling)

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

939 Ellis Street .. San Francisco, CA 94109. (415) 749-4990 FAX (415)-749-5030

1. Business Name: **Valero Refining Co. - California** Plant No: **B2626** (if unknown, leave blank)
2. SIC No: **2911** Date of Initial Operation **~2014 (planned)** Source No S- **97**
3. Name or Description **TK-1776 (External Floating Roof) – Change to Include Crude Oil Service**
4. Code materials* in order of highest throughputs: 1) **89** (crude oil) 2) ____ 3) ____ 4) ____
5. Total throughput (all materials), last 12 months: _____ thousand gal **or** **0 (crude)** thousand bbl
6. Typical % of total annual throughput: Dec-Feb **25** % Mar-May **25** % Jun-Aug **25** % Sep-Nov **25** %

☐ Check box if loading/handling facility; complete lines 7-11 and omit the remainder of this form. (Also complete one Form T for each storage tank)

~~7. ● Usage type: ☐ Bulk plant (truck/rail car) ☐ Bulk plant (marine) ☐ Vehicle service station ☐ Aircraft/marine servicing Other: ____~~

~~8. ● How many nozzles/loading arms? ____ How many pumps? ____~~

~~9. ● Make and model of nozzles/loading arms: ____~~

~~10. ● Nozzle/arm loads tank by: ☐ splash fill ☐ submerged fill ☐ part splash, part submerged~~

~~11. ● Upon loading, vapor space in tank(s) is: ☐ Vented directly to atmosphere ☐ Collected by nozzle/arm and sent to Abatement Device(s): A ____ A ____~~

12. Annual Average: Storage vapor pressure ___ psia **or** tank temperature ambient°F and RVP **9.4** psia
13. Highest v.p. of all materials stored: ___ psia **or** high tank temperature ambient°F and high RVP **9.4** psia
14. Highest °API of all material stored: **~43.5** Lowest initial B.P. of all materials stored: **80-100** °F
15. Tank Type: ☐ underground ☐ fixed roof ☐ internal floating roof ☒ floating roof ☐ pressure ☐ other: ____
16. Tank volume: ____ thousand gallons **or** **110** thousand barrels
17. Tank Diameter: **128** ft height or length: **~48** ft Check if applicable: ☐ heated ☐ insulated

Fixed Roof Tanks Only

~~18. Maximum fill rate: ____ gal/hr **or** ____ bbl/hr~~

~~19. Average height of vapor space: ____ ft Highest head space reactivity ____ %~~
~~☐ Check box if emissions from this tank are controlled; complete lines 20 and 21.~~

~~20. ● Emissions vent to what source(s) and/or abatement device(s)? S ____ S ____ A ____ A ____~~

~~21. ● Do all gauging/sampling devices have gas-tight covers? ☐ yes ☐ no~~

~~22. Paint color: ☐ Aluminum ☐ White ☐ Light grey ☐ Medium grey ☐ Other ____~~

~~23. Paint Condition: ☐ good ☐ poor~~

Floating Roof Tanks Only

24. Shell Type: ☐ gunited ☐ riveted ☒ welded ☐ other: ____
25. Seal Type: ☐ single ☒ double ☐ other: ____ Condition: ☒ tight ☐ loose
26. Maximum withdrawn rate: ____ gal/hr **or** **~3,000** bbl/hr
27. Do all gauging/sampling devices enter below liquid level and have gas-tight covers? ☒ yes ☐ no
28. Roof type: ☐ pan ☒ pontoon ☐ other: ____ Is emergency roof drain at least 90% covered? ☒ yes ☐ no

Person completing this form **S. Gustofson** Date **2/28/2013**

See Material Code Reference List.

Form HRSA

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street . . . San Francisco, CA 94109. . . (415) 749-4990 . . . FAX (415) 749-5030 OR 4949
WEBSITE: WWW.BAAQMD.GOV

Health Risk Screening Analysis

IMPORTANT: For any permit application that requires a Health Risk Screening Analysis, fill out one form for each source that emits a Toxic Air Contaminant(s) [or for a group of sources that exhaust through a common stack]. Emissions can be from a discrete point source (with stack) or a source with fugitive emissions (area or volume source). You must provide a plot plan (drawn to scale, if possible) and a local map (aerial photos are recommended), which clearly demonstrate the location of your site, the source(s), property lines, and any surrounding buildings [see attached example]. Label streets, schools, residences, and other businesses. List major dimensions of all buildings surrounding the source in Section C.

Plant Name: Valero Refining Co. - California Plant No.: B2626

Source Description: Tank 1776 (external floating roof tank)

Source No.: S-97 (if known) Emission Point No.: P-____ (if known)

SECTION A *(Point Source)*

1. Does the source exhaust at clearly defined emission point; i.e., a stack or exhaust pipe? ☐ YES OR ☒ NO

   (If YES continue at #2, If NO, skip to Section B)

2. ~~Does the stack (or exhaust pipe) stand alone or is it located on the roof of a building? ☐ alone OR ☐ on roof~~

   ~~*Important: If stack is on a roof, provide building dimensions on line B1 in* Section C.~~

3. ~~What is the height of the stack outlet above ground level? ____ feet OR ____ meters?~~

4. ~~What is the inside diameter of the stack outlet? ____ inches OR ____ feet OR ____ meters~~

5. ~~What is the direction of the exhaust from the stack outlet? ☐ horizontal OR ☐ vertical~~

6. ~~Is the stack outlet: ☐ open or hinged rain flap OR ☐ rain capped (deflects exhaust downward or horizontally)~~

7. ~~What is the exhaust flowrate during normal operation? ___ feet^3/min OR ___ meters^3/second~~
8. ~~What is the typical temperature of the exhaust gas? __ degrees Fahrenheit OR ___ degrees Celsius~~

   ~~***(Skip Section B and Go on to Section C)***~~

SECTION B *(Area/Volume Source)*

This section applies to fugitive emissions that are NOT captured by a collection system nor directly emitted through a stack or other emission point. Volume sources have fugitive emissions generally released within a building or other defined space (e.g., dry cleaner, gasoline station canopy). Area sources are generally flat areas of release (e.g., landfill, quarry).

1. Is the emission source located within a building? ☐ YES (go to #2) OR ☒ NO (go to #3)

2. ~~If YES (source inside building), provide building dimensions on line B1 in Section C~~

   ~~a. Does the building have a ventilation system that is vented to the outside? ☐ YES OR ☐ NO~~

   ~~b. If NO (ventilation), are the building's doors & windows kept open during hours of operation? ☐ YES OR ☐ NO~~

3. If NO (source not inside building), provide a description of the source, dimensions, & indicate location on plot plan.

   External floating roof tank. Diameter = 128 ft, shell height = 48 ft. See attached figure for location (and Figures 2-1 and 2-2 of application for surrounding area).

(Go on to Section C)

SECTION C *(Building Dimensions)*

Provide building dimensions. Use Line B1 only for building with source/stack on the roof or with fugitive emissions inside building. Use Lines B2-B9 for buildings surrounding the source (within 300 feet). Distance and direction are optional if map and/or aerial photo are adequately labeled with locations of buildings. Check one for units: ☐ feet OR ☐ meters

B#	Building name or description	Height	Width	Length	Distance To Source	Direction To Source
B1	Building with source:				n/a	n/a
B2						
B3						
B4						
B5						
B6						
B7						
B8						

See attached figure for structures surrounding S-97.

NOTE: Label buildings by B# on plot plan, map and/or aerial photo. Provide comments below for any details that need additional clarification (e.g., list buildings that are co-occupied by your employees and other workers, residents, students, etc).

_____

_____

(Go on to Section D)

SECTION D *(Receptor Locations)*

NOTE: Indicate on maps or aerial photos the residential and nonresidential areas surrounding your facility.

1. Indicate the area where the source is located (check one):
   - ☐ zoned for residential use
   - ☐ zoned for mixed residential and commercial/industrial use
   - ☒ zoned for commercial and/or industrial use
   - ☐ zoned for agricultural use
2. Distance from source (stack or building) to nearest facility property line = ~650 feet OR ____ meters
3. Distance from source (stack or building) to the property line of the nearest residence = ~4,000 feet OR _____ meters
4. Describe the nearest nonresidential property (check one): ☒ Industrial/Commercial OR ☐ Other _____

   _____
5. Distance from source (stack or building) to property line of nearest nonresidential site = ~750 feet OR ___ meters
6. Distance from source to property line of nearest school* (or school site) = _____ feet OR ☒ Greater than 1,000 feet

   [Note: Helpful website with California Dept. of Education data: www.greatschools.net]

   Provide the names and addresses of all schools* that have property line(s) within 1,000 feet of the source:

   _____

*K-12 and more than twelve children only

Form HRSA: Plot plan showing location of S-97 (Tank 1776) .

Source: Google Maps, queried January 2013.

Appendix E.4

Air Permit Application, Project Update #1, November 2013

ESA

Crude by Rail
Air Permit Application

Project Update Document # 1

Valero Benicia Refinery
Benicia, California
BAAQMD Plant No. B2626

Public Copy

November 2013

www.erm.com

The world's leading sustainability consultancy.

Valero Refining Co. - California

Crude by Rail
Air Permit Application

Project Update Document # 1

Valero Benicia Refinery
Benicia, California
BAAQMD Plant No. B2626

November 2013

Public Copy

Project No. 0186851

Environmental Resources Management
1277 Treat Boulevard
Suite 500
Walnut Creek, CA 94597
T: (925) 946-0455
F: (925) 946-9968

TABLE OF CONTENTS

LIST OF FIGURES		**IV**
LIST OF TABLES		**IV**
LIST OF ACRONYMS		**V**
1.0	**INTRODUCTION**	**1**
1.1	Facility Contact Information	1
1.2	Overview	1
1.3	Schedule	1
1.4	Application Summary	1
2.0	**FACILITY AND PROJECT DESCRIPTION**	**3**
2.1	Facility Description	3
2.2	Project Description	3
2.2.1	*Unloading Rack*	*5*
2.2.2	*~~Tank 1776 (District Source S-97)~~Tanks 1701-1708 (District Sources S-57 - S-62, S-1047, and S-1048)*	*5*
2.2.3	*Train Activity*	*6*
3.0	**EMISSION ESTIMATES**	**7**
3.1	~~Tank Emissions~~	8
3.1.1	*~~POC Emissions~~*	*8*
3.1.2	*~~TAC Emissions~~*	*8*
3.2	Fugitive Component Emissions	8
3.2.1	*POC Emissions*	*8*
3.2.2	*Toxic Air Contaminant Emissions*	*9*
3.3	Cargo Carrier Emissions	10
3.3.1	*Criteria Pollutant Emissions*	*10*
4.0	**APPLICABLE REGULATIONS**	**11**
4.1	District Rules and Regulations	11
4.1.1	*Regulation 1 – General Provisions and Definitions*	*11*
4.1.2	*Regulation 2 – Permits*	*11*
4.1.2.1	*Rule 2-1 – General Requirements*	*11*
4.1.2.2	*Rule 2-2 – New Source Review*	*11*
4.1.2.3	*Rule 2-5 – New Source Review of Toxic Air Contaminants*	*13*
4.1.2.4	*Rule 2-6 – Major Facility Review*	*15*

4.1.3	*Regulation 3 – Fees*	*15*
4.1.4	*Regulation 6 – Particulate Matter*	*15*
4.1.5	*Regulation 7 – Odorous Substances*	*15*
4.1.6	*Regulation 8 – Organic Compounds*	*16*
4.1.6.1	*Rule 8-5 – Storage of Organic Liquids*	*16*
4.1.6.2	*Rule 8-18 – Equipment Leaks*	*16*
4.1.6.3	*Rule 8-28 – Episodic Releases from Pressure Relief Valves at Petroleum Refineries and Chemical Plants*	*16*
4.1.7	*Regulation 10 – Standards of Performance for New Stationary Sources*	*16*
4.1.8	*Rule 11-12 – National Emission Standard for Benzene Emissions*	*16*
4.2	California Environmental Quality Act	16
4.3	Federal Rules and Regulations	16
4.3.1	*40 CFR 52.21 – Prevention of Significant Deterioration of Air Quality*	*16*
4.3.2	*40 CFR 60 Subpart A – General Provisions*	*16*
4.3.3	*40 CFR 60 Subpart Kb – Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984*	*16*
4.3.4	*40 CFR 60 Subpart GGGa – Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006*	*17*
4.3.5	*40 CFR 61 Subpart A – General Provisions*	*17*
4.3.6	*40 CFR 61 Subpart FF – Benzene Waste Operations NESHAP*	*17*
4.3.7	*40 CFR 63 Subpart A – General Provisions*	*17*
4.3.8	*40 CFR 63 Subpart CC – National Emission Standards for Petroleum Refineries*	*17*
5.0	**ESTIMATED PERMIT FEES**	**18**
6.0	**REFERENCES**	**19**

APPENDIX A – PROJECT DRAWINGS AND SPECIFICATIONS

Attachment A-1 – Process Flow Diagram

Attachment A-2 – Plot Plan

APPENDIX B –EMISSION CALCULATIONS

~~*Attachment B-1 – Tank 1776 Baseline Throughput and Emissions*~~

~~*Attachment B-2 – Tank 1776 Post-CBR Emissions*~~

Attachment B-3 – Fugitive Component Emissions

Attachment B-4 – Cargo Carrier Emissions

APPENDIX C – DISTRICT ATC APPLICATION FORMS

APPENDIX D – HEALTH RISK ASSESSMENT

LIST OF FIGURES

Figure 2-1	*Valero Benicia Refinery Location Map*	*3*
Figure 2-2	*Location Map*	*4*

LIST OF TABLES

Table 2-1	*Fugitive Component Counts*	*5*
Table 2-2	*~~Tank 1776 Capacity and Dimensions~~Tanks 1701-1708 Capacity and Dimensions*	*6*
Table 3-1	*Emissions Summary*	*8*
Table 3-2	*~~Tank 1776 POC Emissions~~*	*8*
Table 3-3	*~~Tank 1776 TAC Emissions~~*	*8*
Table 3-4	*Fugitive Component POC Emissions*	*9*
Table 3-5	*Fugitive Component TAC Emissions*	*9*
Table 3-6	*Cargo Carrier Criteria Pollutant Emissions*	*10*
Table 4-1	*~~BACT for EFR Tanks~~*	*12*
Table 4-2	*Emission Offsets*	*12*
Table 4-3	*TAC Emissions and District Trigger Levels*	*13*
Table 4-4	*Maximum Cancer Risk and Non-Cancer Health Effects Including Cargo Carrier for CEQA Analysis*	*14*
Table 4-5	*Maximum Cancer Risk and Non-Cancer Health Effects from Sources Requiring ATC*	*15*
Table 5-1	*Estimated Permit Fees*	*18*

LIST OF ACRONYMS

ATC	Authority to Construct
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
bbl	barrel
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CBR	Crude by Rail
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
District	Bay Area Air Quality Management District
DPM	diesel particulate matter
EFR	external floating roof
GHG	greenhouse gas
HAP	hazardous air pollutant
HRA	Health Risk Assessment
HRSA	Health Risk Screening Assessment
LDAR	Leak Detection and Repair
MACT	Maximum Achievable Control Technology
MEIR	Maximum Exposed Individual Residential
MEIW	Maximum Exposed Individual Worker
MMbbl	million barrels
MSR	Maximum Sensitive Receptor
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOx	oxides of nitrogen
NPOC	non-precursor organic compound
NSPS	New Source Performance Standards
NSR	New Source Review
PM	particulate matter
POC	precursor organic compound
PSD	Prevention of Significant Deterioration
PTO	Permit to Operate
SO_2	sulfur dioxide

Public Copy

TAC	toxic air contaminant
TBACT	Best Available Control Technology for Toxics
UP	Union Pacific Railroad Company
VOC	volatile organic compound

1.0 INTRODUCTION

This document supplements the application (AN 25242) for Authority to Construct (ATC) for the Valero Crude by Rail (CBR) project ("project"), dated February 2013, previously submitted to Bay Area Air Quality Management District ("BAAQMD" or "District"). Valero Refining Co. - California (Valero) proposes to incorporate changes to the existing permit application by excluding Tank 1776 (BAAQMD Source # S-97) from the project scope and rerouting the crude oil that would be received at the proposed rail car unloading rack to the existing tanks located in the Crude Tank Farm. The emissions estimates from the affected sources have been revised in this project update document.

This document has been prepared such that only modified sections from the existing ATC Application (AN 25242), dated February 2013, will be discussed. Modified sections are included in their entirety to facilitate the incorporation of the proposed modifications into the existing permit application.

1.1 Facility Contact Information

NO CHANGE

1.2 Overview

Valero currently receives crude oil by pipeline and by ship. The project would install one rail car unloading rack capable of unloading two parallel rows of crude oil-laden rail cars on the refinery property and construct associated infrastructure, including rail lines, to allow Valero to receive crude oil by train. The project would permit Valero to receive crude oil in quantities up to 70,000 barrels (bbl) per day (100 rail cars per day), but it would not increase the volume of crude oil delivered to the refinery, because crude oil quantities delivered by train would replace crude oil quantities received by ship. The refinery's crude oil processing rate, which is limited by District permit to an annual average of 165,000 bbl per day (daily maximum of 180,000 bbl per day), would remain unchanged. The project would not result in an increase in the production of existing products or byproducts. No modifications would be made to refinery process equipment.

1.3 Schedule

Valero plans to begin construction in second quarter of 2014 and commence operating the CBR unloading facility in late 2014. Construction is expected to take approximately 6 months.

1.4 Application Summary

This application package, including the attached appendices, provides necessary information for the District to evaluate the project. The remainder of this document is organized as follows:

- Section 2.0 (Facility and Project Description) provides an overview of the facility and presents the various elements of the project, including descriptions of project components;

- Section 3.0 (Emissions Estimates) provides a summary of project emissions for storage tank, fugitive components associated with the rail car unloading facilities, and cargo carrier emissions;
- Section 4.0 (Applicable Regulations) addresses compliance with applicable District and federal regulatory requirements;
- Section 5.0 (Estimated Permit Fees) provides an estimate of District New Source Review fees;
- Section 6.0 (References);
- Appendix A – Project Drawings and Specifications;
- Appendix B – Emission Calculations;
- Appendix C – District Permit Application Forms; and
- Appendix D – Health Risk Assessment.

2.0 FACILITY AND PROJECT DESCRIPTION

2.1 Facility Description

NO CHANGE

Figure 2-1 Valero Benicia Refinery Location Map

NO CHANGE

2.2 Project Description

Valero currently receives crude oil by pipeline and by ship. The proposed project would allow Valero to receive crude oil by train and consist of the following primary components:

- Unloading rack. An unloading rack would be installed to allow crude oil to be transferred from rail cars (up to 100 rail cars per day, 70,000 bbl per day) to existing storage tanks (1701 through 1708) located in the Crude Tank Farm. The rack would be installed in the northeastern portion of the main refinery property, between the eastern side of the lower tank farm and the fence adjacent to Sulphur Springs Creek.
- Pipeline and associated components. New piping of approximately 4,000 feet of primarily 16-inch diameter and associated components (pumps, valves, flanges, and connectors) would be installed between the rail car unloading rack and Crude Tank Farm. The new piping from the rail car unloading rack would tie into existing 20-inch-diameter piping near tank 1776.
- Rail tracks. Two parallel unloading rail spurs and a parallel rail car storage and departure track would be constructed on refinery property to allow receipt of rail cars at the unloading rack. The rail spurs and parallel rail car storage track would be located between the eastern side of the lower tank farm and the western side of the fence along Sulphur Springs Creek.
- Other infrastructure modifications. Approximately 1,800 feet of tank farm dike walls, existing firewater pipeline, compressor station, and underground infrastructure would be relocated to accommodate the new rail tracks and unloading rack. A service road, adjacent to the proposed rail spurs, would also be relocated.

Crude oil offloaded from the new unloading rack would be stored in existing external floating roof (EFR) storage tanks, Tanks 1701 through 1708. These tanks are currently permitted to store crude oil. The tanks currently comply with all the requirements of BAAQMD Regulation 8-5 for the type of material stored, such as control and seal requirements, and associated permit conditions. The tanks will continue to comply with all these requirements with the implementation of this project without requiring any physical modifications or change in service that would impact emissions.

Figure 2-2 shows the location of the rail car unloading rack, pipeline routing and Crude Tank Farm. A process flow diagram is provided in Appendix A.

Figure 2-2 Location Map

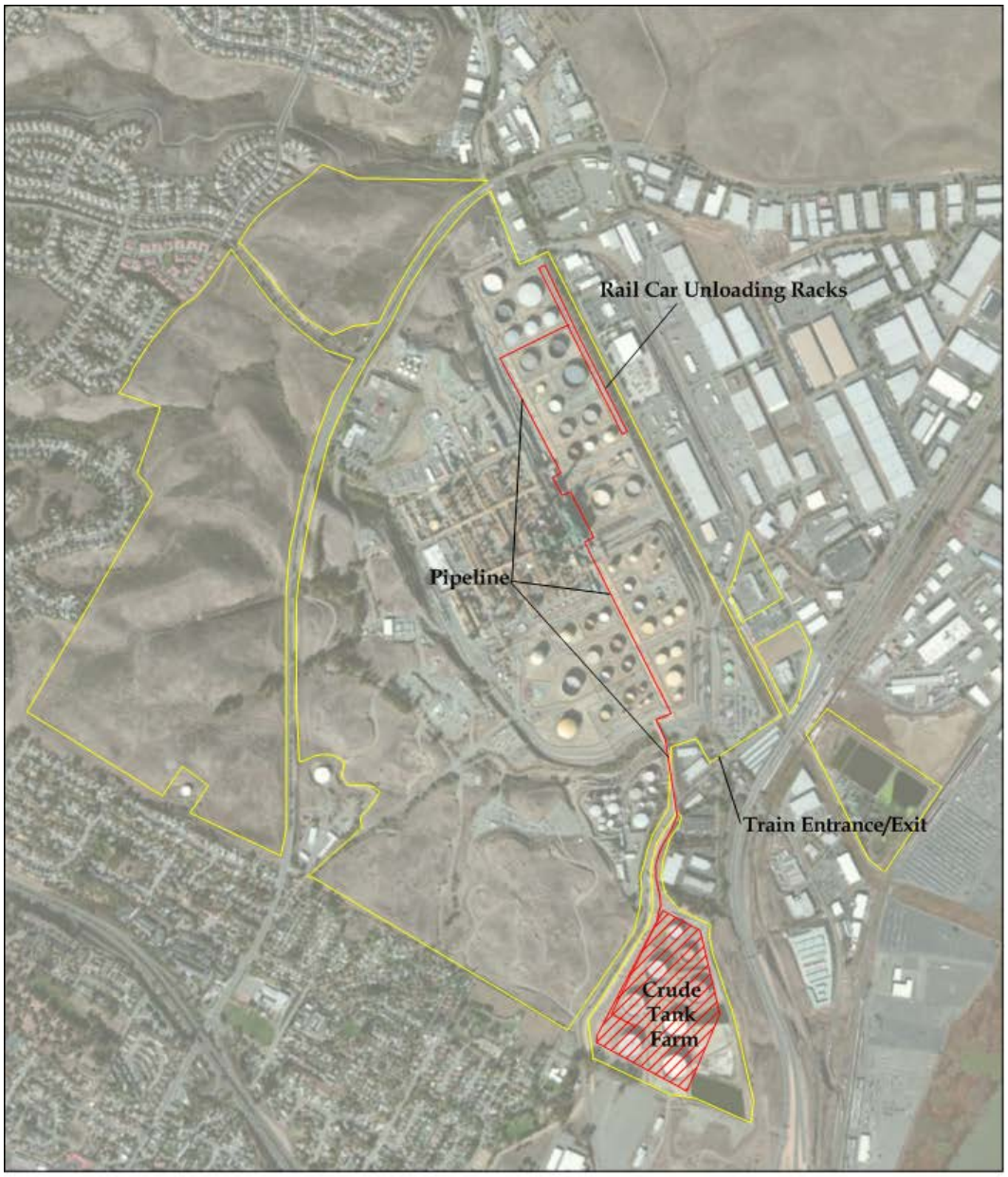


Figure 2-2

Valero Crude by Rail Project
Location Map
Benicia, California

2.2.1 Unloading Rack

An unloading rack would be constructed for this project, capable of unloading two parallel rows of rail cars (one row on each side) and transferring crude oil to the existing crude oil storage tanks located in the Crude Tank Farm. The rack would be installed in the northeastern portion of the main refinery property, between the eastern side of the lower tank farm and the fence adjacent to Sulphur Springs Creek. Each side of the rail car unloading rack would accommodate up to 25 rail cars at a time (two, 50-rail car "switches" per day would be transported to the rack by train). Each side of the rack would have 25 unloading stations, which would "bottom-unload" closed-dome rail cars using a 4-inch-diameter hose, with dry disconnect couplings, that would connect to a common header routed between the two sides of the rack (a 2-inch-diameter check valve, connected to the top of each rail car, would open to allow ambient air to enter during unloading and immediately close when unloading is finished). Three new pumps, two operating in parallel and one as an installed spare pump, would pump the crude oil from the unloading rack header via a new 16-inch pipeline tied into an existing 20-inch pipeline to Crude Tank Farm storage tanks (see Section 2.2.2 for tank details). Once emptied, the 50 rail cars would be disconnected from the rack, moved to the parallel, on-site departure spur, and then replaced by another 50-rail car switch (see Section 2.2.3 for a description of train and rail car movements, including duration).

The 1,500-foot-long unloading rack would be used only for unloading crude oil, up to 70,000 bbl per day (25.55 million barrels [MMbbl] per year); there would be no loading of crude oil or other materials at the rack. As a result, the only emissions associated with the unloading rack would be fugitive emissions from flanges, connectors, valves, and pumps (at the unloading rack and between the unloading rack and Crude Tank Farm). The rack would use isolation valves specified to comply with Best Available Control Technology (BACT) requirements for fugitive emissions.

The estimated number of new fugitive components associated with the project is presented in Table 2-1.

Table 2-1 Fugitive Component Counts

Component Type	Total Estimated Count – Post Project*
Pumps	3
Valves	600
Flanges	1,081
Connectors	340
Pressure Relief Valves/Other	6

All components in light liquid service.
Estimated counts include contingency factor of 15% for valves, flanges, and connectors.

Final component counts would be determined upon completion of construction.
A process flow diagram and project drawings are provided in Appendix A.

2.2.2 ~~Tank 1776 (District Source S-97)~~Tanks 1701-1708 (District Sources S-57 - S-62, S-1047, and S-1048)

Tank 1776 is no longer a part of the revised project. In the revised project, the crude oil received at the proposed rail car unloading rack will be transferred to the existing storage

tanks 1701 through 1708, located in Crude Tank Farm, and not to tank 1776, as proposed in the original project.

Tanks 1701 through 1708 (BAAQMD Facility #B5574, S-57 through S-62, and BAAQMD Facility #B2626 S-1047 and S-1048) are existing EFR tanks that are currently permitted to store crude oil. These tanks would be used to store the crude oil transferred from the rail car unloading rack, up to 70,000 bbl per day (25.55 MMbbl per year). Materials stored in these tanks are in full compliance with Regulation 8, Rule 5, for the type of material stored. Tanks 1701 through 1706 have historically stored crude oil delivered by ships and pipeline. Tanks 1707 and 1708 were recently constructed and were permitted under new source review (NSR) to store crude oil delivered by marine vessels and pipeline. Crude oil from marine vessels, pipelines, and the rail car unloading rack would be stored in these tanks after the project.

These tanks comply with the control and seal requirements of BAAQMD Regulation 8, Rule 5, and applicable permit conditions and will continue to do so with the implementation of this project without requiring physical modifications. Tanks 1701 through 1708 have a combined throughput limit of 62.6 MMbbl per year. Because these tanks are currently equipped and permitted to store crude oil, no changes in service or physical modifications are required or requested.

Table 2-2 *~~Tank 1776 Capacity and Dimensions~~Tanks 1701-1708 Capacity and Dimensions*

These tanks have a welded steel shell and their pontoon-type EFR is equipped with primary and tight-fitting secondary seals to minimize emissions. The roof fittings comply with the current District Rule 8-5 requirements for floating roof tanks.

2.2.3 Train Activity

Up to 100 rail cars per day would be unloaded at the refinery. Typically, two, 50-rail-car switches per day would occur between the unloading rack and the Union Pacific Railroad Company (UP) tracks southeast of the refinery and Highway 680. UP locomotive(s) would transport up to 50 rail cars at a time to the unloading rack. The locomotive(s) would remain with the rail cars while at the refinery. All trains would enter and exit along the southern refinery boundary, near the intersection of Park Road and Bayshore Road (see Figure 2-2 for location of the train entrance/exit).

After the 50 rail cars are emptied at the unloading rack, the locomotive(s) would move the empty rail cars to the adjacent storage and departure track where they would be reassembled into one 50-car train. The UP locomotive(s) would then transport them off site. This unloading cycle would then be repeated for the remaining 50 loaded rail cars.

The duration of this unloading process, from entry of 50 loaded rail cars to refinery property, unloading of the 50 rail cars, to exit of 50 empty rail cars from refinery property, would be approximately 8 to 10 hours (16 to 20 hours for 100 rail cars). Track layouts are provided in Appendix A.

3.0 EMISSION ESTIMATES

Estimated annual emissions have been calculated for the revised project to determine District permitting and emission offset requirements. Annual mass emissions are calculated based on 24-hour-per-day and 365-day-per-year operation. Net emissions are presented as the increase associated with the project based on post-project emissions minus baseline emissions. After consultation with the District, the baseline period was not revised for this project update document. Emissions presented in this project update document were estimated for the original baseline period of 3 years from December 2009 through November 2012.

A summary of project net emissions is presented in Table 3-1. Fugitive emissions from components reflect the increased number of components associated with the unloading rack and the additional pipeline from the unloading rack to Crude Tank Farm, including pumps, valves, flanges, and connectors. Train emissions reflect the potential emissions increase at maximum annual crude throughput of 25.55 MMbbl per year, while marine vessel emissions reflect the potential emissions decrease associated with a 25.55 MMbbl reduction in crude oil delivered by marine vessels.

Net emissions of precursor organic compounds (POCs) from fugitive component emissions (unloading rack, pumps, etc.) are the only pollutant increases associated with the project subject to District permitting requirements.

Tanks 1701 through 1708 are not affected by the revised project. Pursuant to BAAQMD Rules 2-1-233 and 2-1-234, these tanks are neither altered nor modified sources; therefore, these tanks are not subject to ATC and NSR requirements.

Tanks 1701 through 1708 will not undergo any of the following changes that could result in any increase in emissions:

- Physical modifications. No physical modifications to the tanks are required or requested. The tanks are currently constructed, equipped, and permitted to store crude oil. The tanks will continue to comply with these requirements with the implementation of this project without requiring physical modifications.
- Increase in throughput above the permitted level. No change in the throughput limit is requested. 70,000 bbl/day of crude oil from rail car offloading activities would replace an equivalent amount of crude oil offloaded from marine vessels to these tanks. No change is requested in the combined throughput limit for these tanks.
- Changes in material stored. The tanks are currently permitted to store crude oil received by marine vessels and pipeline. With the implementation of this project, the tanks will continue to store crude oil. The crude oil will be received from rail cars, as well as from marine vessels and pipeline. Tanks 1701 through 1706 have historically stored crude oil delivered by ships and pipeline. Tanks 1707 and 1708 were recently constructed and were permitted under NSR to store crude oil. These tanks currently comply with all the requirements in Regulation 8, Rule 5, and associated permit conditions.

Table 3-1 Emissions Summary

Source	Project Emissions, Net Change from Baseline (ton/yr)						
	POC	**NOx**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**GHG**
Unloading Rack and Pipeline Fugitive Components	1.88	-	-	-	-	-	-
Trains	1.70	33.04	5.60	0.83	0.81	0.02	5,593
Marine Vessels	(5.18)	(91.84)	(10.69)	(3.58)	(3.40)	(26.79)	(9,498)
Total	(1.61)	(58.80)	(5.09)	(2.75)	(2.59)	(26.77)	(3,905)

Project emissions estimates @ 25.55 MMbbl per year crude oil by rail. "()" indicates decrease.

POC = precursor organic compounds
NOx = oxides of nitrogen
CO = carbon monoxide
PM_{10} = particulate matter (10 microns or less)
$PM_{2.5}$ = particulate matter (2.5 microns or less)
SO_2 = sulfur dioxide
GHG = greenhouse gases, calculated as CO_2 equivalent (CO_2e)

3.1 ~~Tank Emissions~~

NOT APPLICABLE

3.1.1 ~~POC Emissions~~

NOT APPLICABLE

Table 3-2 ~~Tank 1776 POC Emissions~~

NOT APPLICABLE

3.1.2 ~~TAC Emissions~~

NOT APPLICABLE

Table 3-3 ~~Tank 1776 TAC Emissions~~

NOT APPLICABLE

3.2 Fugitive Component Emissions

3.2.1 POC Emissions

Net fugitive POC emissions from the project are based on the total count of new/additional components associated with the CBR project. POC emission increases are based on emission factors developed using the Correlation Equation Method (California Air Pollution Control Officers Association [CAPCOA]/California Air

Resources Board [CARB], 1999), with the District Rule 8-18 component emission definitions as the screening values. Total fugitive emissions are estimated by multiplying the emission factor for each component type by the estimated count of each component type. For the proposed project, total POC emissions increase from fugitive components are estimated to be 1.88 tons per year as presented in Table 3-4.

Table 3-4 Fugitive Component POC Emissions

Component Type	POC Emissions Increase (tons/yr)
Pumps	0.07
Valves	0.41
Flanges	1.22
Connectors	0.15
Pressure Relief Valves/Other	0.03
Total	**1.88**

All components in light liquid (crude oil) service. POC emissions increase represents net potential emissions. Existing pipeline has long pipe span with only a couple of valves and flanges, resulting in negligible baseline emissions.

Detailed fugitive emission calculations including the correlation equations, screening values, and resulting emission factors are presented in Appendix B.

3.2.2 Toxic Air Contaminant Emissions

Fugitive POC emissions contain compounds that are classified as toxic air contaminants (TACs). Using the liquid fraction for the default crude oil speciation provided in TANKS 4.09d program, TAC emissions were calculated from project component fugitive POC emissions and are presented in Table 3-5.

Per BAAQMD memorandum, dated April 23, 2013, to the original permit application, the crude oil currently available to Valero refinery is expected to have a sulfur content below 1.0 percent by weight. Though there is no direct correlation between the sulfur content and hydrogen sulfide concentration in crude oil, to be conservative for toxic health risk assessment purposes, the District requested Valero to assume 1 percent by weight sulfur as hydrogen sulfide in the crude oil.

Table 3-5 Fugitive Component TAC Emissions

TAC	CAS #	Wt. Percent in Crude Oil	Post-Project TAC Emissions	
			lb/hr	lb/yr
Benzene	00071-43-2	0.60%	2.57E-03	22.53
Ethylbenzene	00100-41-4	0.40%	1.71E-03	15.02
Hexane (n-)	00110-54-3	0.40%	1.71E-03	15.02
Toluene	00108-88-3	1.00%	4.29E-03	37.55
Xylenes (m-)	01330-20-7	1.40%	6.00E-03	52.57
Hydrogen Sulfide	6/4/7783	1.00%	4.29E-03	37.55

Consistent with District Rule 2-5-601, fugitive components on additional piping are considered new sources. Hourly and annual TAC emissions are based on the post-project emissions (i.e., the potential to emit). Detailed fugitive TAC emission calculations are documented in Appendix B.

3.3 Cargo Carrier Emissions

3.3.1 Criteria Pollutant Emissions

NO CHANGE

Table 3-6 Cargo Carrier Criteria Pollutant Emissions

NO CHANGE

4.0 APPLICABLE REGULATIONS

NO CHANGE

4.1 District Rules and Regulations

4.1.1 Regulation 1 – General Provisions and Definitions

NO CHANGE

4.1.2 Regulation 2 – Permits

4.1.2.1 Rule 2-1 – General Requirements

Section 2-1-301 – Authority to Construct

NO CHANGE

Section 2-1-302 – Permit to Operate

NO CHANGE

Section 2-1-412 – Public Notice, Schools

NO CHANGE

4.1.2.2 Rule 2-2 – New Source Review

NO CHANGE

Section 2-2-301 – Best Available Control Technology

Section 2-2-301 requires BACT to control emissions from any new source with the potential to emit 10 pounds per day or more of non-precursor organic compounds (NPOCs), POCs, NOx, SO_2, PM_{10}, or CO. Fugitive components (pumps, valves, flanges, connectors) would be subject to BACT because post-project POC emissions would be above 10 pounds per day. Cargo carriers (trains) are not subject to BACT per Section 2-2-206.

Fugitive components would meet the requirements specified in BAAQMD *Regulation 8, Rule 18, Equipment Leaks* and the specific BAAQMD *BACT Guidelines for Petroleum Refinery Fugitive Emissions* applicable to the component type. Fugitive components will be subject to the BAAQMD approved inspection and compliance program in Regulation 8-18 and District BACT guidelines for POC emissions.

After installation of the fugitive components associated with the CBR project, an actual count of fugitive components will be conducted when the new components are added to the Valero's Leak Detection and Repair (LDAR) program. This information will be provided to the BAAQMD to determine if any adjustments are needed for compliance with applicable requirements (i.e., a possible change in the quantity of required emission offsets).

Tanks 1701 through 1708 are not subject to NSR and BACT as they are not modified sources.

Table 4-1 ~~*BACT for EFR Tanks*~~

Section 2-2-302 and 2-2-303 – Project Emission Offsets

In accordance with Section 2-2-302, emission offsets must be provided for a new or modified source at a facility that emits or will be permitted to emit 35 tons per year or more of POC or NOx (minus any contemporaneous emission reduction credits) at a 1.15 to 1.0 ratio. The refinery is permitted to emit POC and NOx in excess of 35 tons per year. For new and modified sources, emission increases must be calculated in accordance with Sections 2-2-604 and 2-2-605. As presented in Table 4-2, the project results in an increase in POC emissions from fugitive component emissions. Valero plans to provide emission reduction credits at the prescribed ratio of 1.15 to 1.0 to offset the net project emission increase.

Table 4-2 *Emission Offsets*

Emission Source	**POC Emissions Increase (ton/yr)**	**NOx Emissions Increase (ton/yr)**	**PM_{10} Emissions Increase (ton/yr)**	**SO_2 Emissions Increase (ton/yr)**
Project Emissions				
Fugitive Components	1.88	0	0	0
Cargo Carriers (Trains, Marine Vessels)	*	*	*	*
Subtotal	*1.88*	*0*	*0*	*0*
Contemporaneous Emission Reductions				
None	0	0	0	0
Subtotal	*0*	*0*	*0*	*0*
Net Project Emission Increase	**1.88**	**0**	**0**	**0**
Emission Offset Requirement	**2.16**	**-**	**-**	**-**

Emissions are post-project net emissions (post-project potential emissions minus baseline emissions). Emission offset ratio is 1.15:1. Only POC, NOx, PM_{10}, and SO_2 are subject to emission offset requirements.
* There would be no increase in cargo carrier emissions (trains, marine vessels). See Table 3-6 for the estimated net change in emissions from cargo carriers. Cargo carrier emissions would continue to comply with the existing cargo carrier emission limits in Condition 20820, Parts 23-25.

See Appendix B for detailed calculations and assumptions.

Valero would surrender emission reduction credits for the required emission offsets upon confirmation by the District.

Section 2-2-304 through 2-2-306 – PSD Requirement

NO CHANGE

Section 2-2-317 – Maximum Achievable Control Technology Requirement

In accordance with Section 2-2-317, the District shall not issue an ATC for a new or modified source at a Major Facility of hazardous air pollutants (HAPs) unless the source will meet Best Available Control Technology for Toxics (TBACT), except as provided in Section 2-2-114. Section 2-2-114 allows an exemption from Section 2-2-317 when the combined increase in Potential to Emit from all related sources in a proposed construction or modification is less than 10 tons per year of any HAP and less than 25 tons per year of any combination of HAPs. The increase in HAP emissions from fugitive components associated with the project would be less than 10 tons per year of any HAP and less than 25 tons per year of all HAPs combined. Therefore, TBACT is not required for the associated project fugitive components pursuant to Section 2-2-317. Nevertheless, the BACT limits for fugitive components also constitute TBACT.

4.1.2.3 Rule 2-5 – New Source Review of Toxic Air Contaminants

In accordance with District Regulation 2-5-100, if the project's emissions of any TAC, which are identified in Table 2-5-1 of Regulation 2, Rule 5, exceed the indicated trigger level, then a risk analysis is required. "Project emissions" include emissions from new sources and increased emissions from modified sources. The rule requires that emissions of all TACs associated with a project be included in the risk analysis if any single TAC exceeds its hourly or annual trigger level. The trigger levels presented in Table 4-3 below are the trigger levels in the latest version of District Regulation 2-5, Table 2-5-1. These are updated from the levels that were presented in Table 4-3 of the original permit application.

According to Section 2-5-216, project emissions must include all approved projects within the 2-year period preceding an application, unless the emissions are demonstrated to be unrelated to those in the application. There are no approved projects within the 2-year period prior to this application that are related to this application. Therefore, no adjustment to project emissions is necessary.

Project TAC emissions are summarized in Table 4-3. Hourly TAC emissions are below acute trigger levels. Annual TAC emissions are below the chronic trigger level for all pollutants except benzene. Because benzene exceeds the District's chronic trigger level, Valero has included a completed District Health Risk Screening Assessment (HRSA) form in Appendix C and a detailed Health Risk Assessment (HRA) in Appendix D.

Table 4-3 TAC Emissions and District Trigger Levels

Pollutant	CAS Number	Post-Project Potential Emissions (lb/hr)	Emissions Increase Over Baseline (lb/year)	Trigger Levels (District Table 2-5-1)		Exceed Acute Trigger Level?	Exceed Chronic Trigger Level?
				lb/hr (Acute)	lb/yr (Chronic)		
Fugitive Components							
Benzene	71-43-2	2.57E-03	22.53	2.9	3.8	No	Yes
Ethylbenzene	100-41-4	1.71E-03	15.02	NA	43	No	No
Hexane (n-)	110-54-3	1.71E-03	15.02	NA	270,000	No	No
Toluene	108-88-3	4.29E-03	37.55	82	12,000	No	No
Xylenes (m-)	1330-20-7	6.00E-03	52.57	49	27,000	No	No
Hydrogen Sulfide	7783-06-4	4.29E-03	37.55	0.093	390	No	No

TAC emissions associated with locomotive operation are not subject to BAAQMD Regulation 2-5, which is applicable only to stationary sources requiring an ATC or a permit to operate (PTO). However, for the purposes of impact analysis under the California Environmental Quality Act (CEQA), the applicant conducted a detailed HRA that included diesel particulate matter (DPM) emissions from locomotive operation.

The Table 4-4 below summarizes the results of the detailed HRA for CEQA impact analysis. The details of the HRA are provided in Appendix D.

Table 4-4 Maximum Cancer Risk and Non-Cancer Health Effects Including Cargo Carrier for CEQA Analysis

Type of Estimated Health Impact	Cancer Risk (per million), (Receptor Location)	Chronic Hazard Index, (Receptor Location)	Acute Hazard Index, (Receptor Location)
Maximum Exposed Individual Residential (MEIR)* – Hypothetical residential receptors assumed at radii ≥ 40 m from the train tracks.	2.27 Hypothetical receptor at 150 m from center and 130° from north (578686E, 4215678N)	0.0009 Hypothetical receptor at 150 m from center and 130° from north (578686E, 4215678N)	0.0030 (575694E, 4212345N)
Maximum Exposed Individual Worker (MEIW)**	4.45 (576144E, 4214145N)	0.0137 (576144E, 4214145N)	0.0113 (576094E, 4212895N)
Maximum Sensitive Receptor (MSR)***	0.28 (574594E, 4212895N) The Learning Patch - Benicia (day care center)	0.0005 (574594E, 4212895N) The Learning Patch - Benicia (day care center)	0.0004 (574900E, 4212500N) Robert Semple Elementary School
CEQA Threshold Exceeded (Yes/No)	**10** **No**	**1.0** **No**	**1.0** **No**

* MEIR Cancer Risk = Modeled 70-year Resident Risk x 1.7 (ASF).

** 70-year residential cancer risk multiplied by adjustment factor 0.2199 to convert to worker cancer risk for MEIW.

*** MSR Cancer Risk = HARP Modeled 70-year Resident Risk x 9 years x 3 (ASF)/70 years.

Table 4-5 Maximum Cancer Risk and Non-Cancer Health Effects from Sources Requiring ATC

Type of Estimated Health Impact	Cancer Risk (per million), (Receptor Location)	Chronic Hazard Index, (Receptor Location)
Maximum Exposed Individual Residential (MEIR)*	0.031 (575694E, 4212345N)	0.0001 (575694E, 4212345N)
Maximum Exposed Individual Worker (MEIW)**	0.108 (576120E, 4213278N)	0.0031 (576120E, 4213278N)
Maximum Sensitive Receptor (MSR)**	0.002 (574900E, 4212500N) Robert Semple Elementary School	0.00003 (574900E, 4212500N) Robert Semple Elementary School
Regulation 2-5 Threshold Exceeded (Yes/No)	**1.0**	**0.2**
	No	**No**

* MEIR Cancer Risk = Modeled 70-year Resident Risk x 1.7 (ASF).

** 70-year residential cancer risk multiplied by adjustment factor 0.2199 to convert to worker cancer risk for MEIW.

*** MSR Cancer Risk = HARP Modeled 70-year Resident Risk x 9 years x 3 (ASF)/70 years.

As noted above, Regulation 2-5 is applicable only to stationary sources requiring an ATC or PTO. With respect to Regulation 2-5 applicability, the project includes only the fugitive piping components/equipment. For the project to trigger TBACT, the cancer risk must be greater than 1.0 in one million and/or the chronic hazard index must be greater than 0.2 per Regulation 2-5-301. As shown in Table 4-5, the risk values determined for this source indicate that the project is in compliance with Regulation 2-5-301 and 2-5-302 and does not trigger TBACT.

4.1.2.4 Rule 2-6 – Major Facility Review

NO CHANGE

4.1.3 Regulation 3 – Fees

NO CHANGE

4.1.4 Regulation 6 – Particulate Matter

Regulation 6, Rule 1, limits particulate matter and visible emissions. The fugitive components would not be sources of PM or visible emissions. The locomotives used to transport rail cars would emit PM, but Rule 6-1 does not apply to cargo carriers.

4.1.5 Regulation 7 – Odorous Substances

NO CHANGE

4.1.6 Regulation 8 – Organic Compounds

4.1.6.1 Rule 8-5 – Storage of Organic Liquids

NOT APPLICABLE TO REVISED PROJECT ELEMENTS

4.1.6.2 Rule 8-18 – Equipment Leaks

NO CHANGE

4.1.6.3 Rule 8-28 – Episodic Releases from Pressure Relief Valves at Petroleum Refineries and Chemical Plants

NO CHANGE

4.1.7 Regulation 10 – Standards of Performance for New Stationary Sources

NO CHANGE

4.1.8 Rule 11-12 – National Emission Standard for Benzene Emissions

NO CHANGE

4.2 California Environmental Quality Act

NO CHANGE

4.3 Federal Rules and Regulations

4.3.1 40 CFR 52.21 – Prevention of Significant Deterioration of Air Quality

NO CHANGE

4.3.2 40 CFR 60 Subpart A – General Provisions

Any source subject to an applicable standard under Title 40 of the Code of Federal Regulations (CFR) Part 60 is also subject to the general provisions of Subpart A. Because none of the project elements are subject to any other subparts of 40 CFR 60, the requirements of Subpart A do not apply.

4.3.3 40 CFR 60 Subpart Kb – Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

NOT APPLICABLE TO REVISED PROJECT ELEMENTS.

According to the definition of reconstruction or modification under the New Source Performance Standards (NSPS), tanks 1701 through 1708 are not being reconstructed or modified due to the proposed project. These tanks are not affected sources; therefore, they are not subject to 40 CFR 60 Subpart Kb.

4.3.4 40 CFR 60 Subpart GGGa – Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006

The project's group of equipment (valves, pumps, connectors, and flanges in POC service) is not within a process unit, as defined in §60.590a, and is therefore not an affected facility and not subject to 40 CFR 60 Subpart GGGa.

4.3.5 40 CFR 61 Subpart A – General Provisions

NO CHANGE

4.3.6 40 CFR 61 Subpart FF – Benzene Waste Operations NESHAP

NO CHANGE

4.3.7 40 CFR 63 Subpart A – General Provisions

NO CHANGE

4.3.8 40 CFR 63 Subpart CC – National Emission Standards for Petroleum Refineries

Commonly referred to as "Refinery MACT," Subpart CC applies to petroleum refining process units and related emission sources that emit or have equipment containing or contacting one or more HAPs listed in Subpart CC, and are located in a petroleum refinery that is a major source of HAPs. Subpart CC establishes standards for miscellaneous process vents, storage vessels, wastewater streams and treatment operations, equipment leaks, gasoline loading racks, and marine vessel loading operations. The project's fugitive component equipment leaks would be subject to this rule.

5.0 ESTIMATED PERMIT FEES

TO BE DETERMINED BY BAAQMD

Table 5-1 Estimated Permit Fees

TO BE DETERMINED BY BAAQMD

6.0 REFERENCES

Bay Area Air Quality Management District. 2010. Final Major Facility Review Permit, Valero Refining Co. – California, Facility #B2626. December 20, 2010.

Bay Area Air Quality Management District. 2013. *Best Available Control Technology (BACT) Guideline*. http://hank.baaqmd.gov/pmt/bactworkbook/default.htm.

California Air Pollution Control Officers Association (CAPCOA)/California Air Resources Board (CARB). 1999. *California Implementation Guidelines for Estimating Mass Emissions from Fugitive Hydrocarbon Leaks at Petroleum Facilities*. http://www.arb.ca.gov/fugitive/fugitive.htm.

Appendix A
Project Drawings and Specifications

Attachment A-1 – Process Flow Diagram – [REVISED]

Attachment A-2 – Plot Plan – [NO CHANGE]

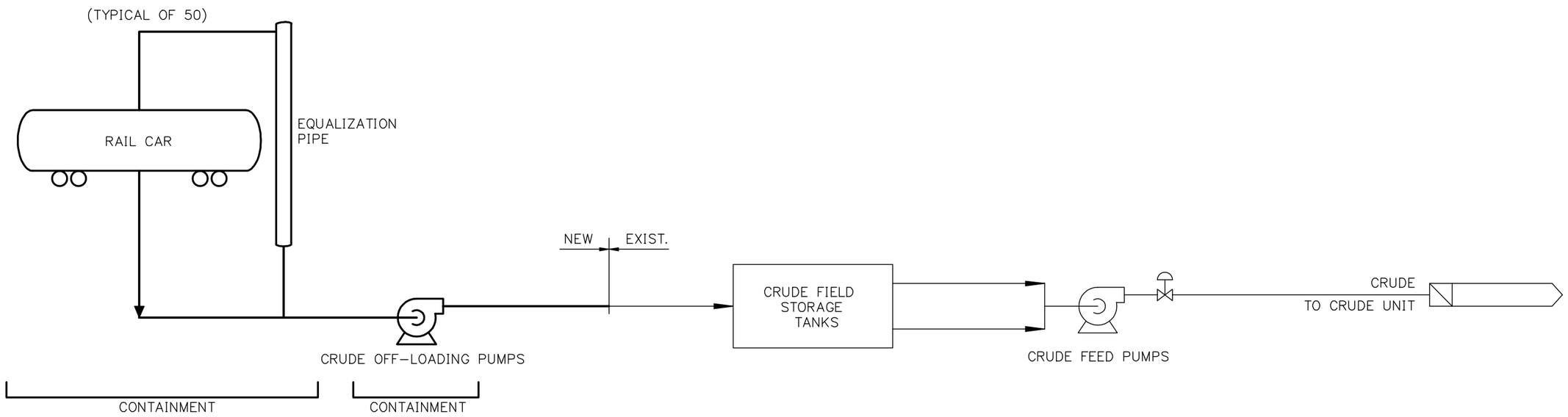
Public Copy

Attachment A-1
Process Flow Diagram

[REVISED]

Public Copy

LEGEND
NEW
EXISTING



REV.	DATE	DESCRIPTION	DSN.	CKD.	APD.	APD.
F	11-6-13	UPDATED TITLE BLOCK INFORMATION	SKL			
E	10-14-13	REVISED CRUDE DISPOSITION TO EXISTING CRUDE FIELD STORAGE FACILITIES	SKL			
D	7/8/13	GENERAL REVISION – PUBLIC VERSION	ALK			
C	1-31-13	GENERAL REVISION	SLK			
B	12-28-12	GENERAL REVISION	SKL			
A	12-10-12	CRUDE BY RAIL	SKL			

DSN.	VALERO	FOR INFORMATION – PHONE	AR/MR
DWN.	SKL 12/10/12		PS
CKD.			DDR
APD.			I/E
APD.			DBASE

VALERO REFINING COMPANY-CALIFORNIA
BENICIA REFINERY

TANKAGE — UNIT 32

CRUDE BY RAIL

PROCESS FLOW DIAGRAM

SCALE: NONE
DATE: 12/10/12
DRAWING NO. 132-FD-1-3588093 (P)
REVISION F

132FD1-3588093(P)-E.DWG SKL 131106.1009 CHK

Public Copy

Attachment A-2
Plot Plan

[NO CHANGE]

Appendix B
Emission Calculations

~~Attachment B-1 – Tank 1776 Baseline Throughput and Emissions~~

[EXCLUDED]

~~Attachment B-2 – Tank 1776 Post-Project Emissions~~

[EXCLUDED]

Attachment B-3 – Fugitive Component Emissions

[REVISED]

Attachment B-4 – Cargo Carrier Emissions

[NO CHANGE]

~~*Attachment B-1*~~
~~*Tank 1776 Baseline Throughput and Emissions*~~

[EXCLUDED]

~~*Attachment B-2*~~
~~*Tank 1776 Post-CBR Emissions*~~

[EXCLUDED]

Public Copy

Attachment B-3
Fugitive Component Emissions

[REVISED]

Public Copy

Crude By Rail Project
Post-Project Fugitive Component Emissions Estimates
10/21/2013

Emission Factors

Component Type	Screening Value (SV)	Correlation Equation	Hourly Emissions	Daily Emissions
	max ppm	kg/hr/comp	lb/hr/comp	lb/day/comp
Pumps	500	5.07E-05(SV)^0.622	5.33E-03	0.12803
Valves	100	2.27E-06(SV)^0.747	1.56E-04	0.00375
Flanges	100	4.53E-06(SV)^0.706	2.58E-04	0.00619
Connectors	100	1.53E-06(SV)^0.736	1.00E-04	0.00240
PSVs/Other	500	8.69E-06(SV)^0.642	1.04E-03	0.02485

Correlation Equation from Table IV-3a (CAPCOA-Revised 1995 EPA Correlation Equations and Factors for Refineries and Marketing Terminals), California Implementation Guidelines for Estimating Mass Emissions from Fugitive Hydrocarbon Leaks at Petroleum Facilities, February 1999.

Screening Value (SV) from BAAQMD Regulation 8, Rule 18 component emission limits

Post-Project Component Count Estimates

Component Type	Component Count Estimate		
	Total	% Contin	Total (w/Contin)
Pumps	3	0	**3**
Valves	521	15%	**600**
Flanges	940	15%	**1081**
Connectors	295	15%	**340**
PSVs/Other	6	0%	**6**
Total			**2,030**

Equipment counts per Valero, October 2013. Total component counts for valves, flanges, and connectors includes 15% contingency.

POC and TAC Emissions

Component Type	Total Count	POC Emission Factor (lb/day/comp)	POC Emissions		TAC Emissions					
					Benzene	Ethylbenzene	Hexane (-n)	Toluene	Xylenes (-m)	Hydrogen Sulfide
					0.60%	0.4%	0.4%	1.00%	1.4%	1.00%
			Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)	Annual Emissions (lb/yr)
Pumps	3	0.12803	0.38	140.2	0.84	0.56	0.56	1.40	1.96	1.40
Valves	600	0.00375	2.25	820	4.92	3.28	3.28	8.20	11.49	8.20
Flanges	1,081	0.00619	6.69	2,442	14.65	9.77	9.77	24.42	34.19	24.42
Connectors	340	0.00240	0.82	297.9	1.79	1.19	1.19	2.98	4.17	2.98
PSVs	6	0.02485	0.15	54.42	0.33	0.22	0.22	0.54	0.76	0.54
Total	2,030	-	**10.29**	**3,755**	**22.53**	**15.02**	**15.02**	**37.55**	**52.57**	**37.55**

TAC speciation percentages based on EPA TANKS 4.09d default speciaiton profile for Crude Oil for BTEX and n-hexane. H2S assumed to be equal to total sulfur content in crude oil.

Emissions Summary (ton/yr)

Component Type	POC	Benzene	Ethylbenzene	Hexane (-n)	Toluene	Xylenes (-m)	Hydrogen Sulfide
Pumps	0.07	4.21E-04	2.80E-04	2.80E-04	7.01E-04	9.81E-04	7.01E-04
Valves	0.41	2.46E-03	1.64E-03	1.64E-03	4.10E-03	5.74E-03	4.10E-03
Flanges	1.22	7.33E-03	4.88E-03	4.88E-03	1.22E-02	1.71E-02	1.22E-02
Connectors	0.15	8.94E-04	5.96E-04	5.96E-04	1.49E-03	2.08E-03	1.49E-03
PSVs	0.03	1.63E-04	1.09E-04	1.09E-04	2.72E-04	3.81E-04	2.72E-04
Total	**1.88**	**1.13E-02**	**7.51E-03**	**7.51E-03**	**1.88E-02**	**2.63E-02**	**1.88E-02**

Attachment B-4
Cargo Carrier Emissions

Train Criteria Pollutant and GHG Emissions

Marine Vessel Criteria Pollutant and GHG Baseline Emissions

[NO CHANGE]

Public Copy

Train
Criteria Pollutant and GHG Emissions

[NO CHANGE]

Public Copy

Marine Vessel
Criteria Pollutant and GHG
Baseline Emissions

[NO CHANGE]

Public Copy

Appendix C
District ATC Application Forms

Form P-101B - [NO CHANGE]

~~Form T -~~ [EXCLUDED]

Form HRSA - [REVISED]

Public Copy

Form HRSA

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street . . . San Francisco, CA 94109. . . (415) 749-4990 . . . FAX (415) 749-5030 OR 4949
WEBSITE: WWW.BAAQMD.GOV

Health Risk Screening Analysis

IMPORTANT: For any permit application that requires a Health Risk Screening Analysis, fill out one form for each source that emits a Toxic Air Contaminant(s) [or for a group of sources that exhaust through a common stack]. Emissions can be from a discrete point source (with stack) or a source with fugitive emissions (area or volume source). You must provide a plot plan (drawn to scale, if possible) and a local map (aerial photos are recommended), which clearly demonstrate the location of your site, the source(s), property lines, and any surrounding buildings [see attached example]. Label streets, schools, residences, and other businesses. List major dimensions of all buildings surrounding the source in Section C.

Plant Name: Valero Refining Co. - California Plant No.: B2626

Source Description: Fugitive Piping Components/Equipment

Source No.: S-new (if known) Emission Point No.: P-new (if known)

SECTION A *(Point Source)*

1. Does the source exhaust at clearly defined emission point; i.e., a stack or exhaust pipe? ☐ YES OR ☒ NO

   (If YES continue at #2, If NO, skip to Section B)

~~2. Does the stack (or exhaust pipe) stand alone or is it located on the roof of a building? ☐ alone OR ☐ on roof~~

~~*Important: If stack is on a roof, provide building dimensions on line B1 in* Section C.~~

~~3. What is the height of the stack outlet above ground level? _____ feet OR _____ meters?~~

~~4. What is the inside diameter of the stack outlet? _____ inches OR _____ feet OR _____ meters~~

~~5. What is the direction of the exhaust from the stack outlet? ☐ horizontal OR ☐ vertical~~

~~6. Is the stack outlet: ☐ open or hinged rain flap OR ☐ rain capped (deflects exhaust downward or horizontally)~~

~~7. What is the exhaust flowrate during normal operation? ___ feet^3/min OR ___ meters^3/second~~

~~8. What is the typical temperature of the exhaust gas? __ degrees Fahrenheit OR ___ degrees Celsius~~

~~(Skip Section B and Go on to Section C)~~

SECTION B *(Area/Volume Source)*

This section applies to fugitive emissions that are NOT captured by a collection system nor directly emitted through a stack or other emission point. Volume sources have fugitive emissions generally released within a building or other defined space (e.g., dry cleaner, gasoline station canopy). Area sources are generally flat areas of release (e.g., landfill, quarry).

1. Is the emission source located within a building? ☐ YES (go to #2) OR ☒ NO (go to #3)

~~2. If YES (source inside building), provide building dimensions on line B1 in Section C~~

~~a. Does the building have a ventilation system that is vented to the outside? ☐ YES OR ☐ NO~~

~~b. If NO (ventilation), are the building's doors & windows kept open during hours of operation? ☐ YES OR ☐ NO~~

3. If NO (source not inside building), provide a description of the source, dimensions, & indicate location on plot plan.

Fugitive emissions from pipeline component/equipment leaks

(Go on to Section C)

SECTION C *(Building Dimensions)*

Provide building dimensions. Use Line B1 only for building with source/stack on the roof or with fugitive emissions inside building. Use Lines B2-B9 for buildings surrounding the source (within 300 feet). Distance and direction are optional if map and/or aerial photo are adequately labeled with locations of buildings. Check one for units: ☐ feet OR ☐ meters

B#	Building name or description	Height	Width	Length	Distance To Source	Direction To Source
B1	Building with source:				n/a	n/a
B2	See Appendix D					
B3						
B4						
B5						
B6						
B7						
B8						

NOTE: Label buildings by B# on plot plan, map and/or aerial photo. Provide comments below for any details that need additional clarification (e.g., list buildings that are co-occupied by your employees and other workers, residents, students, etc).

(Go on to Section D)

SECTION D *(Receptor Locations)*

NOTE: Indicate on maps or aerial photos the residential and nonresidential areas surrounding your facility.

1. Indicate the area where the source is located (check one):

☐ zoned for residential use ☐ zoned for mixed residential and commercial/industrial use

☒ zoned for commercial and/or industrial use ☐ zoned for agricultural use

2. Distance from source (stack or building) to nearest facility property line = ~650 feet OR ____ meters
3. Distance from source (stack or building) to the property line of the nearest residence = ~4,000 feet OR _____ meters
4. Describe the nearest nonresidential property (check one): ☒ Industrial/Commercial OR ☐ Other _____
5. Distance from source (stack or building) to property line of nearest nonresidential site = ~750 feet OR ___ meters
6. Distance from source to property line of nearest school* (or school site) = _____ feet OR ☒ Greater than 1,000 feet

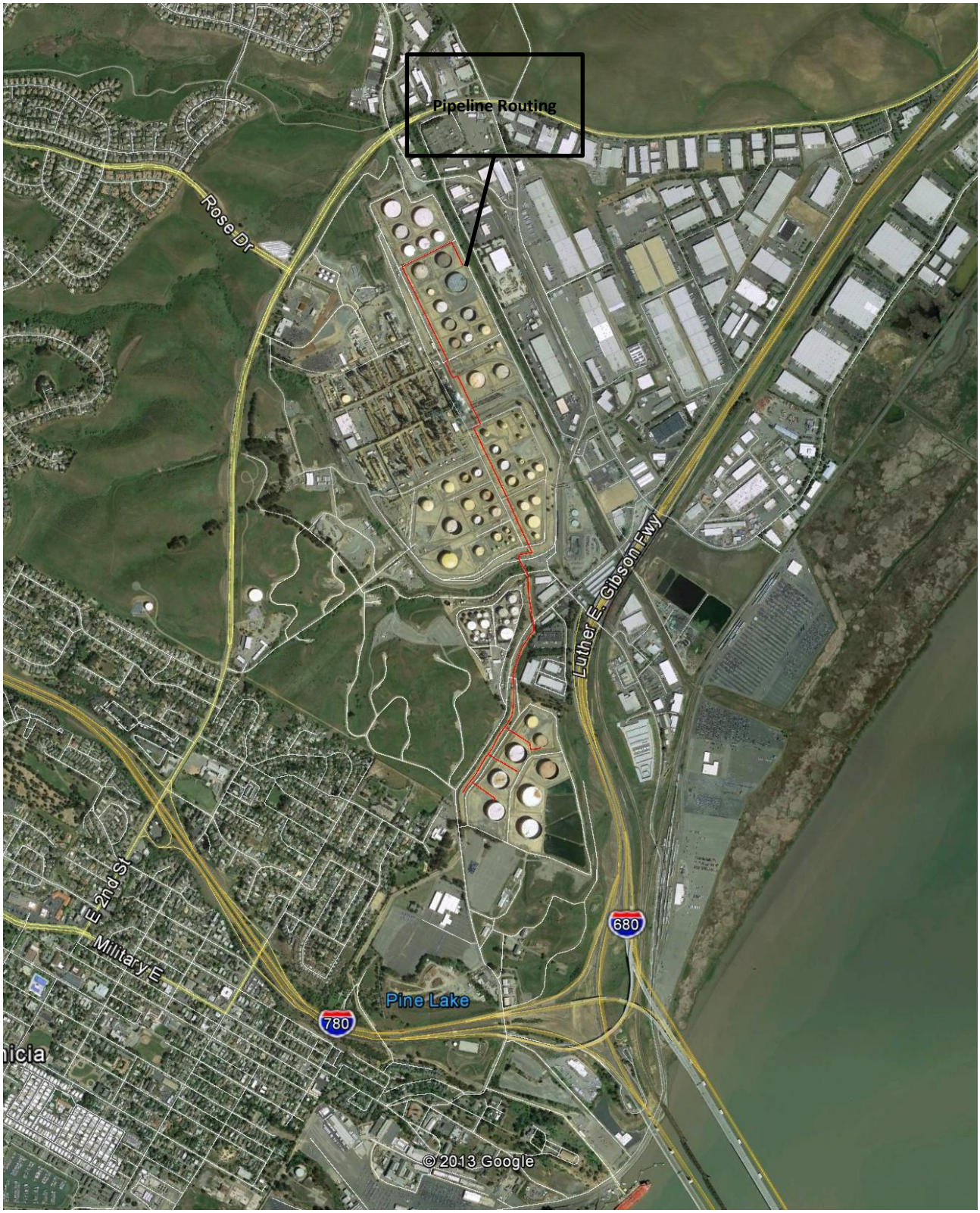
[Note: Helpful website with California Dept. of Education data: www.greatschools.net]

Provide the names and addresses of all schools* that have property line(s) within 1,000 feet of the source:

*K-12 and more than twelve children only

Public Copy

HRSA-2



Source: Google Earth, queried October 2013.

Public Copy

Appendix D
Health Risk Assessment

[Modeling files on CD]

This health risk assessment (HRA) is being submitted to BAAQMD as part of the Project Update Document #1 for BAAQMD Regulation 2-5 review. A comprehensive HRA was conducted for the purposes of health risk impact analysis under CEQA. This comprehensive HRA included both sources that will require an ATC and the sources that are not subject to ATC requirements, such as cargo carriers.

Results of the HRA performed by ERM are provided in Tables 1 and 2 below. Table 1 provides results of the comprehensive HRA, including all sources requiring and not requiring an ATC. Table 2 provides the results from only those sources that will require an ATC. As discussed in the project update document, only the piping components such as valves and flanges require an ATC for the revised project.

This risk analysis includes toxics listed in BAAQMD Reg. 2-5, including benzene, diesel particulate matter (DPM), ethylbenzene, toluene, xylenes, hexane, and hydrogen sulfide. As shown in Table 1, the cancer risk at the maximum exposed individual residential (MEIR) receptor, maximum exposed individual worker (MEIW) receptor, and maximum sensitive receptor (MSR) each is below 10 in a million. The chronic hazard index and the acute hazard index, at the MEIR, MEIW and MSR, are also below 1.0.

Table 1: Maximum Cancer Risk and Non-cancer Health Effects Including Cargo Carriers for CEQA Analysis

Type of Estimated Health Impact	Cancer Risk (per million), (Receptor Location)	Chronic Hazard Index, (Receptor Location)	Acute Hazard Index, (Receptor Location)
Maximum Exposed Individual Residential (MEIR)* – Hypothetical residential receptors assumed at radii ≥ 40 m from the train tracks.	2.27 Hypothetical receptor at 150 m from center and 130° from North (578686E, 4215678N)	0.0009 Hypothetical receptor at 150 m from center and 130° from North (578686E, 4215678N)	0.0030 (575694E, 4212345N)
Maximum Exposed Individual Worker (MEIW)**	4.45 (576144E, 4214145N)	0.014 (576144E, 4214145N)	0.0113 (576094E, 4212895N)
Maximum Sensitive Receptor (MSR)***	0.28 (574594E, 4212895N) The Learning Patch - Benicia (day care center)	0.0005 (574594E, 4212895N) The Learning Patch - Benicia (day care center)	0.0004 (574900E, 4212500N) Robert Semple Elementary School
CEQA Threshold	**10**	**1**	**1**
Exceeded (Yes/No)	**No**	**No**	**No**

* MEIR Cancer Risk = Modeled 70-yr Resident Risk x 1.7 (ASF)

** 70-year residential cancer risk multiplied by adjustment factor 0.2199 to convert to worker cancer risk for MEIW

*** MSR Cancer Risk = HARP Modeled 70-yr Resident Risk x 9 years x 3 (ASF)/70 years

As shown in Table 2, the cancer risk from fugitive piping components/equipment leaks at the maximum exposed individual residential (MEIR) receptor, maximum exposed individual worker (MEIW) receptor, and maximum sensitive receptor (MSR) each is below 1 in a million and the chronic hazard index at the MEIR, MEIW and MSR each is also below 0.2. Therefore, the project is in compliance with Regulation 2-5-301 and 2-5-302 and does not trigger TBACT.

Table 2: Maximum Cancer Risk and Non-cancer Health Effects

Type of Estimated Health Impact	Cancer Risk (per million), (Receptor Location)	Chronic Hazard Index, (Receptor Location)
Maximum Exposed Individual Residential (MEIR)*	0.031 (575694E, 4212345N)	0.0001 (575694E, 4212345N)
Maximum Exposed Individual Worker (MEIW)**	0.108 (576120E, 4213278N)	0.0031 (576120E, 4213278N)
Maximum Sensitive Receptor (MSR)**	0.002 (574900E, 4212500N) Robert Semple Elementary School	0.00003 (574900E, 4212500N) Robert Semple Elementary School
Regulation 2-5 Threshold	**1.0**	**0.2**
Exceeded (Yes/No)	**No**	**No**

* MEIR Cancer Risk = Modeled 70-yr Resident Risk x 1.7 (ASF)

** 70-year residential cancer risk multiplied by adjustment factor 0.2199 to convert to worker cancer risk for MEIW

*** MSR Cancer Risk = HARP Modeled 70-yr Resident Risk x 9 years x 3 (ASF)/70 years

The following sources were modeled for the HRA using the ISCST3 air dispersion model:

1. Locomotive idling – as point source;
2. Locomotive transit – as a line of volume sources;
3. Locomotive switching – as a line of volume sources;
4. Fugitive equipment leak – as a line of rectangular area sources

Locomotive emissions during transit mode were modeled over a track length of 4 miles out from the unloading rack. The modeling domain around the refinery was taken out to approximately 4 miles, as this is distance beyond which there would be minimal impacts from the piping fugitives and train idling. It must be noted that there are no residences along the 4 miles of modeled train route. However, in Fairfield (within the BAAQMD jurisdiction), there are residences as close as 40 meters from the train route. Since the modeling domain did not extend all the way to Fairfield, additional hypothetical residential receptors were assumed, in polar coordinate system at spacing of 10 degrees and radial distance of 30m through 150 m from the locomotive volume source to account for the exposure to nearby residences as the train passes through Fairfield. Residences in Benicia near the refinery are much farther away from the locomotive activity than 40 meters. Therefore, for TAC exposure from locomotive idling and fugitives the estimated MEIR risk shown above is very conservative.

Locomotive emissions during switching mode were modeled over an approximate two train–lengths (3300 feet) from the unloading rack. As a portion of the track within the facility would be used for both switching and transit, emissions from the two activities were added and assigned to the common volume sources. Five years of meteorological data from the BAAQMD meteorological site "Valero Admin" (Site Id 8704) was used. These data can be downloaded from the BAAQMD website. The NAD 27 UTM coordinate system was used to identify source, receptor and building/structure locations. Digital Elevation Model (DEM) files were used to obtain the elevations for sources, receptors, and buildings/structures.

Figure 1 shows the receptor grid modeled and Figure 2 shows the location of modeled sources, facility boundary, and locations of maximum exposed receptors.

Risk was directly modeled in ISCST3 using the unit risk factors (URFs) for cancer risk and reference exposure levels (RELs) for non-cancer health effects, as the exposure pathway for all the toxic air contaminants (TACs) emitted from the above sources is inhalation only. The risk input to the ISCST3 model, for each source, was calculated as shown below. As a result, the ISCST3 model output is residential cancer risk in terms of risk per million and non-cancer risk in terms of hazard index.

$$Cancer\ Risk\ Modeled_j = \sum_i ER_i\ x\ URF_i\ x\ 10^6$$

$$Non - Cancer\ Risk\ Modeled_j = \sum_i \frac{ER_i}{REL_i}$$

Where:

j	=	*Emissions source modeled*
i	=	*Toxic air contaminant*
ER	=	*Emission rate of toxic air contaminant i in g/s from source j*
URF	=	*Unit risk factor of toxic air contaminant i*
REL	=	*Reference exposure level of toxic air contaminant i*

Cancer risk at the MEIR was estimated as modeled residential risk multiplied by the BAAQMD-recommended age specific factor of 1.7.

Cancer risk at the MEIW was estimated as modeled residential risk multiplied by 0.2199, which is the average OEHHA adjustment factor to convert inhalation based cancer risk estimates for a residential receptor to a worker receptor, based on the difference in the length of time of exposure.

The sensitive receptor with highest modeled residential cancer risk is a day care center (The Learning Patch Benicia). Cancer risk at this day-care was estimated as shown below:

$$Cancer\ Risk\ at\ Day\ Care = \frac{Modeled\ Residential\ Risk\ x\ ED_C x\ ASF}{ED_R}$$

Where:

ED_C	=	*Exposure duration for children at school = 9 years*
ASF	=	*Age sensitivity factor for children at school = 3*
ED_R	=	*Exposure duration for residential receptor = 70 years*

Factors listed above are standard factors used in the calculation.

Public Copy

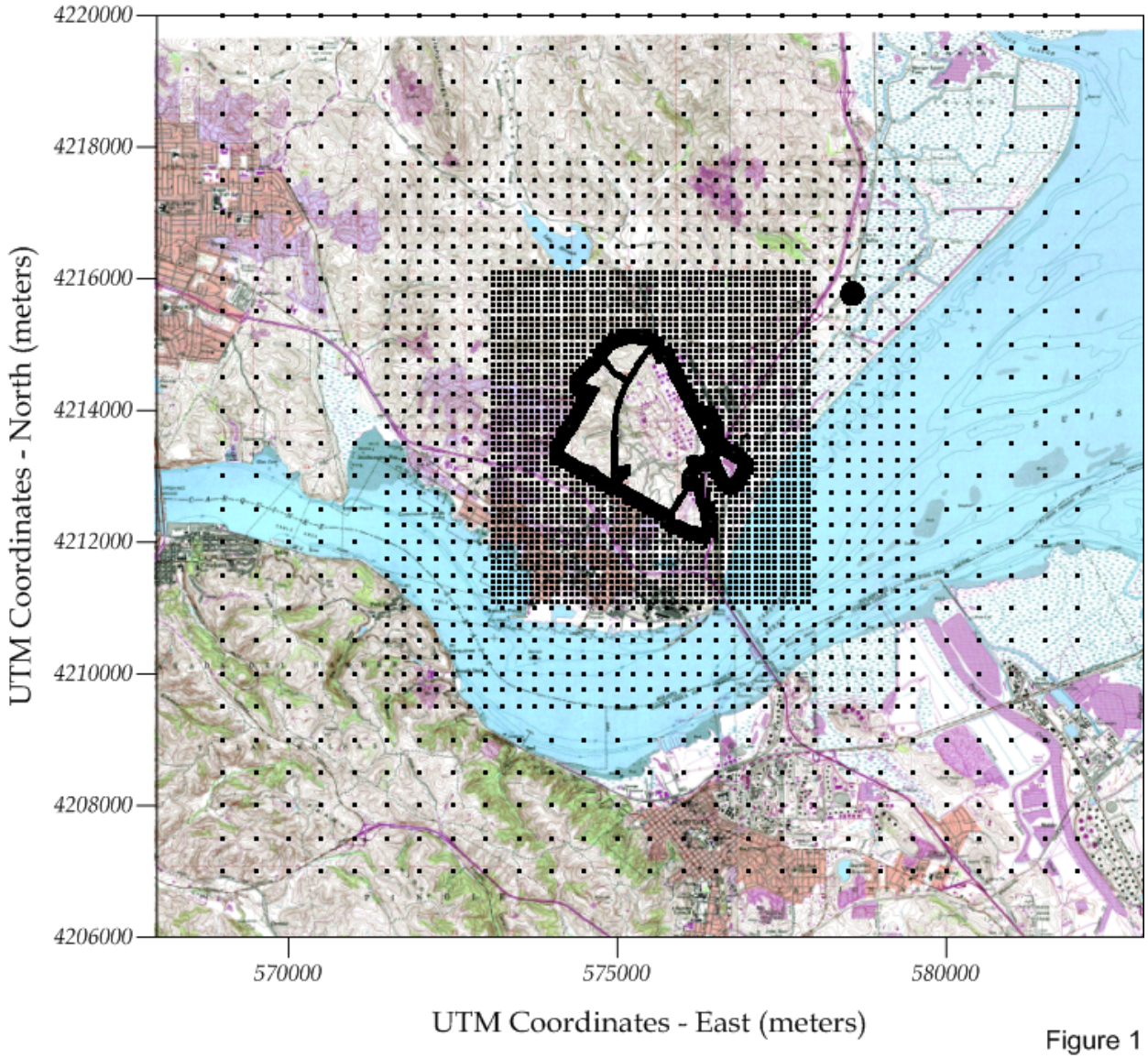


Figure 1

Receptor Locations
Valero - Crude by Rail Project
Benicia, California

Public Copy

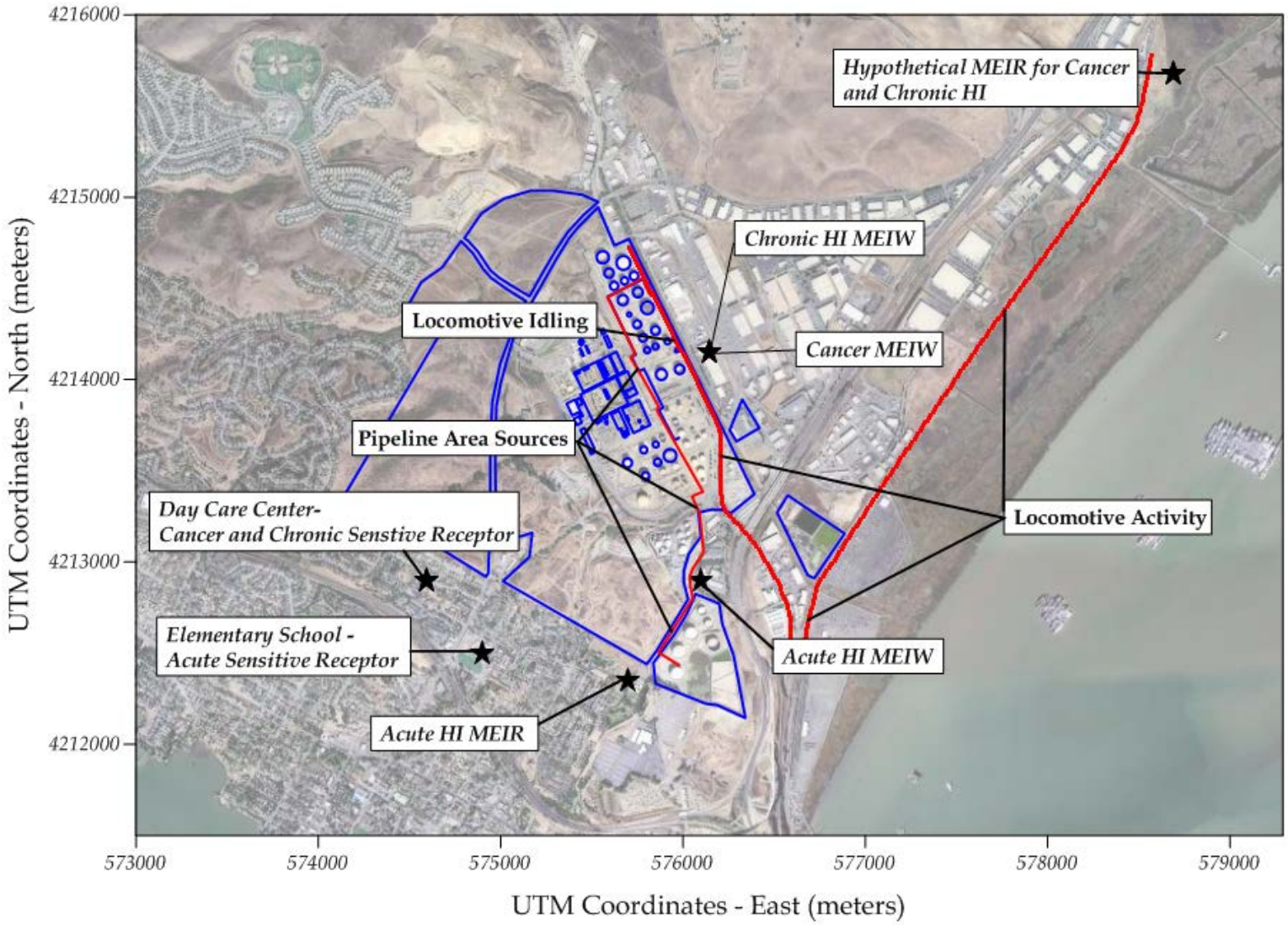


Figure 2

Source and Health Risk Assessment Result Locations
Valero - Crude by Rail Project
Benicia, California

Appendix E.5

Air Quality and GHG Emissions Supplement

ESA

VALERO CRUDE BY RAIL PROJECT AIR QUALITY AND GREENHOUSE GAS EMISSIONS SUPPLEMENT

11-Jun-14

CRITERIA POLLUTANT EMISSIONS

Source	Round Trip Mileage	ROG	NOx	CO	Sox	PM10	PM2.5
Long Line Haul within Bay Area (tons/year)*	44.00	1.02	21.42	4.22	0.02	0.57	0.55
Long Line Haul emission factor - tons/(1,000 miles rail haul-1,000,000 barrels)		0.91	19.05	3.75	0.01	0.51	0.49
Baseline Main Marine Vessel Engine Emissions within Bay Area**	98.97	2.00	36.00	3.00	5.00	1.00	1.00
Baseline Main Vessel Engine Emissions Displaced - within Bay Area	98.97	1.64	29.56	2.46	4.10	0.82	0.82
Baseline Main Vessel Engines emission factor - tons/(1,000 miles marine vessel haul-1,000,000 barrels-year)		0.65	11.69	0.97	1.62	0.32	0.32

*Source data from Appendix E.3. Attachment B-4, Cargo Carrier Emissions, Train Criteria Pollutant and GHG Emissions, page 6, second table, row "BAAQMD Border to Valero Refinery." PDF page 40 indicates that the total track length in BAAQMD is 22 miles.

**Source data from Appendix E.2. Marine Vessel Criteria Pollutant and GHG Baseline Emissions; round trip of 86 nm within Bay Area Basin. These values were converted to miles.

1 mile = 0.86898 nautical miles

Emission Sources for Example Crude Oil Origins	Approximate One-way Distance (miles)	Emissions					
		ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Baseline Marine Vessel Main Engines - Alaska (tons/year)	2,000.00	66.37	1,194.58	99.55	165.91	33.18	33.18
Baseline Marine Vessel Main Engines - South America (tons/year)	4,000.00	132.73	2,389.16	199.10	331.83	66.37	66.37
Baseline marine Vessel Main Engines - Middle East Origin	8,500.00	282.05	5,076.97	423.08	705.14	141.03	141.03
Baseline Marine Vessel Main Engines - Composite Baseline Origin	7,305.00	242.40	4,363.21	363.60	606.00	121.20	121.20
Locomotives – large line haul from North America (tons/year)	1,500.00	69.55	1,460.45	287.73	1.02	38.93	37.77
Net Emissions with Alaskan Origin Baseline (tons/year)		3.18	265.87	188.18	-164.89	5.75	4.59
Net Emissions with South American Origin Baseline (tons/year)		-63.19	-928.71	88.63	-330.81	-27.43	-28.59
Net Emissions with Middle East Origin Baseline		-212.51	-3,616.52	-135.35	-704.11	-102.10	-103.25
Net Emissions with Composite Baseline Origin Baseline		-172.86	-2,902.76	-75.87	-604.98	-82.27	-83.43

Emission within other Air Districts	Approximate roundtrip Distance (miles)	Emissions					
		ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Locomotives – large line haul in Yolo-Solano AQMD (tons/yr)	64.00	1.48	31.16	6.14	0.02	0.83	0.81
Locomotives – large line haul in Yolo-Solano AQMD (lbs/yr)		8.13	170.72	33.63	0.12	4.55	4.42
Locomotives – large line haul Sacramento Metro District (tons/yr)	31.00	0.72	15.09	2.97	0.01	0.40	0.39
Locomotives – large line haul Sacramento Metro District (lbs/yr)		3.94	82.69	16.29	0.06	2.20	2.14
Locomotives – large line haul Placer County (tons/yr)	5.00	0.12	2.43	0.48	0.00	0.06	0.06
Locomotives – Switching (tons/yr)		0.50	8.13	1.04	0.00	0.18	0.18
Locomotives - Placer County Total (tons/yr)		0.62	10.57	1.52	0.01	0.24	0.24
Locomotives – large line haul Placer County (lbs/yr)		0.64	13.34	2.63	0.01	0.36	0.34
Locomotives – Switching (lbs/yr)		2.75	44.57	5.72	0.02	0.99	0.99
Locomotives - Placer County Total (lbs/day)		3.38	57.91	8.34	0.03	1.34	1.33

GHG EMISSIONS

Marine Vessel Baseline CO2e Emissions within California	pounds*	tons*	metric tons
Total Emissions over Baseline Period	94,311,916		42,779.60
Annual Average Emissions over Baseline Period		15,718.65	14,259.87
Estimated Baseline Emissions Offset by Project		12,904.98	11,707.32

*Source data from Appendix E.2. 138 mile round trips within California.

Source	Round Trip Mileage	CO_2e (tons/year)	CO_2e (metric tons/year)
Long Line Haul from Roseville to Refinery*	136.00	5,058.00	4,588.59
Long Line Haul emission factor - metric tons/(1,000 miles rail haul-1,000,000 barrels-year)			1,320.53
Average Long Line Haul from State Line to Roseville	390.0		13,158.45
Small Line Haul within Refinery*		149.00	135.17
Switching within Refinery*		387.00	351.08
Baseline Vessel Engine Emissions from CA Coastal Waters Boundary to the Sea Buoy**	138.09	4,150.35	3,765.18
Baseline Vessel Engine Emissions from CA Coastal Waters Boundary to the Sea Buoy Displaced	138.09		3,091.20
Baseline Main Vessel Engines emission factor - metric tons/(1,000 miles marine vessel haul-1,000,000 barrels-year)			876.12
Indirect Emissions - Electricity Consumption***		198.00	179.62
Amortized Construction Emissions			20.00
Total Project emissions within California (metric tons/year)			18,432.92
Total Project Net emissions within California (metric tons/year)			6,725.59

*Source data from ERM, 2013b. Attachment B-4, Cargo Carrier Emissions, Train Criteria Pollutant and GHG Emissions, page 6, second table, row "BAAQMD Border to Valero Refinery." PDF page 40 identifies track length between Roseville rail yard and Refinery is 68 miles. Average long line haul from State line to Roseville represents a composite distance between Roseville and the Oregon and Nevada borders = (100 + 290)/2 = 195.

**Source data from ERM, 2014a. Attachment B-4, Marine Vessel Criteria Pollutant and Greenhouse Gas Baseline Emissions.

***Source data from Valero response to comments.

1 mile = 0.86898 nautical miles

Emission Sources for Example Crude Oil Origins	Approximate Distance (miles)	tons per 25,550,000 barrels delivered per year
		CO2e
Baseline Marine Vessel Main Engines - Alaska	2,000	89,540
Baseline Marine Vessel Main Engines - South America	4,000	179,080
Baseline Marine Vessel Main Engines - Middle East	8,500	380,544
Baseline Marine Vessel Main Engines - Composite Baseline Origin	7,305	327,044
Locomotives – large line haul from North America	1,500	101,219
Net Emissions with Alaskan Origin Baseline		11,679
Net Emissions with South American Origin Baseline		-77,861
Net Emissions with Middle East Origin Baseline		-279,325
Net Emissions with Composite Origin Baseline		-225,825

Appendix E.6

Updated Methodology for Assessment of Risk and PM2.5 Concentrations at Receptors near Locomotive Tracks in Fairfield, CA

ESA

Memorandum

Environmental Resources Management

1277 Treat Boulevard
Suite 500
Walnut Creek, CA 94597
(925) 946-0455
(925) 946-9968 (fax)

To: Tim Morgan, ESA

From: Cheri Velzy, ERM

cc: **Lynn McGuire, ERM**
Matt Fagundes, ESA

Date: 11 June 2014

Subject: Updated Methodology for Assessment of Risk and PM2.5 Concentrations at Receptors near Locomotive Tracks in Fairfield, Ca

The health risk assessment originally submitted as part of the update to the BAAQMD Permit Application in November 2013, and which included CEQA sources (offsite locomotives), was updated to include modeling of locomotives in Fairfield, California, and to include modeling of PM2.5 concentrations in addition to risk. Results of the revised screening-level health risk assessment (HRA) performed by ERM are provided in Table 1 below. This includes risk analysis for toxics listed in BAAQMD Reg. 2-5, including benzene, diesel particulate matter (DPM), ethylbenzene, toluene, xylenes, hexane, and hydrogen sulfide. As shown in Table 1, the cancer risk at the maximum exposed individual residential (MEIR) receptor, maximum exposed individual worker (MEIW) receptor, and maximum sensitive receptor (MSR) are all below 10 in a million. The chronic hazard index and the acute hazard index, at the MEIR, MEIW and MSR, are also below 1.0. In addition, PM2.5 concentrations are below 0.3 ug/m^3.

Table 1. Maximum Cancer and Noncancer Risk

	Cancer Risk	Chronic	Acute	PM2.5
Type of Estimated Health Impact	**per million (Receptor Location)**	**Hazard Index (Receptor Location)**	**Hazard Index (Receptor Location)**	**Annual Concentration (ug/m^3) (Receptor Location)**
Maximum Exposed Individual Residential (MEIR)	7.99 Worst case risk at 160 feet southeast of train tracks in Fairfield (585058E, 4234218N)	0.003 Worst case risk at 160 feet east of train tracks in Fairfield (585058E, 4234218N)	0.0030 Near E. 6th Street, Benicia (575694E, 4212345N)	0.0157 Worst case Conc. at 160 feet southeast of train tracks in Fairfield (585058E, 4234218N)
Maximum Exposed Individual Worker (MEIW)	4.45 (576144E, 4214145N)	0.014 (576144E, 4214145N)	0.0113 (576094E, 4212895N)	N/A
Maximum Sensitive Receptor	0.28 Day Care Center (574594E, 4212895N)	0.0005 Day Care Center (574594E, 4212895N)	0.0004 Elementary School (574900E, 4212500N)	0.00244 Day Care Center (574594E, 4212895N)

The following sources were modeled for the HRA using the ISCST3 air dispersion model:

1. *Locomotive idling – as point source;*
2. *Locomotive transit – as a line of volume sources;*
3. *Locomotive switching – as a line of volume sources;*
4. *Fugitive equipment leak – as rectangular area source*

The ISCST3 model is an EPA model approved by the BAAQMD for using in health risk assessment dispersion modeling. Locomotive emissions during transit mode were modeled over a track length of 4 miles out from the unloading rack. Beyond 4 miles there is no contribution to the total risk from the project sources at the refinery (locomotive idling, switching, and piping fugitives). Locomotive emissions during switching mode were modeled over an approximate two train–lengths (3300 feet) from the unloading rack. As a portion of the track within the facility would be used for both switching and transit, emissions from the two activities were added. Five years of meteorological data from the BAAQMD meteorological site "Valero Admin" (Site Id 8704) was used. These data can be downloaded from the BAAQMD website. The NAD 27 UTM coordinate system was used to identify source, receptor and building/structure locations. Digital Elevation Model (DEM) files were used to obtain the elevations for sources, receptors, and buildings/structures.

Figure 1 shows the receptor grid modeled and Figure 2 shows the location of modeled sources, facility boundary, and locations of maximum exposed receptors.

Risk was directly modeled in ISCST3 using the unit risk factors (URFs) for cancer risk and reference exposure levels (RELs) for non-cancer risk, as the exposure pathway for all the toxic air contaminants (TACs) emitted from the above sources is inhalation only. The risk input to the ISCST3 model, for each source, was calculated as shown below. As a result, the ISCST3 model output is residential cancer risk in terms of risk per million and non-cancer risk in terms of hazard index.

$$Cancer\ Risk\ Modeled_j = \sum_i ER_i\ x\ URF_i\ x\ 10^6$$

$$Non - Cancer\ Risk\ Modeled_j = \sum_i \frac{ER_i}{REL_i}\ x\ 10^6$$

Where:

j	=	*Emissions source modeled*
i	=	*Toxic air contaminant*
ER	=	*Emission rate of toxic air contaminant i in g/s from source j*
URF	=	*Unit risk factor of toxic air contaminant i*
REL	=	*Reference exposure level of toxic air contaminant i*

The detailed emissions spreadsheet for the modeling input, and a figure showing modeled impact locations, are attached to this memorandum.

Cancer risk at the MEIR was estimated as modeled residential risk multiplied by the BAAQMD-recommended age specific factor of 1.7. It must be noted that there are no residences within 1,000 feet of the refinery or along the 4 miles of modeled train route. However, in Fairfield, CA the locomotives would travel along the tracks adjacent to residences and Armijo High School. These residences are as close as 50 feet from the train route in Fairfield, CA which falls within the BAAQMD jurisdiction. Since the modeling domain did not extend all the way to Fairfield, a separate model run was conducted to model the locomotives that travel through Fairfield, CA, as a string of volume sources the length of a 50-car train. Residences in Benicia near the refinery are much farther away from the locomotives passing through Fairfield; thus the MEIR was modeled in Fairfield. For the Fairfield modeling, a five-year meteorological dataset from the Suisun Sewage Treatment Plant, adjacent to Fairfield, was used in the modeling.

Cancer risk at the MEIW was estimated as modeled residential risk multiplied by 0.2199, which is the average OEHHA adjustment factor to convert inhalation based cancer risk estimates for a residential receptor to a worker receptor, based on the difference in the length of time of exposure.

The sensitive receptor with highest modeled residential risk is a day care center in Benicia. The modeled cancer risk at this location was estimated as shown below:

$$Modeled\ Cancer\ Risk\ = \frac{Modeled\ Residential\ Risk\ x\ ED_C x\ ASF}{ED_R}$$

Where:

ED_C	=	*Exposure duration for children at school = 9 years*
ASF	=	*Age sensitivity factor for children at school = 3.0*
ED_R	=	*Exposure duration for residential receptor = 70 years*

Factors listed above are standard factors used in the calculation.

<u>Locomotive Travel through Other Air Districts</u>

A modeling assessment of risk and PM2.5 concentrations near tracks elsewhere along the route to and from Roseville was also conducted for the Yolo-Solano, Sacramento, and Placer County air districts. The results of the analysis are shown in Table 2 below. The analysis methodology is identical to that described for Fairfield above, except meteorological data from the Sacramento Executive Airport was used for the modeling analysis. This station is more representative of these other areas than that used for Benicia or Fairfield. This is the only meteorological dataset available for use in the ISCST model for that area. Emissions used in the modeling are the same as those used for Fairfield. Figures showing the modeled impact locations are also attached.

Table 2. Maximum Cancer and Non-cancer Risk at Locations Near Rail Tracks in Other Air Districts			
Location of Estimated Health Impact	**Cancer (per million)***	**Chronic Hazard Index**	**PM2.5 Annual Concentration (ug/m3)**
Yolo-Solano Air District (Dixon) 603050 E, 4256574 N	3.91	0.0015	0.0077
Sacramento Air District (Sacramento) 643028 E, 4283130 N	4.25	0.0018	0.0089
Placer Air District (Roseville) 648387 E, 4290123 N	4.59	0.0017	0.0084
Significance Threshold	10	1	N/A

*Includes an Age Sensitivity Factor of 1.7, applicable in the BAAQMD.

Cumulative Analysis

A screening-level cumulative risk was also evaluated in the vicinity of the MEIR noted in Table 1, as recommended in the 2010 BAAQMD CEQA Guidelines, to estimate the combined exposure from the project locomotives, existing locomotives using these tracks, and stationary sources of TACs within 1,000 feet of the MEIR. The BAAQMD provides a Google Earth tool that displays the screening-level health risks and PM2.5 concentrations from TAC sources in each county (BAAQMD 2014). The stationary (top half of table) and existing locomotive sources (bottom half of table) within 1,000 feet of the MEIR are shown in Table 3 below. The cancer risk and PM2.5 concentration values shown in these tables below (outlined in a bold border) were summed for an estimate of cumulative risk at the MEIR.

Table 3. CUMULATIVE ANALYSIS IN FAIRFIELD

Risk and PM2.5 Concentration from Stationary Sources within 1,000 feet of the Maximum Exposed Individual Residence in Fairfield Obtained from BAAQMD Google Earth Data

	Commercial Business	Commercial Business	Commercial Business	Commercial Business	Commercial Business	Commercial Business
Address	744 N Texas Street, Fairfield	1350 N Texas Street, Fairfield	110 Railroad Ave, Ste G, Suisun City	106 Railroad Ave, Suisun City	890 E Travis Boulevard, Fairfield	409 Railroad Ave, Ste B, Suisun City
East UTM Coordinate	584489	584598.388	584768	585018.981	585723	585870
North UTM Coordinate	4234104	4234294.921	4233988	4234204.101	4234917	4234770
Cancer Risk (per million)	0	0	0	16.236956	23.902249	9.18
PM2.5 Annual Concentration (ug/m3)	N/A	0	0	0.029	N/A	0

Risk from Existing Locomotives Traveling on Railroad in Fairfield

	PM2.5	Risk
10 ft N	0.082	47.298
25 ft N	0.065	37.371
50 ft N	0.05	28.81
75 ft N	0.041	23.755
100 ft N	0.035	20.381
200 ft N	0.023	13.456
300 ft N	0.017	10.285
400 ft N	0.014	8.43
500 ft N	0.012	7.157
750 ft N	0.009	5.247
1000 ft N	0.007	4.16
10 ft S	0.139	80.176
25 ft S	0.114	66.021
50 ft S	0.091	52.724
75 ft S	0.077	44.487
100 ft S	0.067	38.83
200 ft S	0.046	26.877
300 ft S	0.036	21.141
400 ft S	0.03	17.675
500 ft S	0.026	15.303
750 ft S	0.02	11.568
1000 ft S	0.016	9.305

Source: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx

Total Cancer Risk (chances in a million)	**88.1**
Total PM2.5 Concentration ($\mu g/m^3$)	**0.10**

Near-Refinery Cumulative Analysis

As noted above, the project health risk assessment modeling found the Maximum Exposed Individual Residence (MEIR) to be at a residence in Fairfield adjacent to the rail tracks primarily as a result of the increase in train traffic for the Benicia Refinery project. Even though risks were determined to be below significance thresholds, cumulative risk was evaluated for sources within 1,000 feet of that location.

Similarly, an additional cumulative assessment was also performed to evaluate the combined risks at residences near the refinery from diesel particulate matter sources from the project, I-680, and existing rail traffic on the tracks near the refinery. As part of this cumulative assessment, the health risk assessed for the Valero Improvement Project (VIP) and VIP Amendments was also combined with the above sources to estimate the contribution to risk from existing sources at the refinery.

Screening-level cumulative risk was evaluated in the vicinity of residences near the refinery where the maximum risk and PM2.5 concentration was modeled. This modeled residence is located to the southwest of the refinery. The BAAQMD provides a Google Earth tool that displays the screening-level health risks and PM2.5 concentrations from freeways and rail sources in each county (BAAQMD 2014). The results of the near-refinery residential cumulative risk from the project, the recent VIP/VIP Amendments project, and the freeway and rail sources obtained from the BAAQMD Google Earth tool are presented below in Tables 4 and 5.

Table 4. Combined Risk Values at Maximum Exposed Residence Near the Valero Refinery UTM 575,694 E (meters), 4,212,345 N (meters)

Type of Estimated Health Impact	Source of Contribution to Risk and PM2.5 Concentration				TOTAL	TOTAL with ASF
	Crude by Rail Project	I-680 (at 1,000 feet W)	UP Rail Tracks (at 1,000 feet W)	VIP Project[2]		
Cancer Risk (per million)	0.99	3.47	1.65	2.38[2]	8.49	14.4[1]
PM2.5 Annual Concentration (ug/m^3)	0.003	0.024	0.002	N/A	0.029	0.029

[1]Includes Age Sensitivity Factor (ASF)

[2]Valero Improvement Project Draft Environmental Impact Report, Table 4.7-9, Maximum Nonresidential Location, and the Valero Improvement Project Amendments – Environmental Analysis, Table 3.1.8-2 and Table 3.1.8-3.

[3]Values for I-680 and UP Rail Tracks are obtained from Table 5 below (bold bordered).

Table 5. Freeway and Rail Risk and PM2.5 Values from BAAQMD Google Earth Tool

I-680			Rail		
	PM2.5	Risk		PM2.5	Risk
10 ft W	0.273	37.642	**10 ft W**	0.032	18.608
25 ft W	0.222	30.791	**25 ft W**	0.027	15.612
50 ft W	0.172	23.917	**50 ft W**	0.021	12.417
75 ft W	0.142	19.764	**75 ft W**	0.018	10.372
100 ft W	0.121	16.981	**100 ft W**	0.015	8.919
200 ft W	0.079	11.189	**200 ft W**	0.01	5.802
300 ft W	0.061	8.563	**300 ft W**	0.007	4.276
400 ft W	0.049	7.019	**400 ft W**	0.005	3.389
500 ft W	0.042	5.96	**500 ft W**	0.004	2.822
750 ft W	0.031	4.377	**750 ft W**	0.003	2.061
1000 ft W	0.024	3.467	**1000 ft W**	0.002	1.647
10 ft E	0.456	62.905	**10 ft E**	0.077	44.529
25 ft E	0.37	51.191	**25 ft E**	0.069	39.968
50 ft E	0.285	39.577	**50 ft E**	0.058	33.357
75 ft E	0.235	32.682	**75 ft E**	0.049	28.636
100 ft E	0.202	28.048	**100 ft E**	0.043	25.161
200 ft E	0.131	18.313	**200 ft E**	0.03	17.603
300 ft E	0.099	13.858	**300 ft E**	0.024	13.833
400 ft E	0.08	11.199	**400 ft E**	0.02	11.539
500 ft E	0.067	9.402	**500 ft E**	0.017	9.954
750 ft E	0.047	6.675	**750 ft E**	0.013	7.574
1000 ft E	0.035	5.001	**1000 ft E**	0.01	6.187

Source: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

The values in the bold border are used in Table 4 above for the contribution to cumulative risk near the refinery.

Crude by Rail Project
Locomotive DPM Emissions for CEQA Modeling
4 June 2014
Annual Emissions

Year 2014 Annual Locomotive DPM Emissions - 100 Railcars per Day

Parameter	Value	Unit	Reference
Additional Annual Tank Cars due to Project	36,500	Cars/year	Based on Project Description
Maximum Freight Weight	106	short tons/car	TRN Spec Sheet-1
Annual Freight Transported due to Project	3,861,700	short tons/year	Based on Project Description
Weight of Empty Tank Car	37	short tons/car	TRN Spec Sheet-1
Total Annual Weight of Empty Tank Cars	1,357,800	short tons/year	
Annual Gross Weight Hauled	5,219,500	short tons/year	Freight Weight + Empty Railcar Weight
Number of Railcars per Train	50	Cars/train	
Length of Line Source	3,000	feet	Google Earth and diagram provided by Valero
Average Fuel Efficiency[1]	400	ton-mi/gal	pg.3 of EPA-420-F-09-025 April 2009 "Emission Factors for Locomotives"
Average Train Size	50	cars/train	Project Description
Length of Railcars	60	ft	
Length of One Train	3,000	ft	
Number of Trains per Day	2	trains/per day	

[1]Based on data collected by the Association of American Railroads for revenue ton-miles and fuel consumption, which show that about one gallon of fuel is consumed by the railroads to haul 400 tons-miles of freight. Thus dividing g/gal emission rates by 400 ton-miles/gal gives approximate g/ton-mile emission rates.

Source Type - Mode	**2014 PM10 Locomotive Emissions Factor**		**DPM Emissions**
	Value	**Unit**	**g/s**
Line Source - Running Full[1]	3.4	g/gal fuel	0.001183
Line Source - Running Empty[1]	3.4	g/gal fuel	0.000416
Total			0.001183

1. Emission Factors for large line haul Locomotives in calendar year 2015.
Source: EPA-420-F-09-025, April 2009

Cancer Risk	DPM		Risk to Model	Total Number of Sources	Risk to Model per Source	DPM (PM2.5) to Model per source
Source	**g/s**	**URF**	**per million**		**per million**	
Locomotive Travel	0.00118	3.00E-04	0.35484	51	0.006958	2.32E-05

Chronic Risk	DPM		Risk to Model	Total Number of Sources	Risk to Model
Source	**g/s**	**REL**	**Chronic Hazard Index**		**Chronic Hazard Index**
Locomotive Travel	0.00118	5.00E+00	0.0002	51	4.64E-06

Locomotive Small Line Haul - Line Source (As Separated Volume Source)					
Track Length Considered for Modeling	3,000	feet		0.6	miles
Length of the Line Source, L_{RS}	3,000	ft		0.6	miles
Width of the Line Source, W (Width of one track + 3 m on each side)*	30	ft		9.1	m
Source Type	Line source represented by separated volume sources, Elevated source not on or adjacent to a building				
Length of the Side of the Line/Volume Source = W	30	ft		9.1	m
Spacing of Separated Volume Source Along Line (c/c)	59	ft		18.1	m
Starting Location	Offset Half Volume Width				
Release Height (stack height of 15 ft + avg. vertical plume rise)	45.8	ft		13.95	m
Initial Lateral Dimension (SYINIT) = 2W/2.15	27.62			8.42	m
Initial Vertical Dimension (SZINIT) = Release Height/4.3	10.64			3.24	m
Number of Volume Sources Generated by BEEST Model	51	volume sources/line		51	volume sources/line

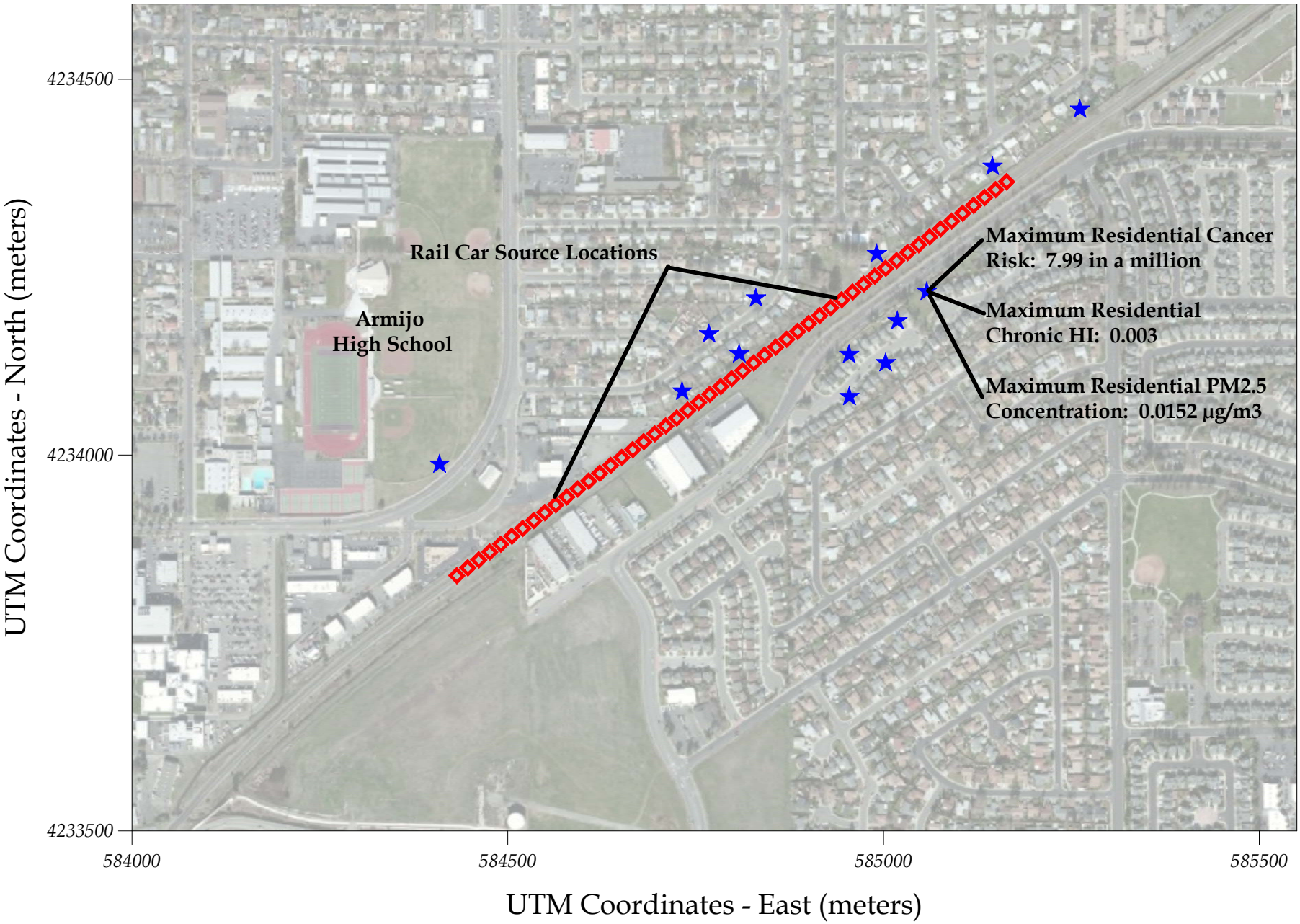
*Appendix C3, Health Risk Assessment for the Southern, California Intermodal Gateway (SCIG), Pg 23/89, http://www.portoflosangeles.org/EIR/SCIG/DEIR/APPENDIX_C3.p

Release parameters obtained from Railyard studies such as

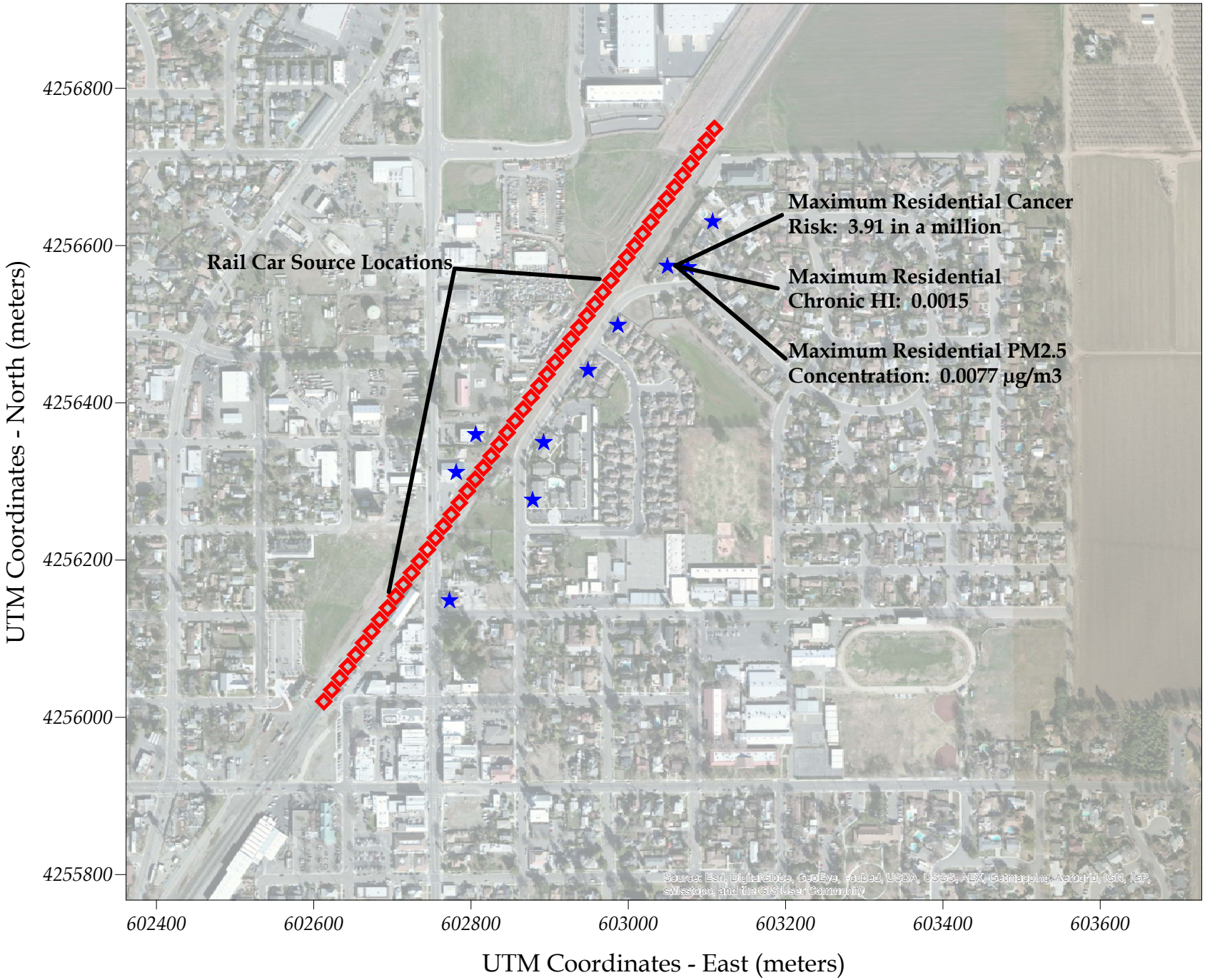
http://www.arb.ca.gov/railyard/hra/env_sheila_admrpt.pdf

http://www.arb.ca.gov/railyard/hra/sr_oak_rpt.pdf

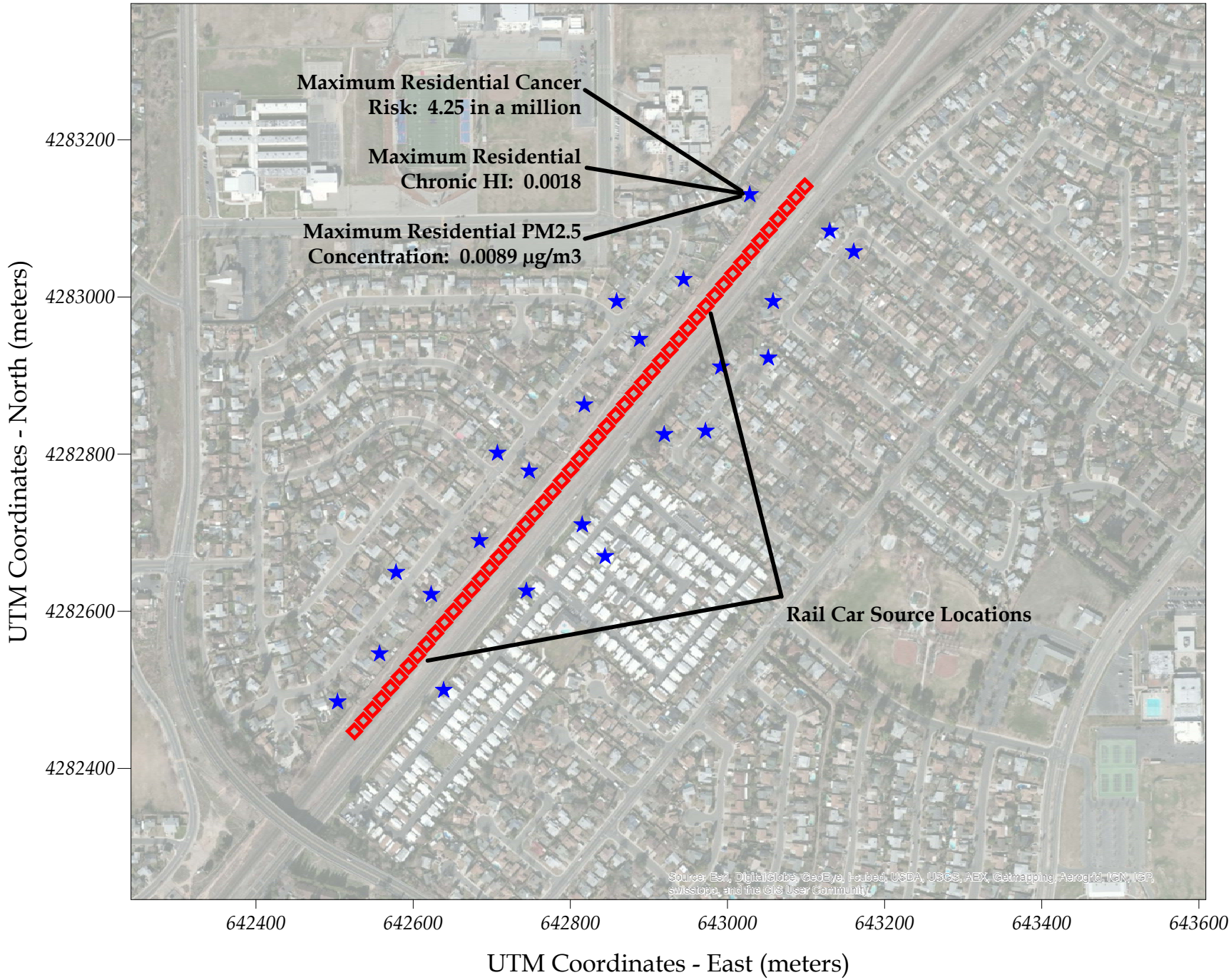
* Average of day time and night time release height for arriving and departing line haul in Table 4-1. http://www.arb.ca.gov/railyard/hra/env_richmond_admrpt.pdf



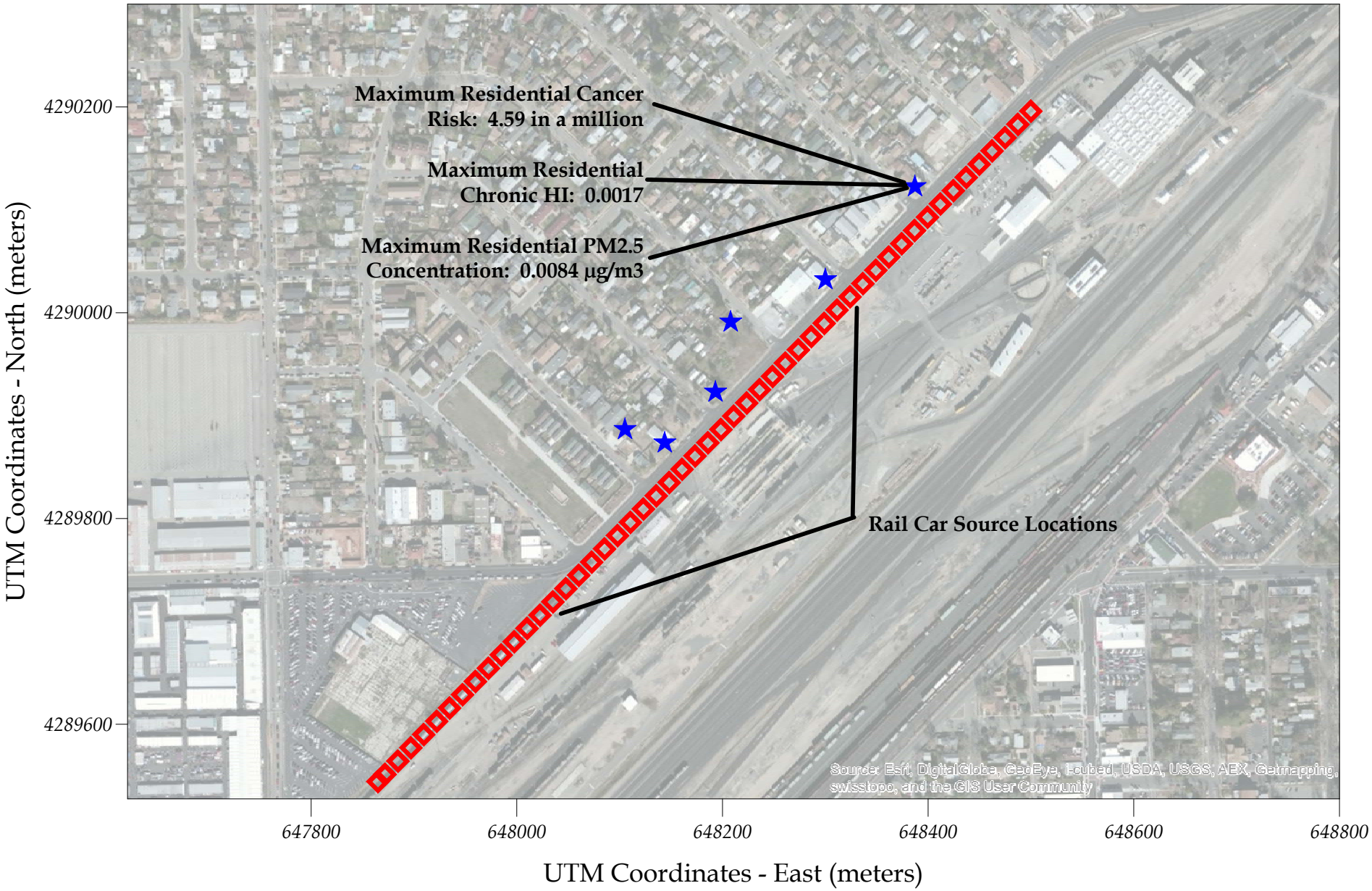
Fairfield Rail Source Locations and Modeling Health Risk Results
Valero Crude by Rail Project
Benicia, California



Yolo Solono County Rail Source Locations and Modeling Health Risk Results
Valero Crude by Rail Project
Benicia, California



Sacramento County Rail Source Locations and Modeling Health Risk Results
Valero Crude by Rail Project
Benicia, California



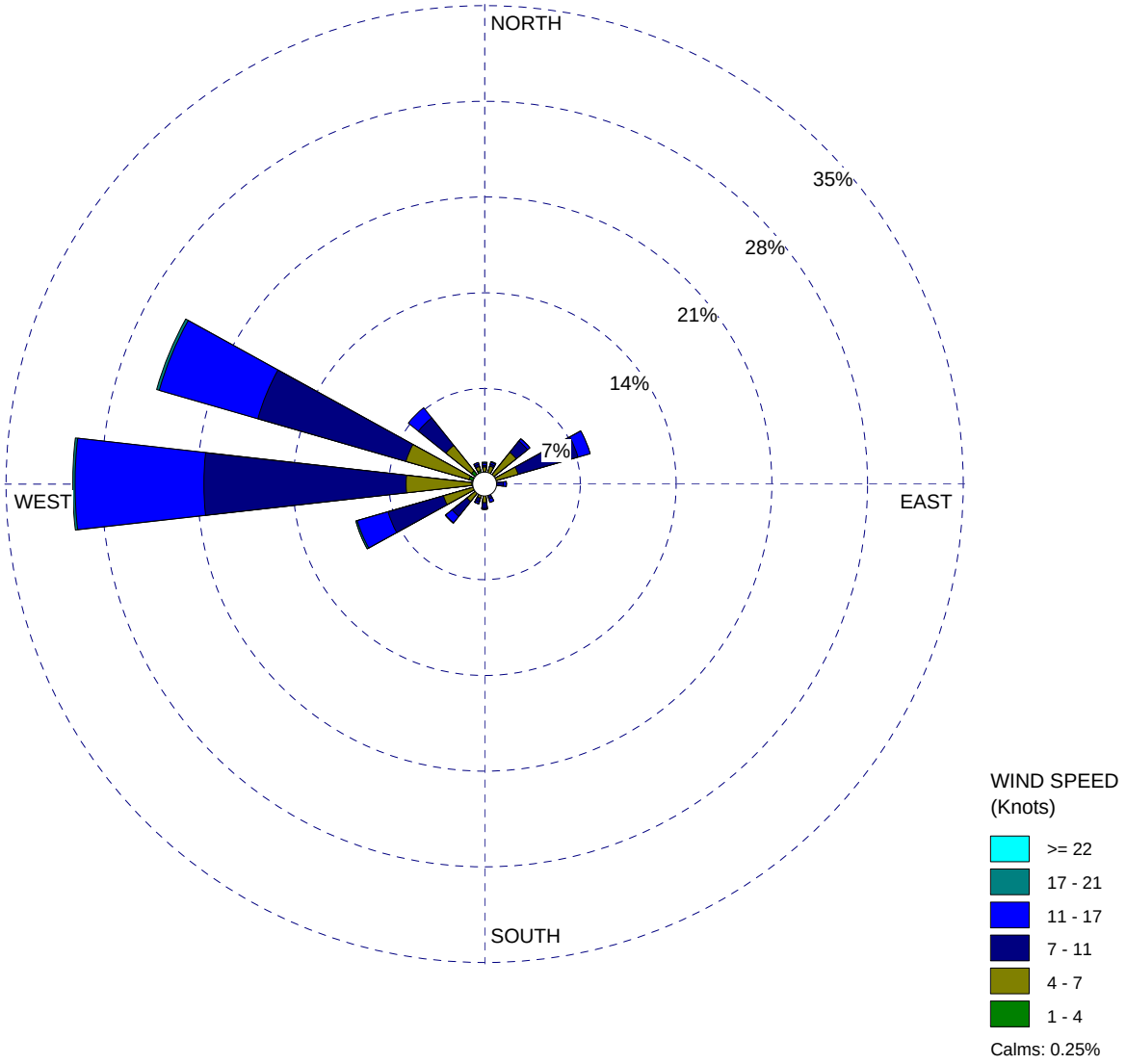
Placer County Rail Source Locations and Modeling Health Risk Results
Valero Crude by Rail Project
Benicia, California

WIND ROSE PLOT:

Valero Refinery, Benicia, California

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
2000, 2001, 2003, 2004	**Start Date: 1/1/2000 - 00:00** **End Date: 12/31/2005 - 23:00**	MODELER:	
	CALM WINDS: **0.25%**	TOTAL COUNT: **43824 hrs.**	
	AVG. WIND SPEED: **8.59 Knots**	DATE: **6/10/2014**	PROJECT NO.:

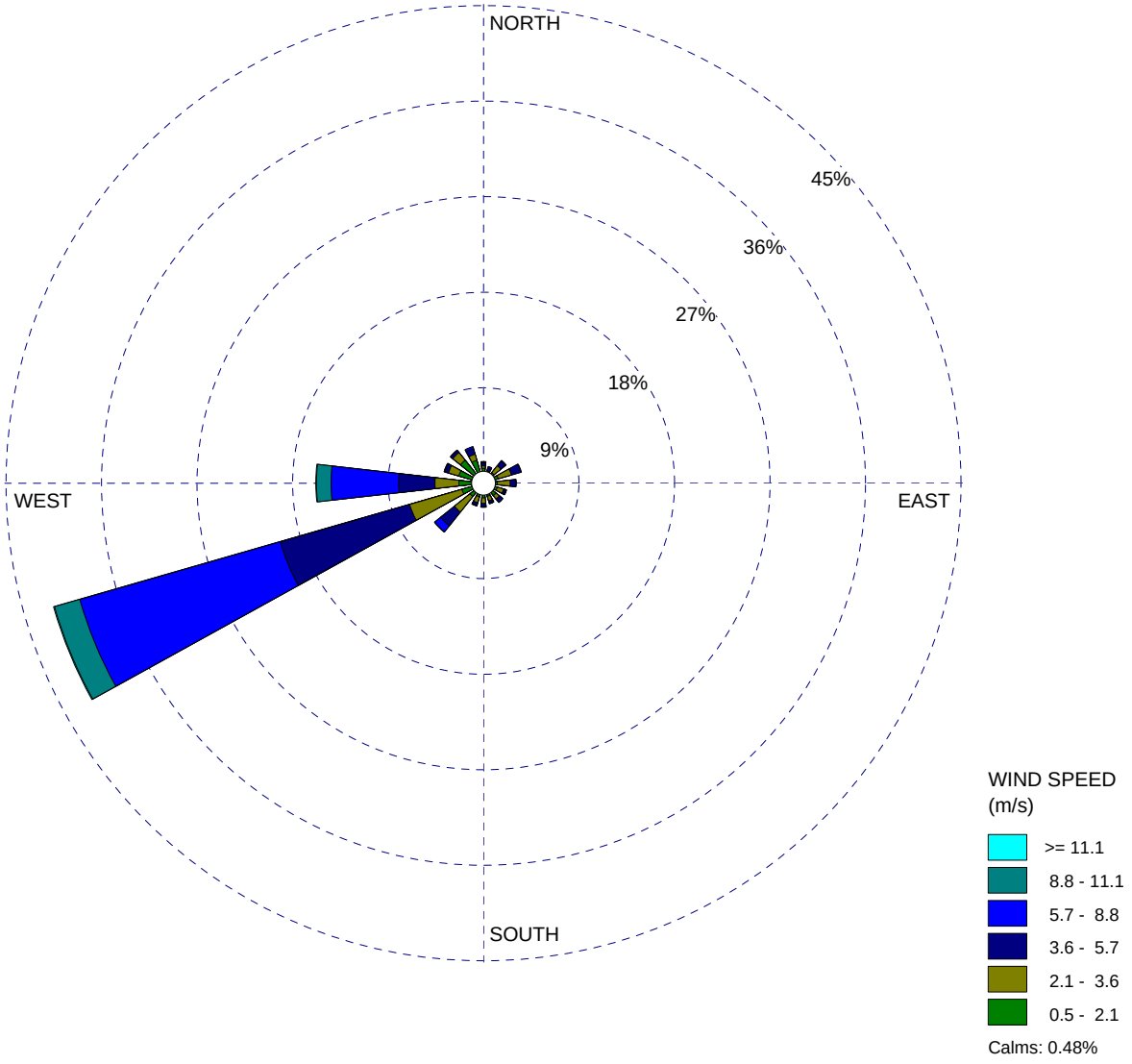
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Suisun City, California

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
2001 through 2005	**Start Date: 1/1/2001 - 00:00** **End Date: 12/31/2005 - 23:00**	MODELER:	
	CALM WINDS: **0.48%**	TOTAL COUNT: **43824 hrs.**	
	AVG. WIND SPEED: **4.30 m/s**	DATE: **6/12/2014**	PROJECT NO.:

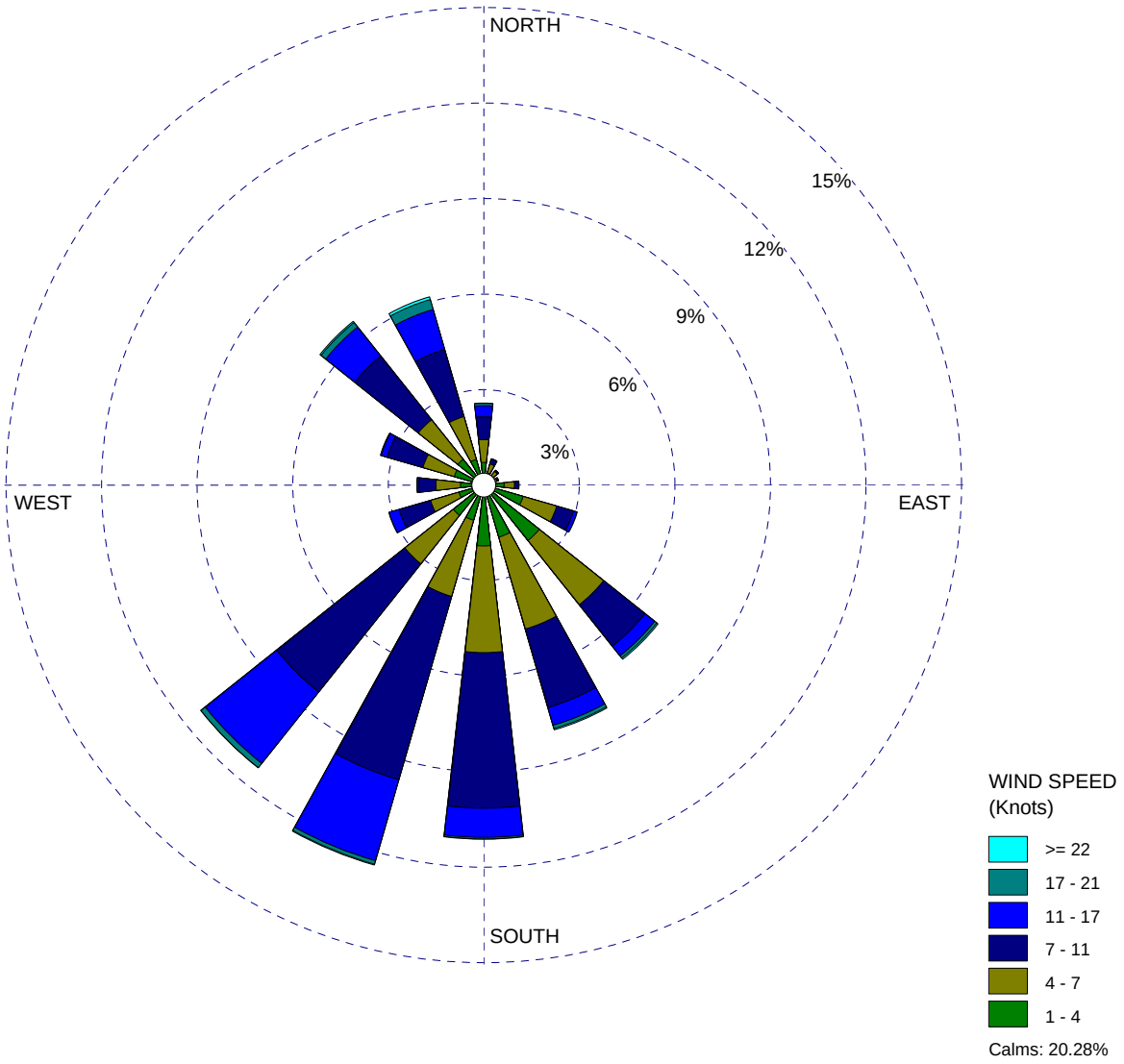
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Sacramento Executive Airport

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
2001 through 2005	**Start Date: 1/1/1985 - 00:00** **End Date: 12/31/1989 - 23:00**	MODELER:	
	CALM WINDS: **20.28%**	TOTAL COUNT: **43824 hrs.**	
	AVG. WIND SPEED: **6.06 Knots**	DATE: **6/12/2014**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Appendix F.

Railroad Crude Oil Release Rate Analysis for Route between Roseville and Benicia

ESA

Final Report

6 June 2014

Railroad Crude Oil Release Rate Analysis for Route between Roseville, CA and Benicia, CA

Christopher P.L. Barkan, Ph.D.
Professor and Executive Director
Rail Transportation and Engineering Center (RailTEC)
Department of Civil and Environmental Engineering, MC-250
University of Illinois at Urbana-Champaign, Urbana, IL 61801
Telephone: (217) 244-6338, Facsimile: (217) 333-9464
E-mail: cbarkan@illinois.edu

M. Rapik Saat, Ph.D.
Research Assistant Professor
Rail Transportation and Engineering Center (RailTEC)
Department of Civil and Environmental Engineering, MC-250
University of Illinois at Urbana-Champaign, Urbana, IL 61801
Telephone: (217) 244-6974, Facsimile: (217) 333-9464
E-mail: mohdsaat@illinois.edu

Xiang Liu, Ph.D.
Postdoctoral Research Associate
Rail Transportation and Engineering Center (RailTEC)
Department of Civil and Environmental Engineering, MC-250
University of Illinois at Urbana-Champaign, Urbana, IL 61801
Telephone: (217) 244-8525, Facsimile: (217) 333-9464
E-mail: liu94@illinois.edu

EXECUTIVE SUMMARY

This report describes an analysis of the estimated annual rate of petroleum crude oil train release accidents on the rail route between Roseville, CA and Benicia, CA. Several major risk factors were taken into account, including Federal Railroad Administration track class, method of operation, tank car safety design and traffic exposure. The results show that the expected occurrence of a crude oil train release incident exceeding 100 gallons is approximately 0.009 per year, or an average of about once per 111 years. The portion of the route traversing the Suisun wetland area has an even lower annual risk of a release incident equaling 0.00381, which corresponds to an average interval between incidents of 262 years.

Type of Tank Car	Annual Crude Oil Train Derailment Rate	Annual Crude Oil Train Release Rate	Average Interval between Release Incidents (Years)
CPC-1232, Non-Jacketed	0.0189	0.00903	111

1. INTRODUCTION

The purpose of this analysis was to estimate the annual release rate of trains transporting petroleum crude oil on the route between Roseville and Benicia, CA. The analysis was conducted based on segment-specific rail infrastructure information and tank car safety design. This study is intended to assist the city of Benicia to understand the risk associated with rail transportation of petroleum crude to the Valero refinery.

2. METHODOLOGY

2.1. Crude Oil Train Release Rate Model

The occurrence of a crude oil train release incident is the result of a sequence of events that are affected by a number of factors. The following model was used to estimate crude oil train release rate:

$$P(R) = \sum_{i=1}^{N} Z_i S_i L_i P_i (R \mid A) \qquad (1)$$

Where:

P(R) = annual crude oil train release rate

Z_i = train derailment rate per train-mile on the ith segment

S_i = number of trains on the ith segment

L_i = segment length (miles)

$P_i(R|A)$ = probability of at least one tank car releasing per crude oil train derailment

N = number of track segments on the route

2.2. Parameters in Risk Analysis

2.2.1. Train Derailment Rate, Z

Train derailment rate is the likelihood that a train derails per unit of traffic exposure (e.g., per million train-miles traveled). Average train derailment rate over the 5-year period 2005 – 2009 has previously been estimated using data from the U.S. Department of Transportation, Federal Railroad Administration (FRA) Rail Equipment Accident (REA) database combined with traffic data from the rail industry (Liu, 2013). The FRA database records all accidents that exceed a specified monetary damage cost to on-track equipment, signals, track, track structures, and roadbed (FRA, 2012). Train derailment rate has been shown to vary with infrastructure and operating characteristics such as: Federal Railroad Administration (FRA) track class, method of operation and traffic density (Liu 2013). Higher FRA track classes (corresponding to higher operational speeds and more stringent safety standards) and signaled trackage demonstrate lower derailment rates, compared to lower FRA track classes and non-signaled trackage (Figure 1).

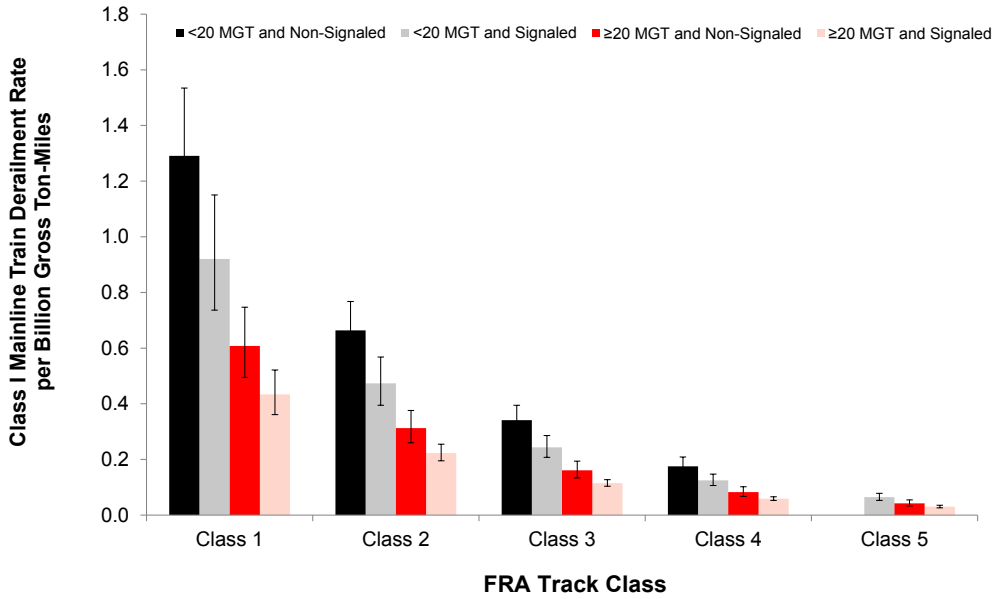


Figure 1: Estimated Class I mainline freight-train derailment rates by FRA track class, method of operation and annual traffic density (error bars represent 95% confidence intervals) (Liu 2013)

The train derailment rates presented in Figure 1 were developed using accident data from the FRA Rail Equipment Accident (REA) database, combined with rail industry traffic exposure data. In addition to normalized rates that can be used for comparative purposes they permit absolute rates to be calculated for any particular route and combination of characteristics (Liu 2013). These rates, combined with characteristics specific to the Roseville to Benicia route, were used to estimate the derailment rate on this line as discussed below.

2.2.2. Probability of at Least One Car Releasing in a Crude Oil Train Derailment

The probability of at least one tank car releasing per crude oil train derailment can be estimated using the following equation:

$$P(R \mid A) = 1 - (1 - CPR)^{D} \qquad (2)$$

Where:

D = number of crude oil cars derailed per train derailment

CPR = conditional probability of release of a derailed or damaged tank car

The median number of cars derailed per FRA-reportable, freight-train derailment on Class I mainlines was six (Liu et al. 2013). In this analysis, we assumed that all derailed cars are crude oil tank cars (D = 6). The conditional probability of release (CPR) represents tank car safety performance in an accident and was estimated based on the latest statistics developed by the Railway Supply Institute (RSI) – Association of American Railroads (AAR) Railroad Tank Car Safety Research and Test Project. The RSI-AAR Tank Car Project analysis accounts for tank car safety design features and accident characteristics.

The car that will be used to transport the petroleum crude on this route is the enhanced safety specification tank car referred to by AAR as CPC-1232 (Figure 2). The safety features affecting its performance in accidents are summarized in Table 1. The RSI-AAR Tank Car Safety Project has calculated that the probability of releasing more than 100 gallons ($CPR_{(>100)}$) if a car of this design is derailed in an FRA-reportable accident is 0.103 (AAR-ASLRA 2013).

Table 1 Summary of CPC-1232 Tank Car Safety Features Affecting Performance in Accidents

- 0.5" thick tank manufactured of TC-128 steel
- Half-height head shield
- Top fittings (rollover) protection
- Bottom fittings protection
- Double-shelf couplers
- High-capacity pressure relief valve

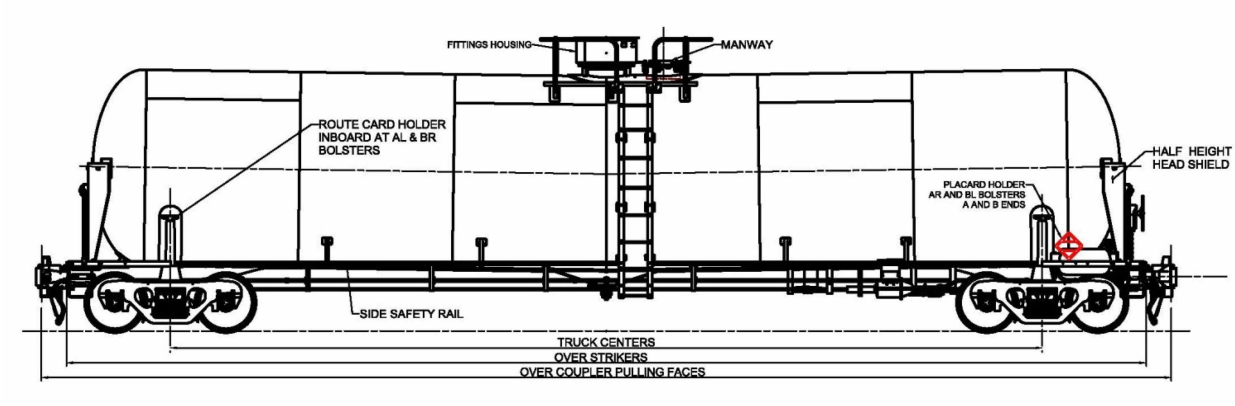


Figure 2: Diagram of CPC-1232 compliant tank car design

Using Equation (2), we estimated the probability of at least one tank car with the CPC-1232 design characteristics releasing if a crude oil train were to derail (Table 2). For example, if a crude oil train containing CPC-1232, non-jacketed tank cars is derailed, there is a 48% chance that this derailment will result in at least one tank car release.

Table 2 Probability of at least one tank car releasing per crude oil train derailment (assuming six tank cars derailed per derailment)

Type of Tank Car	$CPR_{(>100)}$	P(R|A)
CPC-1232, Non-jacketed	0.1030	0.4791

3. RESULTS

3.1. Route Information

The Roseville to Benicia route is 69-miles long with signaled trackage that is mostly FRA class 5 with some class 3 track (Table 3).

Table 3 Train derailment rate and mileage by FRA track class (signaled track territory)

FRA Track Class	Train Derailment Rate Per Million Train-Miles	Percent of Mileage
1	3.10	1.9%
2	1.67	0.0%
3	0.84	18.5%
4	0.41	0.0%
5	0.20	79.6%
Weighted Average	0.37	

The mileage-weighted average train derailment rate over the entire route is 0.37 derailments per million train miles (calculation below):

3.10 × 1.9% (class 1) + 1.67 × 0% (class 2) + 0.84 × 18.5% (class 3) + 0.41 × 0% (class 4) + 0.20 × 79.6% (class 5) = 0.37 train derailment rate per million train-miles

3.2. Annual Train Release Rate

We calculated annual crude oil train derailment and release rates from Roseville to Benicia using the particular characteristics of the route and the methodology described above (Table 4). The annual train release rate on this route is 0.00903, which corresponds to an expected interval between release incidents of approximately once per 111 years of operation (1/0.00903).

Table 4 Annual train derailment and release rates

Train Derailment Rate per Million Train-Miles	0.37
Crude-Oil Train Release Rate per Million Train Miles	0.18
Annual Crude Oil Train Derailment Rate	0.0189
Probability of Train Derailments Involving Releases	0.4791
Annual Crude Oil Train Release Rate	0.00903
Average Interval between Release Incidents (Years)	111

The route risk presented represents the entire route from Roseville to the Valero terminal in Benicia. We were also able to develop an estimate of the risk of a derailment and release on the portion of the route traversing the Suisun wetlands area (Figure 3). Using the same methodology we were able to estimate that the annual train release rate is 0.00381, which corresponds to an average interval between release incidents of 262 years.

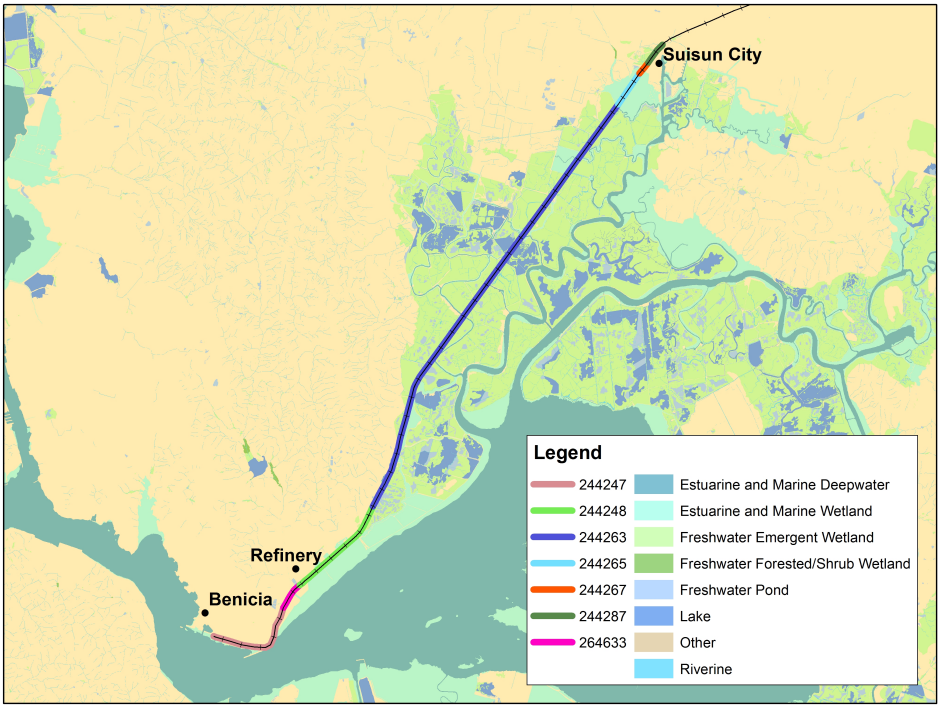


Figure 3: Rail route traversing the Suisun wetland area

3.3. Discussion & Interpretation

The risk estimates described here are probably conservative, i.e. they may tend to over estimate the risk for several reasons. The railroad industry's hazardous materials release accident rate has declined in the years since the rate estimates were developed (2005 – 2009) (Figure 4). Thus the average rate calculated over that time interval is probably higher than if the same rate were calculated using more current data. More broadly, the railroads' accident rate has been declining for decades and this trend is likely to continue due to continued investment in infrastructure and various new technologies that are being developed to improve operating safety. Furthermore, the accident rates used in this analysis do not take into account the effect of various additional safety practices specific to rail transportation of petroleum crude oil that are being implemented (AAR, 2014; Union Pacific, 2014). The risk analysis described here did not account for any of these potential reductions in accident rate.

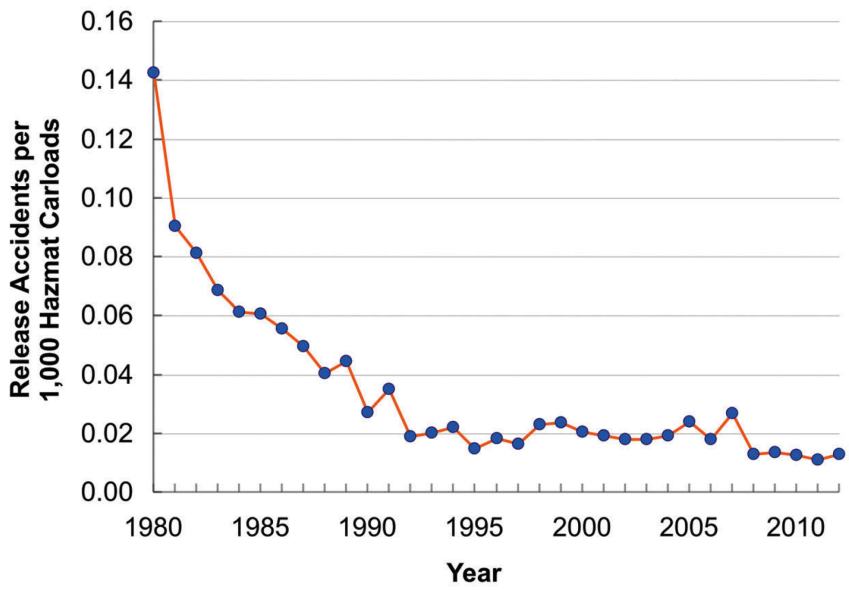


Figure 4: Railroad accident hazardous materials release rate 1980 – 2012 (FRA data, presented in Barkan et al 2013)

Another factor potentially causing an over estimate of the risk are possible changes in the safety design of tank cars use to transport petroleum crude oil. We assumed that the tank cars would conform to the current, AAR non-insulated CPC-1232 design. This is an industry standard agreed to in 2011 that exceeds current federal regulatory requirements for DOT 111 tank cars transporting crude oil. However, a possible result of the current federal rule-making (PHMSA, 2013) would be a requirement to use tank cars that conform to an even safer design at some point in the future, further reducing the risk.

3.4. Relative Risk Compared to Motor Vehicle Transport

Using the analysis described above, the estimated crude oil train release rate per million train-miles is 0.18 ($0.00903 \times 10^6/50552$) (Table 4). By comparison, the average estimated rate of police-reported highway accidents is 4.04 per million vehicle miles (NHTSA 2012). Thus the occurrence of a crude oil train derailment and release on the Roseville to Benicia is approximately 22 times less likely than a highway accident on a per mile-traveled basis. Considered on an annual basis, in 2012 the average U.S.

driver traveled 14,000 miles, and was 6.3 times more likely to be involved in a motor vehicle accident and 1.9 times more likely to be involved in an accident involving injuries or fatalities, than a release incident on the Roseville to Benicia route.

4. Summary

The major factors understood to affect railroad hazardous materials releases were quantitatively analyzed. These include Federal Railroad Administration track class, method of operation, tank car safety design and traffic exposure. The results show that the expected occurrence of a crude oil train release incident exceeding 100 gallons between Roseville and Benicia is approximately 0.009 per year, or an average of about once per 111 years. The portion of the route traversing the Suisun wetland area has an even lower annual risk of a release incident equaling 0.00381, which corresponds to an average interval between incidents of 262 years.

REFERENCES CITED

Association of American Railroads (AAR) 2014. Freight Railroads Join U.S. Transportation Secretary Foxx in Announcing Industry Crude by Rail Safety Initiative. https://www.aar.org/newsandevents/Press-Releases/Pages/Freight-Railroads-Join-U-S-Transportation-Secretary-Foxx-in-Announcing-Industry-Crude-By-Rail-Safety-Initiative.aspx#.U4-PmcYYWkR (accessed 4 June 2014).

Association of American Railroads and American Short Line Railroad Association (AAR-ASLRRA) 2013. Comments on Docket No. PHMSA-2012-0082: Hazardous Materials: Rail Petitions and Recommendations to Improve the Safety of Railroad Tank Car Transportation (RRR).

Barkan, C.P.L., M.R. Saat, F. González, III and T.T. Treichel 2013. Cooperative Research in Tank Car Safety Design, TR News 286: 12-19, Transportation Research Board of the National Academies, Washington, DC.

Center for Chemical Process Safety (CCPS) (1995). Guidelines for chemical transportation risk analysis. Center for Chemical Process Safety of the American Institute of Chemical Engineers, New York.

Federal Railroad Administration (2012). Railroad Equipment Accident/Incident Reporting Threshold 1957–2011. FRA, U.S. Department of Transportation, Washington, DC. http://www.fra.dot.gov/eLib/details/L03622 (accessed 4 June 2014).

Liu, X. (2013). Optimal strategies to improve railroad train safety and reduce hazardous materials transportation risk. Ph.D. Dissertation, Department of Civil and

Environmental Engineering, University of Illinois at Urbana-Champaign, Urbana, IL.

Liu, X., M.R. Saat, X. Qin, C.P.L. Barkan (2013). Analysis of U.S. freight-train derailment severity using zero-truncated negative binomial regression and quantile regression. Accident Analysis and Prevention 59: 87–93.

National Highway Traffic Safety Administration (NHTSA) 2012. Traffic Safety Facts 2012: A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, U.S. Department of Transportation, Washington, DC.

Pipeline and Hazardous Materials Administration (PHMSA) 2013. Docket No. PHMSA-2012-0082, Hazardous Materials: Rail Petitions and Recommendations to Improve the Safety of Railroad Tank Car Transportation (RRR), September 6, 2013, 78 Federal Register 54: 849-861.

Union Pacific 2014. Crude-by-Rail Voluntary Safety Operating Practices https://www.uprr.com/newsinfo/attachments/media_kit/safety/crude_by_rail_safety_practices.pdf (accessed 4 June 2014).

CHRISTOPHER P.L. BARKAN, PH.D.

PROFESSOR - UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN (UIUC)

GEORGE KRAMBLES FACULTY FELLOW

EXECUTIVE DIRECTOR - RAIL TRANSPORTATION AND ENGINEERING CENTER (RAILTEC)

DIRECTOR – NATIONAL UNIVERSITY RAIL (NURAIL) CENTER

DIRECTOR – ASSOCIATION OF AMERICAN RAILROADS AFFILIATED LABORATORY AT UIUC

DEPUTY DIRECTOR – RAILWAY SUPPLY INSTITUTE–ASSOCIATION OF AMERICAN RAILROADS: RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT

OFFICE:

1245 Newmark Civil Engineering Laboratory
205 North Mathews Avenue, MC-250
University of Illinois at Urbana-Champaign
Urbana, IL 61801

Telephone: (217) 244-6338
Facsimile: (217) 333-1924

email: cbarkan@illinois.edu

HOME:

585 CR 1800N
Champaign, IL 61822

Telephone: (217) 863-4047
Cell: (217) 714-3710

EDUCATION

Ph.D.	**1987**	**Biology - State University of New York at Albany** Quantitative ecology, stochastic optimization modeling, experimental design, statistical analysis
M.S.	**1984**	**Biology - State University of New York at Albany** Behavioral ecology, social behavior, optimality theory, statistical analysis
B.A.	**1977**	**Goddard College, Plainfield, VT** Ecology and environmental studies

POST-DOCTORAL EMPLOYMENT

University of Illinois at Urbana-Champaign, Urbana, IL
- 2010 – Present: Executive Director – Rail Transportation and Engineering Center (RailTEC)
- 2009 – Present: Professor
- 2001 – 2009: Associate Professor (granted tenure 2004)
- 2006 – Present: George Krambles Faculty Fellow
- 1998 – 2010: Director – Railroad Engineering Program
- 1998 - 2001: Senior Scientist

Association of American Railroads, Washington, DC

Research & Test and Safety & Operations Departments
- 1988 – 1998: Director - Risk Engineering
- 1995 – 1997: Senior Manager
- 1990 – 1994: Manager
- 1989 – 1990: Assistant Manager
- 1988 – 1989: Environmental Scientist

Smithsonian Environmental Research Center, Edgewater, MD
- 1987 - 1988: Postdoctoral Research Fellow

PROFESSIONAL SUMMARY

Christopher P.L. Barkan is a professor in the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign (UIUC) where he has been employed since 1998. Prior to that he was Director of Risk Engineering at the Association of American Railroads (AAR) where he was employed for ten years in their Research & Test and Safety & Operations Departments. At the AAR he had principal responsibility for the railroad industry's cooperative research programs in environment, hazardous materials and tank car safety. His current research interests are in railroad transportation safety and risk analysis, train derailment analysis, hazardous materials transport, tank car safety, energy efficiency, rail capacity, railroad infrastructure and operating economics, and the development and cost-effectiveness of new rail technologies. He has supervised six Ph.D. students and 29 M.S. students, all of them in rail engineering and transportation subjects. He is also Director of the National University Rail (NURail) Center, a consortium of seven colleges and universities focused on rail research and education funded by the US DOT Research and Innovative Technology Administration. He continues to serve the rail industry as Director of the AAR Affiliated Lab at UIUC, and Deputy Director of the Railway Supply Institute-AAR Railroad Tank Car Safety Research and Test Project. Dr. Barkan is an author or editor of more than 100 railroad-engineering papers, reports, chapters or books on a range of topics. He and his students have won several awards for research presented at international conferences and papers published in peer-reviewed journals. He has been an invited speaker at conferences, universities and corporations throughout North America, as well as Europe and Asia.

QUALIFICATIONS AND RELEVANT EXPERIENCE

University of Illinois at Urbana-Champaign

1998 – Present, *Department of Civil & Environmental Engineering*

Professor 2009 to present
Associate Professor 2001 – 2009
Senior Scientist 1998 – 2001

Dr. Barkan's research at UIUC encompasses railroad transportation safety and risk analysis, hazardous materials transport, railroad energy efficiency, rail line and terminal capacity, railroad infrastructure and operating economics, and the development and cost-effectiveness of new rail technologies. Dr. Barkan teaches courses in railroad transportation engineering, railway signaling and operation, shared rail corridor engineering and operation, and advances in rail technology. Since coming to the University of Illinois, he and his colleagues have expanded the rail curriculum from one course to twelve, the largest of any North American university. He is also working with colleagues at other colleges and universities, leading efforts to expand rail transportation and engineering academic programs and opportunities nationwide.

2010 – Present, *Executive Director, Rail Transportation & Engineering Center (RailTEC)*
1998 – 2010, *Director, Railroad Engineering Program*

In addition to his research and teaching activities at UIUC, Dr. Barkan has served as director of UIUC's railroad engineering program since 1998. With the formation of RailTEC in 2010, this responsibility was expanded to encompass all rail engineering and transportation research and academic activities at UIUC. He promotes and coordinates the development of the rail curriculum and supports faculty and students conducting research on a wide range of topics to improve rail safety, reliability and efficiency.

1998 – Present, *Director, Association of American Railroads Affiliated Laboratory*

Dr. Barkan directs the rail-industry sponsored research activities at UIUC, serving as Director of the AAR Affiliated Laboratory at UIUC. He maintains frequent contact, coordination and collaboration with the railroad research staff at the Transportation Technology Center Inc. in Pueblo, Colo., and with AAR

headquarters staff in Washington, D.C., as well as senior engineering and technical staff and the major North American railroads and the rail supply industry.

1990 – Present, *Deputy Director, Railway Supply Institute - Association of American Railroads Railroad Tank Car Safety Research and Test Project*

Dr. Barkan has served as Deputy Director of the RSI-AAR Railroad Tank Car Safety Research and Test Project for over 20 years. The RSI-AAR Tank Car Project is a cooperative program of the tank car and railroad industries conducting research on improving tank car safety. In this role he has been extensively involved in statistical, engineering, safety and risk analyses evaluating railroad tank car transportation of hazardous materials on behalf of the two project sponsor organizations and their members. The results of this work are extensively used by industry and government stakeholders concerned with tank car safety improvement.

2012 – Present, *Director, National University Rail (NURail) Center*

Dr. Barkan is the Director of the NURail Center, a new, rail-focused, Tier-1 University Transportation Center funded by the U.S. Department of Transportation - Research and Innovative Technology Administration. In 2011, he formed led the consortium of seven colleges and universities that developed the successful proposal for the NURail Center that was awarded in early 2012 and renewed in 2013.

The principal objectives of the NURail Center are to improve and expand U.S. academic rail education, research, workforce development and technology transfer. Rail education is being enhanced through development of new, full-semester courses, continuing education programs and on-line educational opportunities. The NURail consortium selected "Shared rail corridors" as the central theme of its research program and is developing a series of strategic development plans in key areas related to the center theme, including: Integrated rail vehicle-infrastructure design, dynamics and interaction; Railroad safety and risk; Rail network capacity analysis and planning; Urban, regional and high-speed passenger rail implementation; Multi-modal freight transportation; and Rail transport funding, finance, community and economic development . These topics are critically important to sustaining and expanding U.S. freight railroad transportation excellence while at the same time developing commuter and intercity passenger rail.

1988 – 1998, *Association of American Railroads - Research and Test Department and Safety and Operations Department*

From 1988 through 1998, Dr. Barkan was employed in positions of increasing responsibility by the Association of American Railroads in Washington, DC. For most of this time he had principal responsibility for direction and management of the railroad industry's cooperative research programs in environment, hazardous materials transportation risk and tank car safety. In this position he worked extensively on research projects with major railroads, the railway tank car industry, chemical and petroleum shippers, government agencies in the U.S. and Canada and other organizations concerned with improving railroad environmental and safety performance.

SELECTED RECENT PUBLICATIONS

PEER-REVIEWED JOURNAL ARTICLES

Liu, X., M.R. Saat, C.P.L. Barkan 2014. Probability analysis of multiple-tank-car release incidents in railway hazardous materials transportation (Accepted with revisions) Journal of Hazardous Materials.

Saat, M.R., Werth, C.J., Schaeffer D.,Yoon, H., Barkan, C.P.L. 2014. Environmental risk analysis of hazardous material rail transportation. Journal of Hazardous Materials 264: 560-569.

Dingler, M.H., Y-C. Lai, and C.P.L Barkan. 2013. Effect of train-type heterogeneity on single-track heavy haul railway line capacity. In-Press, Journal of Rail and Rapid Transit.

Dingler, M.H., Y-C. Lai, and C.P.L. Barkan. 2013. Mitigating train-type heterogeneity on a single-track line. Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit 227: 140-147.

Liu, X., M.R. Saat, C.P.L. Barkan and X. Qin 2013. Analysis of U.S. freight-train derailment severity using zero-truncated negative binomial regression and quantile regression. Accident Analysis and Prevention 59: 87–93.

Liu, X., M.R. Saat and C.P.L. Barkan 2013. Integrated risk reduction framework to improve railway hazardous materials transportation safety. Journal of Hazardous Materials 260: 131-140.

Liu, X., M.R. Saat and C.P.L. Barkan 2013. Safety-effectiveness of integrated risk reduction strategies for rail transport of hazardous materials. Transportation Research Record - Journal of the Transportation Research Board 2374: 102-110.

Lovett, A., G. Munden, M.R. Saat and C.P.L. Barkan 2013. High-speed rail network design and station location evaluation: a model and sensitivity analysis. Transportation Research Record - Journal of the Transportation Research Board 2374: 1-8.

Rapp, C.T., M.C. Dersch, J.R. Edwards, C.P.L. Barkan, B. Wilson and J. Mediavilla 2013. Measuring concrete cross-tie rail seat pressure distribution with matrix-based tactile surface sensors. Transportation Research Record - Journal of the Transportation Research Board 2374: 190-200.

Saat, M.R., C.J. Werth, D. Schaeffer, H. Yoon and C.P.L. Barkan 2013. Environmental risk analysis of hazardous material rail transportation. Accepted, Journal of Hazardous Materials.

Sogin, S.L., Y-C Lai, C.T. Dick and C.P.L. Barkan 2013. Comparison of capacity of single- and double-track rail lines. Transportation Research Record - Journal of the Transportation Research Board 2374: 111–118.

Zeman, J.C., J.R. Edwards, D.A. Lange and C.P.L. Barkan 2012. Hydraulic pressure cracking in rail seats of concrete crossties. ACI Materials Journal 109: (6) 639-646.

Liu, X, M.R. Saat and C.P.L. Barkan 2012. Analysis of major causes of train derailments and their effect on accident rates. Transportation Research Record - Journal of the Transportation Research Board 2289: 154-163.

Marruffo, A., H. Yoon, D.J. Schaeffer, C.P.L. Barkan, M.R. Saat and C.J. Werth 2012. NAPL source zone depletion model and its application to railroad-tank-car spills. Ground Water 50: 627–632.

Lai, Y-C, A. Kawprasert, C.Y. Lin, M.R. Saat, C.H. Liang and C.P.L. Barkan 2011. Integrated optimization model to manage risk of transporting hazardous materials on railroad networks. Transportation Research Record - Journal of the Transportation Research Board 2261: 115-123.

Lai, Y-C. and C.P.L Barkan. 2011. Comprehensive decision support framework for strategic railway capacity planning. ASCE Journal of Transportation Engineering 137: 738-749.

Liu, X, C.P.L. Barkan and M.R. Saat 2011. Analysis of derailments by accident cause: Evaluating railroad track upgrades to reduce transportation risk. Transportation Research Record - Journal of the Transportation Research Board 2261: 178–185.

Saat, M.R, and C.P.L. Barkan 2011. Generalized railway tank car safety design optimization for hazardous materials transport: addressing the trade-off between transportation efficiency and safety. Journal of Hazardous Materials 189: 62–68.

Schlake, B.W., C.P.L. Barkan and J.R. Edwards 2011. Train delay and economic impact of in-service failures of railroad rolling stock. Transportation Research Record - Journal of the Transportation Research Board. 2261: 124-133.

Dingler, M.H., Y-C. Lai and C.P.L. Barkan 2010. Effects of communications-based train control and electronically controlled pneumatic brakes on railroad capacity. Transportation Research Record - Journal of the Transportation Research Board 2159: 77-84.

Kawprasert, A. and C.P.L Barkan. 2010. Effect of train speed on risk analysis of transporting hazardous materials by rail. Transportation Research Record - Journal of the Transportation Research Board 2159: 59-68.

Schlake, B.W., S. Todorovic, J.R. Edwards, J.M. Hart, N. Ahuja, and C.P.L Barkan. 2010. Machine vision condition monitoring of heavy-axle load railcar structural underframe components. Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit (Special Issue on Heavy Haul and Innovative Development) 224: 499-511.

Dingler, M.H., Y-C. Lai, and C.P.L. Barkan 2009. Impact of train type heterogeneity on single-track railway capacity. Transportation Research Record - Journal of the Transportation Research Board. 2117: 41–49

Kawprasert, A. and C.P.L Barkan 2009. Communication and interpretation of results of route risk analyses of hazardous materials transportation by railroad. Transportation Research Record - Journal of the Transportation Research Board 2097: 125-135.

Lai, Y-C., and C.P.L. Barkan 2009. Enhanced parametric railway capacity evaluation tool. Transportation Research Record - Journal of the Transportation Research Board. 2117: 33-40.

Ouyang, Y., X. Li, Y-C. Lai, C.P.L. Barkan, and A. Kawprasert 2009. Optimal locations of railroad wayside defect detection installations. Computer-Aided Civil and Infrastructure Engineering 24: 1–11.

Peltier, D.C. and C.P.L. Barkan 2009. Characterizing and inspecting for progressive epoxy debonding in bonded insulated rail joints, Transportation Research Record - Journal of the Transportation Research Board. 2117: 85-92.

Yoon, H., Werth, C.J., Barkan, C.P.L., Schaeffer, D.J. and Anand, P. 2009. An environmental screening model to assess the consequences to soil and groundwater from railroad-tank-car spills of light non-aqueous phase liquids. Journal of Hazardous Materials 165: 332-344.

Barkan, C.P.L. 2008. Improving the design of higher-capacity railway tank cars: optimizing the trade-off between weight and safety. Journal of Hazardous Materials 160: 122-134.

Kawprasert, A. and C.P.L. Barkan 2008. Effects of route rationalization on hazardous materials transportation risk. Transportation Research Record - Journal of the Transportation Research Board 2043: 65-72.

Schafer, D.H. and C.P.L. Barkan 2008. Relationship between train length and accident causes and rates. Transportation Research Record - Journal of the Transportation Research Board 2043: 73-82.

CONFERENCE PROCEEDINGS PAPERS AND PRESENTATIONS - 2013

Atanassov, I., C.T. Dick and C.P.L Barkan. 2013. Incremental Capacity of Single to Double Track with Variable and Sparse Siding Spacing. Presented at the 2013 INFORMS Conference, Minneapolis, MN, October 2013.

Caughron, B.M., C. T. Dick and C.P.L. Barkan. 2013. A Project Selection Model for Improving Running Time on Passenger Rail Corridors. In: Proceedings of the American Railway Engineering and Maintenance-of-Way Association Annual Conference, Indianapolis, Indiana, September 2013.

Caughron, B.M., C. T. Dick and C.P.L. Barkan. 2013. A Project Selection Model for Improving Running Time on Passenger Rail Corridors. Presented at the ASME Joint Rail Conference, Knoxville, TN, April 2013.

Chadwick, S.G., C.T. Dick, M.R. Saat and C.P.L. Barkan. 2013. Statistical Modeling of Freight Train Derailments at Highway-Rail Level Crossings. In: 2013 World Congress on Railway Research, Sydney, Australia, November 2013.

Chadwick, S.G., M.R. Saat, C.T. Dick and C.P.L. Barkan. 2013. Decreasing Derailment Occurrence and Severity at Highway-Rail Grade Crossings. In: Proceedings of the American Railway Engineering and Maintenance-of-Way Association Annual Conference, Indianapolis, Indiana, September 2013.

do Carmo, T.B., J.R. Edwards, R.G. Kernes, B.O. Andrawes and C.P.L Barkan. 2013. Analysis of the Shear Behavior of Rail Pad Assemblies as a Component of the Concrete Sleeper Fastening System. In: 2013 World Congress on Railway Research, Sydney, Australia, November 2013.

Greve, M.J., C.T. Rapp, M.S. Dersch, J.R. Edwards, C.P.L. Barkan, J. Mediavilla and B. Wilson. 2013. Quantification of Concrete Sleeper and Elastic Fastening System Demands Utilizing Concrete Sleeper Rail Seat Contact Area. In: 2013 World Congress on Railway Research, Sydney, Australia, November 2013.

Lin, C-Y., M.R. Saat and C.P.L Barkan. 2013. Causal Analysis of Passenger Train Accidents on Freight Rail Corridors. In: 2013 World Congress on Railway Research, Sydney, Australia, November 2013.

Liu, X., M.R. Saat, and C.P.L. Barkan. 2013. A Framework for Evaluating Cost-effectiveness of Accident Prevention Strategies Under Uncertainty. In: Proceedings of the Transportation Research Board Annual Meeting, Washington, DC, January 2013

Liu, X., C.T. Dick, A.H. Lovett, M.R. Saat and C.P.L. Barkan. 2013. Seasonal Effect on the Optimization of Rail Defect Inspection Frequency. In: Proceedings of the ASME 2013 Rail Transportation Division Fall Technical Conference, Altoona, PA, October 2013.

Liu, X., C.T. Dick, A.H. Lovett, M.R. Saat and C.P.L. Barkan. 2013. Optimization of Rail Defect Inspection Frequency. Presented at the 2013 INFORMS Conference, Minneapolis, MN, October 2013.

Liu, X., M.R. Saat and C.P.L Barkan. 2013. Integrated Risk Management Framework for Improving the Safety of Hazardous Materials Transportation by Rail. In: 2013 World Congress on Railway Research, Sydney, Australia, November 2013.

Liu, X., M.R. Saat and C.P.L. Barkan. 2013. Analysis of Major Derailment Causes on Heavy Haul Railways in the United States. In: Proceedings of the 10th International Heavy Haul Association Conference, New Delhi, India, February 2013.

Liu, X., M.R. Saat and C.P.L. Barkan. 2013. Safety Effectiveness of Integrated Accident Prevention Strategies. In: Proceedings of the ASME Joint Rail Conference, Knoxville, TN, April 2013.

Lovett, A.H., C.P.L. Barkan and C.T. Dick. 2013. An Integrated Model for the Evaluation and Planning of Railroad Track Maintenance. In: Proceedings of the American Railway Engineering and Maintenance-of-Way Association Annual Conference, Indianapolis, Indiana, September 2013.

Lovett, A.H., M.R. Saat, C.T. Dick, C. Ruppert and C.P.L. Barkan. 2013. Development of an integrated railroad track maintenance model. In: 2013 World Congress on Railway Research, Sydney, Australia, November 2013.

Shih, M.-C., C.T. Dick and C.P.L Barkan. 2013. Optimal Siding Location Model. Presented at the 2013 INFORMS Conference, Minneapolis, MN, October 2013.

Shurpali, A.A., J.R. Edwards, R.G. Kernes, X. Liu, D.A. Lange and C.P.L. Barkan. 2013. Investigation of material improvements to mitigate the effects of abrasion mechanism of concrete crosstie rail seat deterioration (RSD) In: Proceedings of the Transportation Research Board Annual Meeting, Washington, DC, January 2013.

Shurpali, A.A., R.G. Kernes, J.R. Edwards, M.S. Dersch, D.A. Lange and C.P.L. Barkan. 2013. Investigation of the Mechanics of Rail Seat Deterioration (RSD) and Methods to Improve the Abrasion Resistance of Concrete Sleeper Rail Seats. In: Proceedings of the 10th International Heavy Haul Association Conference, New Delhi, India, February 2013.

Sogin, S., C.T. Dick, Y-C. Lai and C.P.L. Barkan. 2013. Analyzing the Incremental Transition from Single to Double Track Railway Lines. In: Proceedings of the International Association of Railway Operations Research (IAROR) 5th International Seminar on Railway Operations Modelling and Analysis, Copenhagen, Denmark, May 2013.

Van Dyk, B.J., C.T. Rapp, M.S. Dersch, J.R. Edwards, C.J. Ruppert, Jr. and C.P.L. Barkan. 2013. Evaluation of Existing Loading Environment in North America for Improved Concrete Sleepers and Fastening Systems. In: 2013 World Congress on Railway Research, Sydney, Australia, November 2013.

Van Dyk, B.J., J.R. Edwards, C.J. Ruppert Jr. and C.P.L. Barkan. 2013. Considerations for Mechanistic Design of Concrete Sleepers and Elastic Fastening Systems in North America. In: Proceedings of the 10th International Heavy Haul Association Conference, New Delhi, India, February 2013.

Van Dyk, B.J., M.S. Dersch, J.R. Edwards, C.J. Ruppert Jr. and C.P.L. Barkan. 2013. Quantifying Shared Corridor Wheel Loading Variation Using Wheel Impact Load Detectors. In: Proceedings of the ASME Joint Rail Conference, Knoxville, TN, April 2013.

Appendix G.

Valero Emergency Procedures Manual, Sections 203 and 206

ESA

SECTION 203

CITY NOTIFICATION

EMERGENCY NOTIFICATION

The City Dispatcher will be notified without delay in the event that the Operations Superintendent mobilizes refinery resources to deal with a fire, medical emergency, or vapor release. Any situation where the refinery fire horn is activated, or Valero emergency response equipment is staffed are examples of when the City Dispatcher is to be notified. Even partial mobilization of the Process Fire Brigade requires that the city be informed.

The City will respond with emergency equipment based on the description of the incident. Instructions for which gate to respond through should be provided when the notification is made. The "first in" officer from the city will report to the Incident Commander and a **Unified Command** will be established.

Initial communications with the City will be over the direct phone to the City's combined dispatcher. The Dispatcher can also be reached on (707) 745-2424 in the event the direct line has a problem or, if the Incident Commander is in the Mobile Command Post.

Communications with incoming city fire equipment can be made over the city fire radio frequency, or face to face with the ranking officer once they are on scene.

Any request for additional emergency resources through the Solano County Mutual Aid System should be made by contacting the Benicia Dispatcher. All such requests must be authorized by the Incident Commander.

MINOR EVENT NOTIFICATION

When a minor event occurs, the Operations Superintendent may choose to notify the Benicia Fire Department via a direct call to the **"Duty Captain"** at Fire Station One (746-4275). Minor events are considered to be those that do not present an immediate danger to the environment or the public, and no emergency equipment has been used. Direct communication would be made to inform the fire department of the situation. Serious incidents should continue to be reported immediately through the direct line to Benicia Dispatch.

Any event that might draw the attention and concern of the citizens should be communicated to the city dispatcher. An example of such an event would be heavy or extended flaring. Communication should be made so that the dispatcher can explain the situation to those citizens who may call in to them. The city dispatcher may also use the direct dial line to contact the refinery for information on events that have caused the citizens to contact them.

SECTION 206

Valero Fire Department
Apparatus and Equipment List

The following is a general listing of fire apparatus maintained by the Valero Fire Department:

Engine Fifteen (E-15)
1250-GPM National Foam Engine
1000-gallons ATC Foam
Remote Operated 1250-GPM monitor
Three hose beds
Bed 1: 600-ft. of 5" Large Diameter Hose
Bed 2: 500-ft. of 2 1/2" hose, gated wye and 2- 100 ft. 1 ¾" attack lines
Bed 3: 500-ft. of 2 1/2" hose, gated wye and 2- 100 ft. 1 ¾" attack lines
Two 200', 1 ¾" crosslays (water only)
8 MSA 4500 Firehawk SCBA's
Stored at Station Fifteen.

Engine Sixteen (E-16)
2000-GPM E-1 Foam Engine
1000-gallons ATC Foam
2000-GPM Monitor
Four hose beds
Bed 1: 300-ft of 3" supply hose.
Bed 2: 450-ft, of 5' Large Diameter Hose
Bed 3: 450-ft, of 5' Large Diameter Hose
Bed 4: 300-ft of 3' hose, gated wye and 2- 100 ft. 1 ¾" attack lines.
Two 200', 1 ¾" crosslays (foam available).
5 MSA 4500 FireHawk SCBA's
Stored at Station Sixteen.

Truck Sixteen (Aerial) (T-16)
2,000 GPM E-One Foam Aerial
90' Ladder with 1,500 GPM nozzle
700-gallons 3X3 Foam
800' of 5" Large Diameter Hose
Two 200', 1 ¾" crosslays
4 MSA 4500 Firehawk SCBA's
Stored at Station Sixteen

Brush Fifteen (B-15)
Ford F-550 Diesel 4x4 Type 3 Wildland Rig
300-gallons of water
20-gallons of ATC foam
120-GPM pump
2 MSA 4500 Firehawk SCBA's
Portable Hale pump 60 GPM, 2 cycle motor
Stored at Station Sixteen

Brush Two Fifteen (B-215)
Ford F-550 Diesel 4x4 Type 3 Wildland Rig
300-gallons of water
20-gallons of ATC foam
120-GPM pump
2 MSA 4500 Firehawk SCBA's
Portable Hale pump 60 GPM, 2 cycle motor
Stored at Station Sixteen

Brush Seventeen (B-17)
Ford F-550 Diesel 4x4 Type 3 Wildland Rig
300-gallons of water
20-gallons of ATC foam
120-GPM pump
2 MSA 4500 Firehawk SCBA's
Portable Hale pump 60 GPM, 2 cycle motor
Stored at Station Sixteen

Foam Tender (FT-16)
Peterbuilt Diesel Tank Truck (Converted)
4000-gallons of ATC Foam
150-GPM diesel positive displacement transfer pump
2 biscuit fold-up tanks, 1500-gallon capacity
Stored at Station Sixteen

Rescue Squad (R-15)
Large inventory of medical, confined space rescue, and high angle rescue equipment
Stored at Station Fifteen

Flatbed Cattle Truck (U-315)
Ford F-550 Crew cab Flatbed truck
Stored at Station Fifteen

Big Sucker and Kenworth Diesel Truck (PP-16)
5000-GPM trailer mounted pump
6000-watt generator
Stored at Station Sixteen

Portable Pump Two Sixteen (PP-216)
6000-GPM Trailer Mounted Pump
Stored at Fire Maintenance Shop

HazMat Trailer (HM-15)
Suits and support Equipment all levels of HazMat response
Stored at Station Fifteen

SCBA Trailer
60 (approximately) MSA 4500 air bottles
9 MSA 4500 SCBA's
Stored at Station Sixteen

Foam Trailer No. 1
1000-gallons of ATC foam
60 GPM positive displacement transfer pump
Stored at the fire training grounds

Foam Trailer No. 2
1000-gallons ATC
Stored at the fire training grounds

5" Hose Trailer No. 1 *(currently being assembled)*
3200 ft. of 5" large diameter hose
2 portable hydrants w/adapters
Licensed for use outside the refinery
Stored at Station Sixteen

5" Hose Trailer No. 2
4800-ft. of 5" large diameter hose
2 portable hydrants w/adapters
Licensed for use outside the refinery
Stored at Fire Training Grounds

3" Hose Trailer
1200-ft. of 3' hose
Licensed for use inside the refinery only
Stored at the fire training grounds

EADC Trailer (Met-L-Kyl Trailer)
500# of Aluminum Alkyl- Extinguishing agent
Stored at Station Sixteen

Six Gun Foam Monitor
2000- 6000 GPM adjustable flow Monitor
Stored at Station Sixteen

Hired Gun Foam Monitor
2000-GPM Monitor
Stored at Station Sixteen

750 GPM Foam Monitors
(8) Portable wheeled monitors w/eductor nozzles and jet booster hardware
(4) 50-foot lengths of 3" hose
(4) 50-foot Lengths of 1 ¾" hose.
Stored at Station Sixteen

Firefly 500 GPM Monitors
(5) Portable wheeled water monitors
(2) 50-ft. lengths of 1 ¾" hose
Stored at Station Sixteen

Foam Barrel Trailers
(6) 55-gal 2-barrel AFFF foam trailers
Self-educting nozzle for monitor conversion
Stored at Station Sixteen

Foam Totes
(~37) 305-gal foam totes
Stored at Station Sixteen

NOTE: Inspection/Inventory lists for all portable hand held and wheeled fire extinguishers, and all SCBA's are maintained in the office of the Fire Chief.

Appendix H.

UPRR Hazardous Material Emergency Response Plan

ESA

UNION PACIFIC RAILROAD COMPANY

HAZARDOUS MATERIAL EMERGENCY RESPONSE PLAN

October 1, 2009

PB-20850

TO: **All Union Pacific Railroad Company Employees**

FROM: **R. Grimaila, Sr. VP Safety & Environment**
M. Hemmer, Sr. VP Law & General Counsel

The Union Pacific Railroad Company's Hazardous Materials Emergency Response Plan (HMERP) has been revised. The revised HMERP will become effective on October 1, 2009.

Managers must ensure that their employees receive HMERP training and that relevant training is documented in the Union Pacific Plateau system.

TO: All Union Pacific Railroad Company Employees

FROM: R. Grimaila, Sr. VP Safety & Environment
M. Hemmer, Sr. VP Law & General Counsel

Effective immediately, the Hazardous Materials Emergency Response Plan (HMERP) is amended as follows:

- The requirement for HZ-90 training is no longer required. HZ-90 is not required to support implementation of the HMERP.

For more information, contact Mark Maday at 8-544-3313.

INTRODUCTION

This Hazardous Material Emergency Response Plan (HMERP) has been established to provide emergency response information to personnel who may become involved in a hazardous materials incident. It is designed to be consistent with the emergency response plan provisions set forth by the Occupational Safety and Health Administration (OSHA) under 29 C.F.R. 1910.120(q). For purposes of this HMERP, the term "hazardous materials" shall include "hazardous materials" as defined by the U.S. Department of Transportation (DOT), and "hazardous substances and hazardous wastes" as defined by the U.S. Environmental Protection Agency (EPA). If there is any doubt concerning the classification of a particular material, *i.e.*, whether it is "hazardous material," and/or whether it is covered by this HMERP, contact the Response Management Communication Center (RMCC) at 888-877-7267, 1-888-UPRRCOP, or company line 8-544-RMCC.

DISTRIBUTION

This HMERP is distributed throughout the Union Pacific Railroad network through the company's intranet web site where it is available for printing and posting. The HMERP is also supplemented with a site-specific emergency response information addendum at eighty-three facilities listed in *Section VI, Attachment B* of this HMERP (*List of Union Pacific Railroad Facilities With Supplemental Site-Specific Emergency Response Information).* For those facilities, a template for the site-specific emergency response information addendum is attached (*Section VI, Attachment C).* The template is completed by the Hazardous Materials Manager for each facility and attached to the HMERP. A copy of the entire HMERP is posted in an area where it is readily accessible to all employees, and in digital form, on the facilities' internal websites, if one is available.

This HMERP may be made available for inspection and copying by employees, their representatives, and OSHA personnel. Copies may also be forwarded to local emergency planning commissions and other legally authorized emergency response entities.

ORGANIZATION

This HMERP is divided into six (6) sections:

- Section I - Scope of the HMERP
- Section II - Initial Observers and Other Employees – Roles, Responsibilities & Training
- Section III - Managers – Roles, Responsibilities & Training
- Section IV - Emergency Response Personnel – Roles, Responsibilities & Training
- Section V - Miscellaneous
- Section VI - Attachments:
    - HMERP Training Guide
    - List of Union Pacific Railroad Facilities With Site-Specific Emergency Response Information Addendum
    - Site-Specific Emergency Response Information Addendum Template

TABLE OF CONTENTS

Section I Scope of the HMERP.....4

Section II Initial Observers and Other Employees – Roles, Responsibilities & Training.....5
A. Scope
B. Expectations
C. Training – First Responder "Awareness" for Employees

Section III Managers in the Affected Area – Roles, Responsibilities & Training 7
A. Scope
B. Expectations
C. Training – First Responder "Awareness" for Managers

Section IV Emergency Response Personnel – Roles, Responsibilities & Training 10

A. Scope 10
1. Defensive Operations
2. Offensive Operations
3. HAZMAT Incident Commander

B. Expectations 11
1. Protocol for Defensive Operations
2. Protocol for Offensive Operations
3. Protocol for HAZMAT Incident Commander

C. Training – First Responder "Operations." 13
1. Defensive Operations Training
2. Offensive Operations Training
3. HAZMAT Incident Commander Training

D. Other Personnel in the Railroad Incident Command Structure 16

Section V Miscellaneous 17

A. Pre-Emergency Planning
B. Coordination with Non-Railroad Emergency Response Personnel
C. Communications
D. Emergency Recognition and Prevention
E. Safe Distances/Places of Refuge/Evacuation Routes/Procedures
F. Site Security and Control
G. Decontamination Procedures
H. Emergency Medical Treatment and First Aid
I. Incident Critique and Follow-up Actions
J. Personal Protective Equipment

Section VI Attachments.....20
A. HMERP Training Guide 21
B. Union Pacific Railroad Facilities With Site-Specific Emergency Response Information Addendum 25
C. Site-Specific Emergency Response Information Template 27

SECTION I

SCOPE OF THE HMERP

This Hazardous Materials Emergency Response Plan (HMERP) describes the emergency response procedures that will apply to a "non-incidental" release or threatened release of hazardous materials from a locomotive, railcar, vessel, or facility under the jurisdiction, custody or control of the Union Pacific Railroad Company. It applies to a non-incidental release that occurs anywhere within Union Pacific Railroad's system, including off-site track and other right-of-way.

A response to an "incidental" release of hazardous materials which can be absorbed, neutralized, or otherwise controlled at the time of the release by employees in the immediate release area, or by maintenance personnel, is not considered an emergency response within the scope of this HMERP (or the OSHA standard requiring the development of this HMERP). A response to a release of hazardous materials where there is no potential safety or health hazard (such as fire, explosion or chemical exposure) is not considered an emergency response under OSHA's definition of emergency response, and may be handled in a manner most suitable to the circumstances, taking into account the health and safety of on-the-scene personnel and other relevant legal requirements, but without initiating the Railroad's incident command structure.

An incidental release of a hazardous material, where there is no significant safety risk or health hazard to the employee cleaning it up, or to employees in the immediate vicinity, and which has no potential to become an emergency in a short time frame, may be cleaned up by employees who are familiar with the hazards. No emergency response is required if the employees are knowledgeable, capable, and properly equipped to contain and mitigate the hazard, and there is no significant threat to human health, safety or the environment.

See 29 C.F.R. 1910.120(a)(3) – Definitions: "*Emergency Response*;" and Appendix E: "*Releases of Hazardous Substances that Require an Emergency Response.*"

SECTION II

INITIAL OBSERVERS AND OTHER EMPLOYEES
ROLES, RESPONSIBILITIES & TRAINING

A. SCOPE

The provisions of this Section apply to "Initial Observers" and other employees in an affected area. Initial observers and other employees are individuals who are trained to initiate the emergency response sequence by notifying the proper authorities, and can assist in certain defensive response activities outside the zone of danger, but they do not assist in offensive emergency response operations. In the event of a hazardous materials incident, personnel that fall within this group are expected to "Protect, Alert, Notify, and Follow Instructions."

B. EXPECTATIONS

When a release of hazardous materials is observed or discovered, the following actions should be taken by the Initial Observer and other employees in the affected area:

1. *Protect yourself and Alert Others*

- Move upwind and uphill a safe distance away from the release.
- Avoid contact with material and vapors.
- Warn bystanders to stay away.
- Eliminate ignition sources (do not smoke or use fusees).
- Alert others in the affected area.
- Use yard specific alarm systems if available; follow emergency radio procedures if necessary and appropriate.

2. *Initiate the Notification Process*

- Contact 911 if there is imminent risk of death, injury or damage to persons, property or the environment, or if there are other circumstances requiring immediate assistance.
- Contact the RMCC at 888-877-7267 (888-UPRRCOP) and provide the requested information. The RMCC will notify federal, state and local emergency response authorities. Do not wait to make this notification. Provide whatever information is available at the time. Other information can be provided as it becomes available.
- Notify the local railroad command center, yardmaster, dispatcher, facility manager or local manager, as appropriate. If a telephone is not available, follow emergency radio procedures, as identified in the General Code of Operating Rules (GCOR), *i.e.*, Rule 2.10.

3. *Follow Instructions.*

- Turn to a designated radio channel or contact your supervisor directly for instructions.
- If ordered to evacuate, proceed to do so in a safe manner, as directed.
- If ordered to take refuge, proceed in a safe manner to the designated place of refuge.
  - For maximum protection at place of refuge, turn off all air handling equipment and close all windows and doors.
  - When safe to do so (supervisor will advise), open windows and doors and exit the building.

4. *Provide Limited Assistance*

- Stay within the limits of training and authorization.

- Assist as required in implementing defensive measures (e.g., use sandbags to erect a containment structure to protect a nearby waterway), but stay outside the zone of danger.
- Do not assist in offensive emergency response operations.

C. TRAINING

Since Union Pacific is a transporter of hazardous materials, the Company trains all employees to the "first responder awareness level." First responders at the awareness level are individuals who are expected to initiate the emergency response sequence by notifying the proper authorities.

The preferred training mechanism for this group of employees is the *"Hazardous Materials Emergency Response Plan Training Guide."* The *Training Guide* identifies various classes of hazardous materials, recognition techniques, documentation requirements, and initial observer actions delineated in the HMERP. Employees who regularly work at one of eighty-three (83) facilities identified in the list of facilities delineated by *Section VI, Attachment B* are further directed to review a supplemental site-specific emergency response information addendum for that facility. The site-specific information addendum establishes awareness of local warning systems, evacuation routes, areas of refuge, the location of windsocks, flags, showers and eyewash stations, and the telephone numbers of local emergency response agencies, *i.e.*, fire department, police department, and emergency medical personnel.

The *Training Guide* is delivered electronically or by regular mail to all Union Pacific employees on an annual basis. The site-specific information addendum is posted in common areas at each facility. It can also be acquired from facility managers, and/or downloaded and printed from the company's intranet web site.

Delivery of the *Training Guide* is documented for each employee in the Union Pacific Plateau system. HZ89 is the training code to record distribution of the *Training Guide.* A copy of the *Training Guide* and a template for the site-specific information addendum are attached to Section VI of this HMERP (*Attachments A and C*).

SECTION III

MANAGERS IN THE AFFECTED AREA
ROLES, RESPONSIBILITIES & TRAINING

A. SCOPE

This Section applies to managers in the affected area who observe or discover a release or have news of a release reported to them by a subordinate. Managers are trained to initiate the emergency response sequence by notifying the proper authorities, and can assist in certain defensive response activities outside the zone of danger, but cannot participate in offensive emergency response operations. In addition to the expectations that apply to the Initial Observer and other employees (*i.e.*, protect, alert, notify and follow instructions) they are expected to account for the safety of their employees and contractor personnel, arrange for first-aid if required by subordinates, coordinate facility-based evacuations, and assist in defensive response activities outside the zone of danger.

B. EXPECTATIONS

When a release of hazardous materials is observed, discovered or reported by a subordinate, Managers in the affected area should initiate the following actions:

1. Protect Yourself and Alert Others

- Adhere to the provisions of Section II of this HMERP to protect yourself.
- Accurately record information provided by an Initial Observer.
- Contact 911 if there is imminent risk of death, injury or damage to persons, property or the environment, or if there are other circumstances requiring immediate assistance.
- Alert all employees and other persons in the affected area:
    - Sound the designated warning signal for a general emergency.
    - Implement GCOR Rule 2.10 and broadcast the following message:

This is a hazardous materials emergency broadcast.
There is a hazardous materials emergency at *indicate location* **.**
Do not enter this area. Anyone in this immediate area should move away from the incident. Go upwind to safety. Contact your supervisor."

2. Initiate the Notification Process

- Contact the RMCC at 888-877-7267 (888-UPRRCOP) and provide the requested information. Table 1 (see below) references relevant RMCC information protocol. The RMCC will notify federal, state and local emergency response authorities. Do not wait to make this notification. Provide whatever information is available at the time. Other information can be provided as it becomes available.
- Notify the local railroad command center, yardmaster, dispatcher, facility manager or local manager, as appropriate. If a telephone is not available, follow emergency radio procedures, as identified in the GCOR, Rule 2.10.
- Notify arriving and departing train crews; provide instruction on appropriate safety precautions and/or evacuation, if necessary.

3. Provide Limited Assistance

- Provide emergency response officials with a copy of the train list or shipping papers. For a transportation incident, obtain shipping description entries and other pertinent emergency

response information from the TCS system. Logon to TCS10 and enter ***TTH car initials and number*** (all together) or for train information, enter ***BC Train identification date D***. Example: *TTHGATX1234 or BC MPCRO 30 D.*

- Guide emergency response personnel to the location of the incident, if safe to do so. Identify access routes, staging areas, and other pertinent information.

4. *Account for All Employees and Other Personnel*

- Account for all direct-report employees and contractor personnel in the affected area.
- Report immediately to the ranking on-scene emergency response official or the RMCC if any employee or contractor personnel are not accounted for.

5. *Coordinate Evacuation of Employees & Other Facility Personnel*

- If evacuation is necessary, note wind direction and use available broadcast resources (e.g., radio, telephone, or facility sound system) to instruct all non-emergency response personnel to evacuate the area or proceed to an appropriate place of refuge, located upwind and outside the danger zone.
- If necessary, consult the site-specific information addendum to this HMERP for the location of windsocks and/or flags, safety showers, evacuation routes, and places of refuge.
- Direct all subordinate management officials, *i.e.*, supervisors and/or foremen, to account for all direct-report employees and contractor personnel.
- Report to the ranking on-scene emergency response official or the RMCC if any employee or contractor personnel cannot be accounted for at the designated place of refuge.

6. *Arrange for First-Aid to be Provided to Injured Personnel*

- If personnel have been injured, arrange for first-aid or on-site medical evaluation and treatment.
- If first aid and/or medical services are not available on site, transport injured personnel to a nearby first-aid or medical treatment facility, if safe to do so.
- If available, provide relevant hazardous material information (e.g., MSDS) to first aid/medical personnel engaged in evaluation and/or treatment.
- If injured personnel are transported off-site, record the name, address and telephone number of the receiving medical treatment facility.

7. *Stay within Authorized Limits of Training and Scope of Duties*

- Assist as required in implementing defensive emergency response measures (e.g., erect a containment structure using sandbags to protect a nearby waterway), but stay outside the zone of danger.
- Direct non-emergency response activities from a safe location until relieved by a more senior Railroad official.
- Stay within the limits of training and authorization. Do not assist in offensive emergency response operations.

TABLE 1
RMCC Information Protocol

Contact the RMCC to initiate the notification process. The information in the table below will be helpful to the RMCC. Provide as much information as possible, but do not delay notification. Provide what information is available at the time, and supplement it as more information becomes available.

Information about yourself *(the observer/caller*).	Name Location (place where you will meet responders) Means of contact (telephone number, radio frequency, etc.)
Type of emergency.	
Location of emergency.	Mile post County/parish City Subdivision Name of facility/yard or track Street address, etc. Special instructions for emergency responders, if needed
Status of employees and others in area.	Deaths, injuries, and numbers and names, if known.
Date and time emergency occurred.	
Equipment involved (rail, other).	Car initial and number Unit number Name and quantity of hazardous material Hazard class
Description of surroundings.	Proximity to populated buildings, other important or occupied buildings, important roads, bridges, drainage ditches, streams, waterways, bodies of water, and drains.
Resources Required to Manage.	Fire Ambulance Law enforcement
Resources Currently Available.	
Initial actions taken.	Emergency response agencies on the scene. UPRR personnel responding Defensive Operations initiated (e.g., evacuation, control of released materials, etc.).
Initial notifications made.	Identify any prior notifications (i.e. RMCC, 911, etc.).
Weather conditions.	
Effect on train operations.	

C. TRAINING

In addition to HZ89 training, managers also complete an online course of instruction referred to as HZ90. The HZ90 training module is a more comprehensive version of the HZ89, and includes an online examination. The objective of the HZ90 is to provide managers with a more comprehensive understanding of the HMERP. Once completed, documentation of training is automatically recorded in Plateau. HZ90 refresher training is performed annually. Note that HZ90 does not qualify managers to initiate or direct a defensive or offensive emergency response operation. Managers are authorized to coordinate evacuations of facility personnel, and may assist in the implementation of defensive emergency response operations, but only outside the zone of danger, and only under the direction of properly trained emergency response personnel.

SECTION IV

EMERGENCY RESPONSE PERSONNEL ROLES, RESPONSIBILITIES & TRAINING

A. SCOPE

The provisions of this Section apply to individuals who are trained and authorized to engage in both "defensive" and "offensive" emergency response operations.

1. *Defensive Operations:*

   "Defensive" emergency response operations, as defined by OSHA regulations, are distinct from "offensive" emergency response operations. The individuals who perform defensive operations do not attempt to approach the point of a release. They may take action to contain a release from a safe distance, and try to prevent exposures, but do not try to stop a release. Their objective is to prevent further injury or damage to nearby persons, property and/or the environment. The individuals who perform this function for Union Pacific are Environmental Management Group (EMG) personnel, special agents/hazardous materials, and other properly-trained personnel who are first to arrive at the scene.

2. *Offensive Operations:*

   Individuals who are trained to engage in "offensive" emergency response operations are referred to by OSHA regulations as *Hazardous Materials Technicians* and *Hazardous Materials Specialists.* The T*echnician* is trained, equipped and authorized to approach the point of a release in order to plug, patch or otherwise stop the release. The *Specialist* responds with and provides support to the Technician. The duties of the Specialist parallel those of the Technician, but require a more comprehensive understanding of the hazardous materials they may be called upon to address. Within Union Pacific, most EMG personnel are trained to the hazardous materials technician level. A select group of individuals, including hazardous materials managers, special agents/hazardous materials and certain other EMG personnel, are trained to the hazardous materials specialist level.

3. *HAZMAT Incident Commander:*

   The highest ranking properly trained official designated by the Railroad to take charge of the Railroad's emergency response operations is the *HAZMAT Incident Commander*. The role of the HAZMAT Incident Commander is limited to managing the personnel, equipment and resources associated with emergency response operations. Other functions incident to Railroad operations are typically outside the scope of his or her authority.

   If the functions of the HAZMAT Incident Commander are assumed by an Incident Commander designated by federal, state or local authorities (e.g., local fire or police chief, EPA on-scene coordinator, FEMA coordinator, etc.), the HAZMAT Incident Commander must relinquish authority over emergency response operations to the Government's Incident Commander and cooperate as necessary to complete emergency response operations. Under such circumstances, the HAZMAT Incident Commander may continue to perform liaison functions to the Government's Incident Commander, or be asked to stand down by Union Pacific management to allow another senior Railroad official, *i.e.*, the *Railroad Operations Commander*, to perform the liaison function.

B. EXPECTATIONS

1. *Protocol for Defensive Operations:*

When a release of hazardous materials is reported, the following actions may be taken by individuals authorized to initiate and/or direct "defensive" emergency response operations:

- Take action to protect yourself and others.
- Confirm that notification protocols have been initiated.
- Identify the hazardous material(s) involved in the incident.
- Identify potential human and ecological receptors.
- Contact 911 if immediate assistance is required to abate an imminent risk to human health or the environment.
- Identify available resources that can be used for basic control, containment and/or confinement operations.
- Mobilize available resources and utilize personal protective equipment.
- Initiate basic control, containment and/or confinement operations if safe to do so, consistent with available resources and personal protective equipment.
- Communicate conditions on the ground to the HAZMAT Incident Commander, facility manager(s) and/or federal, state and local authorities.
- Do not approach the point of release or otherwise attempt to plug, patch or stop the release.

2. *Protocol for Offensive Operations:*

The following protocol should be adhered to by individuals who engage in "offensive" emergency response operations:

- Operate within the Railroad Incident Command structure (identified below).
- Identify the hazardous material(s) involved in the incident.
- Utilize personal protective equipment that are appropriate to the incident.
- Utilize field survey instruments and other equipment, as required.
- Locate the point of release and identify damage to containment structures and/or associated device(s).
- Identify equipment and other resources needed to perform repairs and/or stop the release.
- Communicate site conditions to the HAZMAT Incident Commander, facility manager(s) and/or federal, state and local authorities.
- Inform the HAZMAT Incident Commander immediately if assistance is required to abate an imminent risk to human health or the environment.
- Repair existing containment structures and/or associated devices and perform other functions as required to abate a release or threatened release.

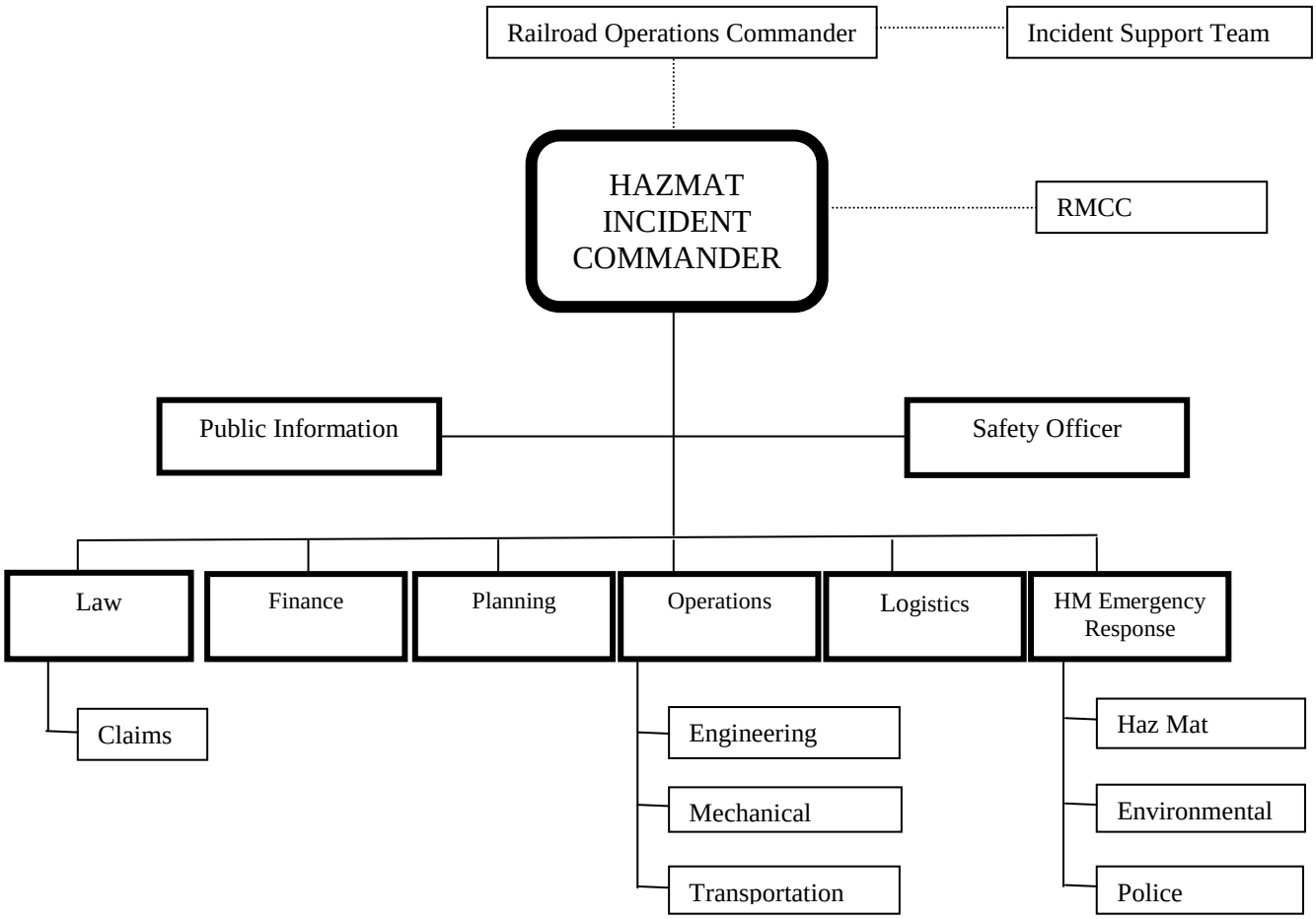
3. *Functions of the HAZMAT Incident Commander:*

The HAZMAT Incident Commander is responsible for initiating the Railroad's Incident Command Structure (depicted below) and for implementing the HMERP. In doing so, the HAZMAT Incident Commander performs the following functions:

- Identify the hazardous materials present at the location of a hazardous materials incident and the conditions that pose a risk to emergency response personnel, and based on this assessment, plan and implement an emergency response operation to contain and stop the release, repair existing containment structures and/or associated devices, and address continuing risks to human health, property and/or the environment.
- Ensure that emergency response personnel utilize appropriate personal protective equipment.

- Designate a safety official who is familiar with the operations to be implemented at the emergency response site. This individual will be responsible for identifying hazards, evaluating risks, and making recommendations to enhance safety. This individual will also have the authority to alter, terminate or suspend emergency response operations if he or she suspects conditions exist that pose imminent danger.
- Ensure that offensive emergency response activities are performed in groups of two or more.
- Ensure that backup personnel are available with equipment ready to provide assistance or rescue.
- Ensure that advanced first-aid personnel are available with medical equipment and transportation capability.
- Ensure that non-employee support personnel are properly briefed and equipped with appropriate personal protective equipment before performing emergency support work.
- Ensure that appropriate decontamination procedures have been implemented after emergency response operations are terminated.

RAILROAD INCIDENT COMMAND STRUCTURE



C. TRAINING

1. Defensive Operations:

Employees authorized to engage in defensive emergency response operations must be trained to the "First Responder Operations Level," as defined by OSHA. First responders at the operations level must receive at least eight (8) hours of training **or** have sufficient experience to demonstrate competency in the following areas (in addition to those listed for the First Responder Awareness Level):

1. Knowledge of basic hazard and risk assessment techniques.
2. Ability to properly select and use personal protective equipment.
3. An understanding of basic hazardous materials terms.
4. Ability to initiate basic control, containment and/or confinement operations.
5. Ability to initiate basic decontamination procedures.
6. Understanding of standard operating and termination procedures.

Within Union Pacific, the individuals who perform this function receive forty (40) hours of comprehensive HAZWOPER training.

2. *Offensive Operations:*

Employees authorized to engage in "offensive" emergency response operations must be trained to the "Hazardous Materials Technician" or "Hazardous Materials Specialist" level. This involves a minimum of twenty-four (24) hours of training and a demonstration of various core competencies.

The Technician must demonstrate competency in the following areas:

1. Utilize field survey instruments and other equipment to ascertain the classification, identification and verification of known and unknown hazardous materials.
2. Be able to implement the HMERP.
3. Be able to function effectively within the Railroad Incident Command Structure.
4. Be able to properly select and utilize appropriate personal protective equipment.
5. Understand hazard and risk assessment techniques.
6. Be able to perform advanced control, containment and/or confinement operations.
7. Understand and implement decontamination procedures.
8. Understand termination procedures.
9. Understand basic chemical and toxicological terminology and behavior.

The Specialist must demonstrate a more comprehensive understanding of the Technician's core competency areas, and in addition, demonstrate the following:

1. Know how to implement the emergency response plan of the local jurisdiction.
2. Know of the State's emergency response plan.
3. Be able to develop a site safety and control plan.

Within Union Pacific, individuals who perform the duties of a hazardous material technician receive forty (40) hours of comprehensive HAZWOPER training. Individuals who perform the duties of a hazardous materials specialist receive eighty (80) hours of relevant training, consisting of the forty (40) hour HAZWOPER program and a forty (40) hour TANK CAR SAFETY program unique to Railroad operations.

3. *HAZMAT Incident Commander Training*:

Employees who will assume the role of HAZMAT Incident Commander must have at least twenty-four (24) hours of training, and in addition, demonstrate competency in the following core areas:

1. Know how to implement the HMERP.

2. Know and be able to implement the Railroad's incident command structure.
3. Understand the hazards and risks that employees face when working in chemical protective clothing.
4. Know how to implement the emergency response plan of the local jurisdiction.
5. Know of the State emergency response plan and the Federal Regional Response Team.
6. Know and understand the importance of decontamination procedures.

Within Union Pacific, qualified individuals receive a minimum of forty (40) hours of HAZWOPER training or greater.

4. *Other Personnel within the Railroad Incident Command Structure:*

The roles of other individuals in the Railroad Incident Command Structure are outlined in Section D (see below). Training of other personnel within the Railroad Incident Command Structure will be based upon the duties and functions to be performed by each employee.

5. *Refresher Training:*

All employees will receive annual refresher training of sufficient content and duration to maintain their competencies.

6. *Records Management:*

Documentation of initial and annual refresher training shall be noted and maintained in the Union Pacific Plateau system.

Table 2

Summary of Railroad Emergency Response Training

Role of Employee Group	Employee Group	Regulatory Training Requirement	UPPR Training Protocol & Documentation
Protect, Alert, Notify & Follow Instructions	All Union Pacific employees.	First Responder Awareness plus annual refresher training.	HZ89 for all employees; documented in Plateau.
Account for Subordinates, Assist and Coordinate as Directed	Field managers.	First Responder Awareness plus annual refresher training.	HZ90; documented in Plateau.
Defensive Operations	Select EMG personnel; special agents/hazardous materials; and other properly-trained personnel.	Minimum 8 hours **or** experience sufficient to demonstrate core competencies plus annual refresher training.	40 Hour HAZWOPER (HZ94) plus annual refresher (HZ95); documented in Plateau.
Offensive Operations/ Hazardous Materials Technician	Select EMG personnel; special agents/hazardous materials.	24 hours **and** experience sufficient to demonstrate core competencies plus annual refresher training.	40 Hour HAZWOPER (HZ94) plus annual refresher (HZ95); documented in Plateau.
Offensive Operations/ Hazardous Materials Specialist	Select EMG personnel and special agents/hazardous materials.	24 hours **and** experience sufficient to demonstrate core competencies plus annual refresher training.	40 Hour HAZWOPER (HZ94) plus annual refresher (HZ95) & 40 Hour Tank Car Safety (HM06); documented in Plateau.
HAZMAT Incident Commander	Highest ranking properly-trained EMG official or special agent/hazardous materials.	24 hours **and** experience sufficient to demonstrate core competencies plus annual refresher training.	40 Hour HAZWOPER (HZ94) plus annual refresher (HZ95) & NIMS (HZ97A, B & C); documented in Plateau.
Railroad Operations Commander	Senior Railroad official with or without hazardous materials training.	Not addressed by regulation.	None

D. OTHER PERSONNEL IN THE RAILROAD INCIDENT COMMAND STRUCTURE

The roles of various Railroad personnel within the framework of the Railroad Incident Command Structure are described below. All individuals must comply with the direction of the Railroad Incident Commander when engaged in activities designed to support emergency response operations. The roles assigned to particular personnel, if any, will depend upon the nature of the emergency.

Group/Position	***Role***
Response Management Communications Center (RMCC)	Initiates notification of relevant federal, state and local emergency response authorities and Railroad personnel. Provides updates as needed.
Dispatching Centers HDC (Harriman), SDC (Southern), WDC (Western)	Conducts internal notifications to other departments, as necessary.
Law Department	Provides legal support and other resources to Railroad emergency response personnel.
HAZMAT Incident Commander	Implements the HMERP. Performs associated command functions. Coordinates with Incident Commander appointed by Government entity, if one is designated.
Public Information Officer	Disseminates emergency-related information to third parties.
Assigned or Designated Safety Officer	Identifies and evaluates hazards and provides appropriate direction with respect to all matters relating to operational safety, including health and safety of employees and contractors. Arranges for advanced first aid personnel and transportation when local resources are not available. Safety Officer has the authority to alter, suspend, or terminate operations if there is imminent risk of danger to health and safety.
Finance	Maintains information on cost issues.
Claims	Directs efforts to minimize impact on the community; manages and investigates all claims.
Engineering	Rebuilds damaged track, subgrade, bridges and culverts, signals, and other railroad structures associated with the emergency.
Mechanical	Rerails, repairs, or disposes of damaged rail equipment and non-hazardous lading associated with the emergency.
Transportation	Maintains local railroad operations that are not impacted by and/or do not impact emergency response operations.
Hazardous Materials	Responds to a hazardous material release incident with properly trained personnel.
Environmental	Directs efforts to address environmental aspects that may be associated with hazardous material release. Supports hazardous materials emergency response efforts.
Police	Manages site security in conjunction with local, state, and federal law enforcement agencies.
Damage Prevention (Freight Claims)	Transfers, salvages, or disposes of non-hazardous commodities associated with the emergency.
Derailment Prevention	Directs efforts for investigation of cause of the emergency.
Tele-communications	Provides and maintains required communications.

Section V

MISCELLANEOUS

A. PRE-EMERGENCY PLANNING

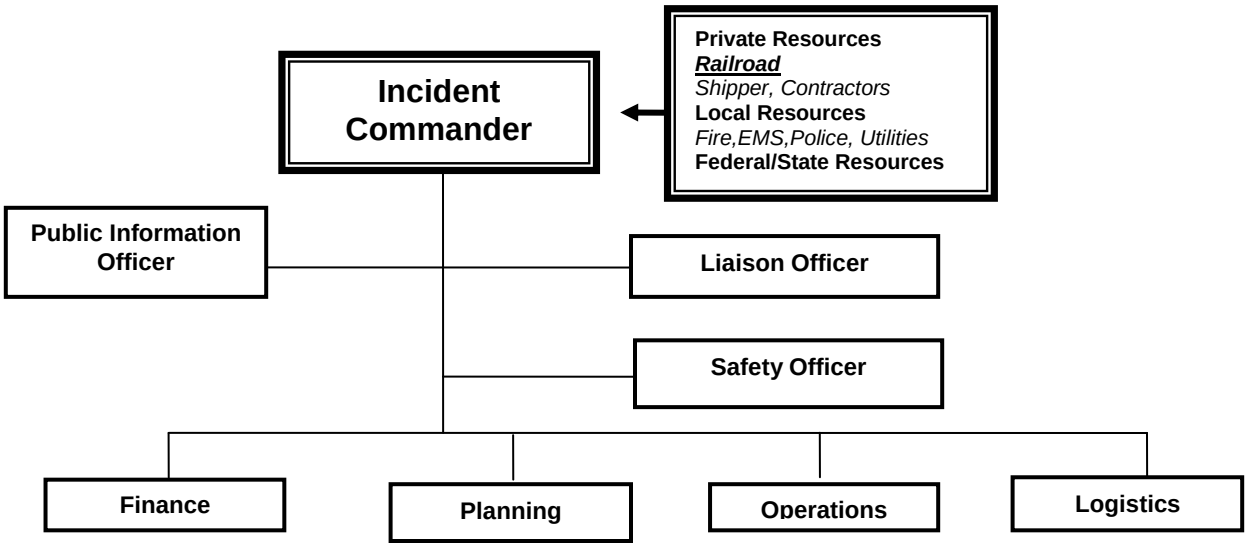
The Railroad provides emergency response training specific to Railroad operations to local first responders throughout the Railroad's geographic area of operations. Hazardous materials information is provided to local emergency response authorities pursuant to the Emergency Planning and Community Right-to-Know Act (EPCRA). In addition, the Railroad cooperates and actively participates with local communities through various outreach initiates, i.e., LEPC meetings, Responsible Care Initiatives, and TransCAER events, to enhance coordinated emergency response activities. The HMERP is provided to local fire departments upon request.

B. COORDINATION WITH NON-RAILROAD EMERGENCY RESPONSE PERSONNEL

- If the functions of the HAZMAT Incident Commander are assumed by an Incident Commander designated by federal, state or local authorities (e.g., local fire or police chief, EPA on-scene coordinator, FEMA coordinator, etc.), the HAZMAT Incident Commander shall relinquish authority over emergency response operations to the Government's Incident Commander and cooperate as necessary to complete emergency response activities.

- The HAZMAT Incident Commander may continue to perform liaison functions consistent with the National Incident Management Structure (NIMS) identified below, or may be asked to stand down to allow other Railroad officials to perform this function, *i.e.*, the Railroad Operations Commander.

NATIONAL INCIDENT MANAGEMENT STRUCTURE (NIMS)



C. COMMUNICATIONS

- Notifications to federal, state and local authorities will be initiated by the Response Management Communications Center (RMCC).

- The HAZMAT Incident Commander will establish internal communication protocol and advise emergency response personnel regarding radio frequencies, telephones and other means of communication that will be made available during emergency response operations.

D. EMERGENCY RECOGNITION AND PREVENTION

- All Union Pacific employees receive annual training at the first responder awareness level through the *HMERP Training Guide*. The *Training Guide* identifies classes of hazardous materials, recognition techniques, documentation requirements, and initial observer actions delineated in the HMERP. Individuals engaged in offensive and defensive emergency operations receive more comprehensive training.

- Railroad personnel perform hazardous materials inspections at various stages of the transportation cycle.

E. SAFE DISTANCES/PLACES OF REFUGE AND EVACUATION ROUTES/PROCEDURES

- A site-specific emergency response information addendum has been developed for eighty-three facilities listed in Section VI, Attachment B. This document is posted in common areas at each facility, and may be obtained from the facility manager, and/or downloaded from the company's intranet web site.

F. SITE SECURITY AND CONTROL

- Railroad police are authorized to address general security issues on Railroad property, including those that may arise during emergency response operations. If local law enforcement officials become involved in an incident response, Railroad police coordinate with local law enforcement officials to manage site security and control.

G. DECONTAMINATION PROCEDURES

- The HAZMAT Incident Commander shall determine and instruct emergency response personnel on appropriate decontamination methods relevant to a particular chemical hazard.

H. EMERGENCY MEDICAL TREATMENT AND FIRST AID

- Managers at the first responder awareness level arrange for first-aid and/or medical treatment of injured non-emergency response personnel.

- The HAZMAT Incident Commander arranges for advanced first aid/medical treatment of injured emergency response personnel.

- The HAZMAT Incident Commander will communicate information pertaining to chemical materials and other hazards to first-aid/medical personnel as necessary to facilitate appropriate treatment of injuries.

I. INCIDENT CRITIQUE AND FOLLOWUP ACTIONS

- An incident analysis shall be performed and documented for non-incidental emergency response actions which involve mobilization of a HAZMAT Incident Commander.

- The HAZMAT Incident Commander shall ensure that copies of the incident analysis are retained for future reference and/or inspection.

- Follow-up actions, including appropriate amendments to governing documents, shall be implemented as required to address deficiencies in the implementation of emergency response operations or other provisions of the HMERP.

J. PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Determination of appropriate PPE levels will be based on an evaluation of the characteristics of the PPE relative to the requirements of the site, the task, and the hazards identified.

SECTION VI

ATTACHMENTS

A. HMERP Training Guide

B. List of Union Pacific Railroad Facilities With A Site-Specific HMERP Addendum

C. Site-Specific HMERP Addendum Template

Attachment A

HZ-89

Hazardous Materials Emergency Response Plan Training Guide

RESERVED

RESERVED

RESERVED

Attachment B

UNION PACIFIC RAILROAD FACILITIES WITH A SITE-SPECIFIC EMERGENCY RESPONSE INFORMATION ADDENDUM

STATE	LOCATION
AR	Little Rock
AR	Pine Bluffs
AZ	Nogales
AZ	Phoenix
AZ	Tucson
AZ	Yuma
CA	Bakersfield
CA	City of Industry
CA	Commerce-Los Angeles
CA	Dolores
CA	Fresno
CA	LATC-Los Angeles
CA	ICTF Yd-Long Beach
CA	Martinez
CA	Oakland
CA	Roseville (potential OPA 2005)
CA	Stockton
CA	West Colton
CA	Yermo
CO	36th Street-Intermodal-Denver
CO	Burnham-Denver
CO	North Yard-Denver
CO	Grand Junction
IA	Cedar Rapids
IA	Clinton
IA	Council Bluffs
IA	Des Moines
ID	Nampa
ID	Pocatello
IL	Canal Street-Intermodal
IL	Dupo
IL	East St. Louis(A&S)
IL	Global 1
IL	Global III
IL	Melrose Park-Proviso-Global II
IL	Yard Center-Dolton
KS	Coffeyville
KS	Kansas City (Armourdale, 18th, Armstrong, Fairfax)
KS	Topeka
KS	Wichita
LA	Alexandria

(continued)

STATE	LOCATION
LA	Avondale
LA	Lake Charles

LA	Livonia
LA	Hollywood-Shreveport
MN	St. Paul
MO	Neff-Kansas City
MO	Lesperance-St. Louis
NE	Fremont
NE	Grand Island
NE	North Platte
NE	South Morrill
NV	Elko
NV	Sparks
OR	Albina
OR	Barnes
OR	Eugene
OR	Hermiston-Hinkle
OR	Brooklyn-Portland
TN	Memphis
TX	Angleton
TX	Beaumont
TX	Bloomington-Victoria
TX	Dallas Street-El Paso
TX	Alfalfa-El Paso
TX	Davidson (Ft. Worth)
TX	Hearne
TX	LaPorte-Strang-Houston
TX	Englewood-Houston
TX	Settegast-Houston
TX	Longview
TX	Ney
TX	Kirby-San Antonio
TX	East Yard-San Antonio
TX	SoSan Yard-San Antonio
UT	Ogden
UT	Roper
UT	Salt Lake
WA	Argo-Seattle
WI	Butler-Milwaukee
WY	Cheyenne
WY	Green River
WY	Rawlins

Attachment C

SITE-SPECIFIC EMERGENCY RESPONSE INFORMATION ADDENDUM

Hazardous Materials Managers shall complete this HMERP addendum for each of the facilities identified in Section VI, Attachment B. The entire HMERP, including this addendum, must be posted in an area of the facility which is easily accessible to employees. It should also be made available on the company's local intranet website.

Local Emergency Contact Numbers:

Fire Department …….

Police Department …….

First-Aid/Emergency Medical Services ……..

Response Management Communications Center …….

Emergency Evacuation Route(s) (attach map): _____
_____
_____
_____

Places of Refuge & Special Instructions: _____
_____
_____
_____

Location of Emergency Alarm System /Sirens: _____
_____

Emergency Radio Channel(s): _____

Location of Emergency Showers/Eyewash: _____
_____

Location of Available Wind socks and/or Flags: _____
_____

Access Points: _____
_____

Staging Areas: _____
_____
_____

Command Post Location: _____
_____

List Equipment that may be used to Facilitate Emergency Response: _____
_____
_____
_____

_____
_____
_____
_____
_____

Location of Equipment that may be used to Facilitate Emergency Response: _____
_____
_____
_____
_____
_____
_____
_____

Other Relevant Information: _____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Appendix I.
Transportation Impact Analysis

ESA

Final Transportation Impact Analysis Report

VALERO BENICIA REFINERY CRUDE BY RAIL PROJECT

Prepared for:

Valero Energy Corporation

ERM

October 2013

FEHR PEERS

WC13-3005

Final Transportation Impact Analysis
Valero Benicia Refinery
Crude by Rail Project

Prepared for:
Valero Energy Corporation
ERM

October 2013

WC13-3005

FEHR PEERS

Table of Contents

1.0 INTRODUCTION 1

1.1 Background 1
1.2 Project Description 1
1.3 Study Purpose 2
1.4 Study Area 4
1.5 Analysis Scenarios 4
1.6 Analysis Methods 6
1.6.1 Unsignalized Intersections 6
1.6.2 Traffic Operations Analysis Software 7
1.7 Significance Criteria 7
1.8 Report Organization 9

2.0 EXISTING CONDITIONS 10

2.1 Project Location 10
2.2 Study Area Roadways 10
2.3 Existing Pedestrian and Bicycle Facilities 11
2.3.1 Pedestrian Facilities 11
2.3.2 Bicycle Facilities 11
2.4 Existing Transit Service 11
2.5 Existing Freight Rail 12
2.6 Existing Truck Routes 14
2.7 Existing Emergency Vehicle Response Times 15
2.8 Collision History 15
2.9 Existing Lane Configurations and Traffic Volumes 16
2.10 Existing Intersection Operations 20
2.10.1 Model Approach 20
2.10.2 Model Validation 20
2.10.3 Intersection Operations Results 21

3.0 EXISTING PLUS PROJECT CONDITIONS 24

3.1 Project Assumptions 24

3.2 Intersection Operations Results 25
3.2.1 Off-Peak Hour Operations Results 25
3.3 Existing Project Impacts and Mitigation Measures 29
3.3.1 Transit Impacts 30
3.4 Emergency Vehicle Access 30

4.0 CUMULATIVE CONDITIONS 32

4.1 Cumulative Year Volume Forecasts 32
4.2 Cumulative Year Roadway Network 34
4.3 Intersection Operations Results 34
4.3.1 Off-Peak Hour Operations Results 34
4.4 Cumulative Project Impacts and Mitigation Measures 38

Appendices

Appendix A: Existing Traffic Data

Appendix B: Intersection Analysis Worksheets

List of Figures

Figure 1-1 Regional Vicinity Map 3

Figure 1-2 Project Study Area 5

Figure 2-1 Average Weekday Traffic Volumes by Time of Day on Park Road 18

Figure 2-2 Existing Conditions Intersection 2:45 – 3:45 PM Hour Traffic Volumes and Lane Configurations 19

Figure 3-1 Existing Plus Project Queuing Analysis 28

Figure 4-1 Cumulative Conditions Intersection 2:45 – 3:45 PM Hour Traffic Volumes and Lane Configurations 33

Figure 4-2 Cumulative Plus Project Queuing Analysis 39

List of Tables

Table 1-1 Unsignalized Intersection LOS Criteria 7

Table 2-1 Fairfield and Suisun Transit (FAST) Transit Service Summary 12

Table 2-2 Existing At-Grade Rail Operations 13

Table 2-3 Study Area Collision History Summary – January 2009 thru January 2012 16

Table 2-4 Validation Criteria Thresholds Comparison 21

Table 2-5 Existing Off-Peak Hour Intersection Level of Service 22

Table 2-6 Existing Off-Peak Hour Intersection Queuing 23

Table 3-1 Existing Plus Project Off-Peak Hour Intersection Level of Service 26

Table 3-2 Existing Plus Project Off-Peak Hour Intersection Queuing 27

Table 4-1 Cumulative Plus Project Off-Peak Hour Intersection Level of Service 36

Table 4-2 Cumulative Plus Project Off-Peak Hour Intersection Queuing 37

1.0 INTRODUCTION

1.1 BACKGROUND

The Valero Refinery is located on 880 acres north of the Carquinez Strait in the City of Benicia, California. The refinery was built in 1968 and has undergone significant modifications and upgrades to become one of the most complex refineries in the United States. The refinery processes domestic crude from the San Joaquin Valley in California and the Alaskan North Slope, along with foreign crudes. The refinery has a feedstock throughput capacity of 170,000 barrels per day and employs approximately 480 people. Crude oil deliveries currently arrive by pipeline and marine vessels. A regional vicinity map of the refinery is provided on **Figure 1-1**.

1.2 PROJECT DESCRIPTION

The proposed Valero Benicia Refinery Crude by Rail Project would ship crude oil from North American sources by rail into the refinery. The Project would expand the proportion of crude oil delivered to the refinery by railcar, to up to 70,000 barrels per day, but would not increase the total volume of crude oil delivered to the refinery because train deliveries would replace ship deliveries. Railcar deliveries would use an existing Union Pacific Railroad (UPRR) track to access the refinery, crossing the existing at-grade railroad crossing at Park Road, just east of the intersection of Park Road/Bayshore Road. The deliveries would arrive at the refinery each day and in trains up to 50 railcars in length per delivery. Up to two railcar deliveries are expected per day, totaling approximately 100 railcars. The Project would not increase the number of employees at the refinery.

A typical rail car handling scenario is described below:

1. UPRR-operated locomotives would haul up to 100 crude oil railcars (in two trains of up to 50 cars) a day from the UPRR Roseville rail yard to the Refinery. Each railcar is nominally 60 feet long, with a capacity of approximately 700 barrels and a maximum estimated load of 211,600 pounds.
2. For each delivery, UPRR-operated locomotives would haul in a full 50-railcar train crossing Park Road on Track 700 and then travel on Track 732 to the unloading rack. Twenty-five rail cars would be spotted on each unloading track located on each side of the unloading rack. UPRR would leave its locomotives attached to each 25-rail-car train.
3. The Refinery would unload the delivered rail cars.

4. After the rail cars are emptied, the empty rail cars would be moved onto the "departure" spur on Refinery property adjacent to the unloading rack, to assemble a 50-railcar train.
5. The empty 50-railcar train on the departure spur would be moved onto Track 700, across Park Road, and transported off site by a UPRR operator.

Steps 2 through 5 above would take approximately 8 to 10 hours for 50 rail cars. The proposed Project would result in four 50-car train crossings of Park Road per day (two trips into the Refinery and two trips out). UPRR would deliver one full 50-car train and pull out an empty 50-car train between the hours of 8:00 PM and 5:00 AM. A second 50-car train would either be delivered and empty 50-car train pulled out during this time period or during the non-peak daytime hours (avoiding 6:00 AM to 9:00 AM, 12:00 PM to 1:00 PM, and 4:00 PM to 6:00 PM). A train with 200 feet of locomotive and 50 railcars in length would take about 7.3 minutes to cross Park Road at a speed of 5 mph. The at-grade crossing traffic controls provide a 30-second buffer time before and after each train crossing on Park Road. Each 50-railcar train movement is estimated to block traffic on Park Road for approximately 8.3 minutes. Operations would occur 24 hours per day/7 days per week/365 days per year.

1.3 STUDY PURPOSE

The purpose of this study is to evaluate potential impacts to local roadways and intersections with implementation of the Project. The study of anticipated impacts to the transportation system was undertaken to maintain compliance with California Environmental Quality Act (CEQA) requirements and to assist in identifying additional traffic controls or mitigation that may be needed to reduce potential impacts from Project activities to levels of insignificance. This study focuses on the potential transportation impacts of the increased rail crossings on the local transportation network under existing and cumulative conditions.

Figure 1-1.

Regional Vicinity

WC13-3005_1-1_RegVic

FEHR PEERS

1.4 STUDY AREA

The five intersections listed below and shown on **Figure 1-2** are the most likely to be affected by increased vehicle queues that could form at intersections during train crossings, and were thus selected for analysis.

1. Park Road / Bayshore Road
2. Interstate 680 (I-680) Southbound On-Ramp / Bayshore Road
3. I-680 Northbound Off-Ramp / Bayshore Road
4. Park Road / Bay Vista Court
5. Park Road / Valero Refinery Entrance

The I-680 ramp-terminal intersections listed above fall under the jurisdiction of Caltrans; all other intersections fall under the jurisdiction of the City of Benicia.

Freeway operations along segments of I-680 and I-780 within the study area were not analyzed as part of this study. Generally, a freeway analysis is undertaken if a project would increase peak hour trips in the peak direction by more than three percent. The Project would not generate new vehicle trips, and therefore would not increase peak hour trips on freeways in the study area.

1.5 ANALYSIS SCENARIOS

Study intersection operations were evaluated for the following scenarios:

Scenario 1: ***Existing Conditions*** – Evaluates intersection operations based on traffic counts collected in January and September 2013 and observed intersection lane configurations and traffic control devices. Existing rail operations were also documented for a 7-day period in April.

Scenario 2: ***Existing Plus Project Conditions*** – Evaluates intersection operations based on traffic counts collected in January and September 2013 and assuming rail deliveries of up to 50 railcars in length utilizing the Park Road at-grade railroad crossing.

Scenario 3: ***Cumulative No Project Conditions*** – Cumulative No Project traffic forecasts were developed to reflect year 2035 conditions. The analysis assumes the same intersection lane configurations and traffic control devices as Existing conditions.

Figure 1-2.

Study Area

WC13-3005_1-2_StudyArea

FEHR PEERS

Scenario 4: ***Cumulative Plus Project Conditions*** – Evaluates intersection operations based on year 2035 forecast estimates developed under *Scenario 3* and assuming rail deliveries of up to 50 railcars in length utilizing the Park Road at-grade railroad crossing.

1.6 ANALYSIS METHODS

The operations of roadway facilities are described with the term "level of service" (LOS). LOS is a qualitative description of traffic flow from a vehicle driver's perspective based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels of service are defined ranging from LOS A (best operating conditions) to LOS F (worst operating conditions). LOS E corresponds to operations "at capacity." When volumes exceed capacity, stop-and-go conditions result and operations are designated as LOS F.

1.6.1 UNSIGNALIZED INTERSECTIONS

For unsignalized (all-way stop-controlled and side-street stop-controlled) intersections, the Transportation Research Board's 2000 *Highway Capacity Manual (*HCM*)* method for unsignalized intersections was used. With this method, operations are defined by the average control delay per vehicle (measured in seconds). The control delay incorporates delay associated with deceleration, acceleration, stopping, and moving up in queue. **Table 1-1** summarizes the relationship between delay and LOS for unsignalized intersections. At side-street stop-controlled intersections, the delay is calculated for each stop-controlled movement, the left-turn movement from the major street, as well as the intersection average. The intersection average delay and highest movement/approach delay are reported for side-street stop-controlled intersections.

TABLE 1-1
UNSIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Delay in Seconds
A	Little or no delays	≤ 10.0
B	Short traffic delays	> 10.0 to 15.0
C	Average traffic delays	> 15.0 to 25.0
D	Long traffic delays	> 25.0 to 35.0
E	Very long traffic delays	> 35.0 to 50.0
F	Extreme traffic delays with intersection capacity exceeded	> 50.0

Source: 2000 *Highway Capacity Manual.*

1.6.2 TRAFFIC OPERATIONS ANALYSIS SOFTWARE

The traffic operations analysis for the project utilized the VISSIM software platform. VISSIM is a micro-simulation software that analyzes the traffic operations of cars, trucks, transit vehicles, trains, pedestrians, and bicycles. The software can analyze both arterial and freeway corridors, signalized and unsignalized intersections, roundabouts, ramp meters, and at-grade railroad crossings. The development of a VISSIM model requires many components. These components include lane geometries, traffic controls, traffic volumes, and vehicle behavior characteristics. Micro-simulation provides the capability of analyzing the study area as a system and accounts for queuing interactions between intersections. Micro-simulation also provides an accurate assessment of average vehicle delay and queue lengths at each study intersection. VISSIM has the capability to simulate roadway blockages due to at-grade train crossings and evaluate the congestion that builds as the roadway is blocked.

1.7 SIGNIFICANCE CRITERIA

Significance criteria are used to determine whether a project impact is considered significant and therefore requires mitigation. The *City of Benicia General Plan* provides a LOS standard of D for intersection operations but does not provide standards for at-grade railroad crossing operations. This LOS D criterion is typically used to assess impacts of development projects that would potentially increase vehicle trips at intersections within the study area. However, the Project would not increase vehicle trips within the study area, and level of service is not the only metric that can be used to evaluate impacts of increased rail activity on the surrounding transportation network. LOS is solely based on average delay

incurred on vehicles at an intersection. Generally, people that drive through industrial areas served by at-grade railroad crossings have a higher tolerance of delay associated with intermittent at-grade rail activity compared to delay at intersections that are not in the vicinity of an at-grade railroad crossing. Therefore, LOS delay thresholds that apply to intersections are not readily applicable to at-grade railroad crossings.

Vehicle queues that result from at-grade rail activity have a major influence on roadway and intersection traffic operations within the vicinity of the at-grade crossing. Vehicle queues and delay are directly related, the longer the vehicle queues are, the higher the average delay becomes. This is certainly the case during times of the day when traffic volumes are high. However, during times of the day when traffic volumes are low, it is possible for an at-grade train crossing to result in average delays in the LOS F range with resulting vehicle queues accommodated within the storage capacity provided at the intersection. Even though average delay might be high during a long train crossing, if resulting queues are accommodated within the provided storage then it is less likely that the at-grade train crossing would adversely affect the surrounding transportation network.

Although the City of Benicia does not have adopted significance criteria for at-grade railroad crossing operations, the Project team recommends the following criteria to evaluate impacts associated with increased rail activity on at-grade crossings:

- A Project impact would be considered significant if rail crossing activity causes vehicle queues that impede other traffic, such as queue spillback to the freeway mainline or to an adjacent intersection and traffic not destined over the crossing is unable to continue along the travel way.

Additional significance criteria considered as part of this study include:

- Would the Project conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads and highways?

- Would the Project result in a change in traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?

- Would the Project substantially increase traffic hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment), or due to the proposed increased frequency and length of train crossings?

- Would the project result in inadequate emergency access?

- Would the Project conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

1.8 REPORT ORGANIZATION

This report is divided into four chapters as described below:

Chapter 1 – ***Introduction*** discusses the study purpose, analysis scenarios and methods, significance criteria, and organization of the report.

Chapter 2 – ***Existing Conditions*** describes the transportation facilities and existing traffic operations in the project vicinity, including the surrounding roadway network, typical vehicular traffic volumes, and intersection operations. Existing rail crossing operations are also discussed in additional to a review of reported incidents at the rail crossing and collisions at study intersections.

Chapter 3 – ***Existing Plus Project Conditions*** presents relevant Project information, and evaluates existing conditions assuming proposed Project railcar deliveries at the at-grade Park Road railroad crossing.

Chapter 4 – ***Cumulative Conditions*** addresses year 2035 conditions without and with the Project and discusses cumulative impacts.

2.0 EXISTING CONDITIONS

This chapter describes the transportation system in the Project study area and the existing operations of the study intersections.

2.1 PROJECT LOCATION

The Valero Benicia Refinery is located in an industrial area of Benicia, California, northeast of the main residential and commercial center of the city, as shown previously on **Figure 1-1**. The site is generally bounded by I-680 and Suisun Bay to the south, East Channel Road to the east, and East 2nd Street to the west and to the north.

2.2 STUDY AREA ROADWAYS

Regional access to the Project site is provided primarily from I-680, while local access is provided via Industrial Way, Bayshore Road and Park Road. The roadways in the study area are described below and their locations in relation to the Project site are shown in **Figure 1-2**.

Interstate 680 (I-680) is a north-south freeway connecting Santa Clara County in the south to Solano County to the north, traversing eastern Alameda County and central Contra Costa county. The freeway terminates in the City of Fairfield, where it merges into I-80. I-680 is oriented along a northeast/southwest axis along the southern edge of the Valero Refinery, and provides two lanes in each direction. Interchanges at Bayshore Road and Industrial Way provide access to the southern portions of the refinery.

Park Road is a 2-lane arterial that connects the industrial port area along the southeastern edge of the City of Benicia to the industrial areas to the northeast. Its path largely parallels that of I-680. It intersects the existing Union Pacific Railroad (UPRR) track at an at-grade railroad crossing located just east of Bayshore Road. The posted speed limit varies from 30 to 35 mph.

Bayshore Road is a 2-lane arterial that connects the Valero Benicia Refinery to the industrial port area along the southeastern edge of the City of Benicia, following the Suisun Bay shoreline. A partial interchange with I-680 provides access to and from the south. The posted speed limit is 35 mph.

Industrial Way is a 2-lane arterial that loops through the industrial area where the Valero Refinery is situated, providing access to numerous industrial parcels either directly or via connections with local

streets. A partial interchange with I-680 provides access to and from the north. The posted speed limit is 40 mph.

Bay Vista Court is a local street providing direct access to two industrial parcels, from Park Road.

2.3 EXISTING PEDESTRIAN AND BICYCLE FACILITIES

This section describes the existing pedestrian and bicycle facilities in the study area.

2.3.1 PEDESTRIAN FACILITIES

Typical pedestrian facilities include sidewalks, crosswalks, and pedestrian signals at signalized intersections. The study area lacks substantial pedestrian facilities, which is typical of industrial areas. Sidewalks are not provided along any of the roads in the study area, and none of the study intersections—all unsignalized—feature crosswalks.

2.3.2 BICYCLE FACILITIES

Bicycle facilities include the following:

- Bike paths (Class I) – Paved trails that are separated from roadways.
- Bike lanes (Class II) – Lanes on roadways designated for use by bicycles through striping, pavement legends, and signs.
- Bike routes (Class III) – Designated roadways for bicycle use by signs only; may or may not include additional pavement width for cyclists.

No designated bicycle facilities are provided within the study area. According to the *City of Benicia General Plan*, a future Class III bike route is planned along Park Road southwest of Industrial Way.

2.4 EXISTING TRANSIT SERVICE

Fairfield and Suisun Transit (FAST) operates an express intercity route—Route 40—that connects the City of Vacaville to the BART station in the City of Walnut Creek. Route 40 has one stop at Park Road and Industrial Way, roughly a quarter of a mile east of the at-grade Union Pacific railroad crossing on Park Road. From here, the northbound route continues via I-680 to the City of Fairfield, and the southbound route continues via I-680 to the Pleasant Hill BART Station; both utilize the I-680 interchanges at Industrial Way and Bayshore Road. Headways and fares are summarized in **Table 2-1**.

TABLE 2-1
FAIRFIELD AND SUISUN TRANSIT (FAST) TRANSIT SERVICE SUMMARY

Agency	FAST	
Route	40	
Hours of Operation	*Weekdays*	5:30 – 9:00 AM 3:30 – 8:00 PM
	Weekends	No Service
Headways	20-60 minutes	
Standard One-Way Fare	Varies from $1.50 to $6.75, based on distance traveled	
Nearest Stop to Project Site	Park Road and Industrial Way (0.25 mile east of at-grade railroad crossing)	

Source: FAST Transit Website (Accessed February 2013)

2.5 EXISTING FREIGHT RAIL

The study area is served by the Union Pacific Railroad (UPRR), which operates a fleet of over 8,000 locomotives across a network that spans 23 states and 32,000 miles of track. The City of Benicia serves as the terminus for what is commonly referred to as the Overland Route, which connects Chicago to the San Francisco Bay Area. A railroad drawbridge built in 1930 alongside the Benicia-Martinez Bridge connects the Benicia terminus via the Port of Oakland to San Jose, where service continues as the UPRR Coast Line to Los Angeles Union Station.

The Valero Benicia Refinery is served by a spur off the Overland Route mainline that runs between the industrial port area along the southeastern edge of the City of Benicia and the refinery itself, terminating north of Park Road. This spur features an at-grade crossing at Park Road, east of Bayshore Road. The spur also serves the industrial areas northeast of the refinery. Switching activity between tracks typically occurs just south of the Park Road at-grade railroad crossing. The Park Road crossing is controlled by two gates and mast-mounted flashing lights. The freight rail network through the study area is shown in **Figure 1-2**.

Train crossing counts were collected at the Park Road at-grade intersection in addition to the at-grade crossing at the Iron Workers Union Driveway just 700 feet southeast of Park Road. Video cameras were placed adjacent to the at-grade crossings for the week of Monday, April l5 through Sunday, April 21, 2013. The video data was reviewed to determine the number of train crossings per day, number of railcars per crossing, time of day for each crossing, and the blockage time at each at-grade intersection. A summary of the video data is provided in **Table 2-2** and in **Appendix A**.

TABLE 2-2
EXISTING AT-GRADE RAIL OPERATIONS

Measure	Park Road At-Grade Crossing	Iron Workers Union Driveway At-Grade Crossing
Range of Crossings Per Day	4 - 18	4 - 6
Average Crossings Per Day – Weekdays	10	5
Average Crossing Duration – Weekdays	02:50	03:15
Average Number of Railcars Per Day – Weekdays	95	69
Average Number of Railcars Per Crossing - Weekdays	10	15
Range of Number of Railcars Per Crossing - Weekdays	2 - 35	2 - 43
Maximum Observed Crossing Duration – Weekdays	16:17	24:50
% of Crossings With Duration Under 5 Minutes – Weekdays	86%	87%
Average Crossings Per Day – Weekend	7	5
Average Crossing Duration – Weekend	01:42	00:18
Average Number of Railcars Per Day – Weekend	45	40
Average Number of Railcars Per Crossing - Weekend	7	8
Range of Number of Railcars Per Crossing - Weekend	2 - 18	2 - 18
Maximum Observed Crossing Duration – Weekend	05:56	03:21
% of Crossings With Duration Under 5 Minutes – Weekend	92%	100%

Source: Fehr & Peers, 2013.

As shown in **Table 2-2**, the number of train crossings is higher at the Park Road at-grade intersection compared to the Iron Workers Union Driveway intersection. The reason for the higher number of crossings at Park Road is because the majority of switching activity between tracks serving the Valero refinery and tracks serving other industrial areas northeast of the refinery occur on the segment just south of Park Road and north of the Iron Workers Union Driveway. It is common for UPRR trains to access the Valero refinery, then exit the refinery, cross Park Road, perform the track switching, and cross Park Road again to access the other industrial areas northeast of the refinery, and vice versa.

The majority of train crossings at both at-grade intersections occurred between the 9:00 AM and 7:30 PM on weekdays and between 12:00 PM and 6:30 PM on weekends. An average of 10 train crossings totaling 95 railcars during the weekdays were observed on Park Road, with the average crossing duration

estimated at 2 minutes and 50 seconds. About 86 percent of all crossings on Park Road had a duration less than 5 minutes. The majority of train crossings on Park Road had a duration typically under 2 minutes, however a maximum crossing duration was observed at 16 minutes and 17 seconds on Wednesday, April 17, 2013 around 2:00 PM. On average, train crossing durations greater than 8 minutes occurred once a day during the weekdays and typically during the afternoon period.

Similarly, the majority of train crossings on the Iron Workers Union Driveway had a duration under 2 minutes, however a maximum crossing duration was observed at 24 minutes and 50 seconds on Wednesday, April 17, 2013 around 2:00 PM. Some trains were observed to perform back and forth movements to disengage railcars from the locomotive and at times trains would come to a complete stop, which blocks the Iron Workers Union Driveway for a substantial period of time and explains why the observed maximum crossing duration is greater at the Iron Workers Union Driveway compared to the Park Road crossing. The average number of train crossings and duration of each crossing is generally lower on weekends compared to weekdays.

In addition to the video count data, UPPR also provided an estimate of their delivery schedule at Park Road for the time period between January 4th and January 14th, 2013; the UPPR data is provided in **Appendix A**. The UPPR data provides the delivery schedule but does not provide the number of train crossings across Park Road. It is common for a single train delivery to cross Park Road multiple times due to switching or train cutting activity. Therefore, the video count data was the primary source of train crossing information to perform the transportation impact assessment for the Project.

2.6 EXISTING TRUCK ROUTES

The Surface Transportation Assistance Act (STAA) designates two types of truck routes: national network routes and terminal access routes. The entire length of I-680 is a designated national network route, and the interchanges at Bayshore Road and Industrial Way provide local access to the refinery site. The ramp-terminal intersections of the interchanges within the study area have been designed to appropriately accommodate large truck turning movements.

Truck freight movement through Benicia is heaviest along the northern I-680 corridor, where the Valero Benicia Refinery is located, and in the industrial port area adjacent to the Benicia-Martinez Bridge. Freeway signs direct traffic destined for these industrial areas to use I-680 exits.

2.7 EXISTING EMERGENCY VEHICLE RESPONSE TIMES

The City of Benicia Fire Department recently provided an emergency response time analysis for year 2012. According to the National Fire Protection Association (NFPA) standard 1710, fire departments should arrive to structure fires within 5 minutes of initial dispatch. The City of Benicia Fire Department also has a contract with the Solano County Emergency Medical Service Authority to provide an advance life support staffed engine to all emergency medical calls within 7 minutes from the time the station is alerted. The fire department strives to reach the standard of a seven minute response time to all emergency incident types for 90 percent of the total incidents. In 2012, the fire department responded to 2,099 incidents with an average response time of 5 minutes and 13 seconds throughout the entire City of Benicia. For the industrial areas along Park Road and Bayshore Road the fire department responded to a total of 27 incidents in 2012 with an average response time of 6 minutes and 35 seconds. Thus in 2012, the average emergency response time for the project study area was higher than the average response for the entire City of Benicia. The City of Benicia Fire Department year 2012 emergency vehicle response time data is provided in **Appendix A**.

2.8 COLLISION HISTORY

The Federal Railroad Administration (FRA) provided collision history data for the Park Road at-grade crossing. According to the FRA, no train-vehicle collisions were reported at the Park Road crossing within the last three years. The last reported collision at the Park Road at-grade crossing was in April 1995, in which a train collided with a truck. The FRA collision history data for the study area is provided in **Appendix A**.

Collision history data from January 2009 through January 2012 was also obtained from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS). The SWITRS collision data for the study area is summarized in **Table 2-3**, the data is also provided in **Appendix A**. As shown in **Table 2-3**, a total of nine collisions were reported within the study area between 2009 and 2012, six of which occurred within the vicinity of the intersection of Park Road/Bayshore Road. Three collisions were reported in the vicinity of the I-680 on-ramp intersection with Bayshore Road. Neither of the collisions between January 2009 and January 2012 resulted in an injury or fatality within the study area.

TABLE 2-3
STUDY AREA COLLISION HISTORY SUMMARY – JANUARY 2009 THRU JANUARY 2012

Location	Total Collisions	Collisions Involving Pedestrians	Collisions Involving Bicyclists	Collisions Resulting in Injury	Collisions Resulting in Fatality
1. Park Road / Bayshore Road	6	0	0	0	0
2. I-680 SB On-Ramp / Bayshore Road	3	0	0	0	0
3. I-680 NB Off-Ramp / Bayshore Road	0	0	0	0	0
4. Park Road / Bay Vista Court	0	0	0	0	0
5. Park Road / Valero Refinery Driveway	0	0	0	0	0

Source: California Highway Patrol Statewide Integrated Traffic Records System, 2013.

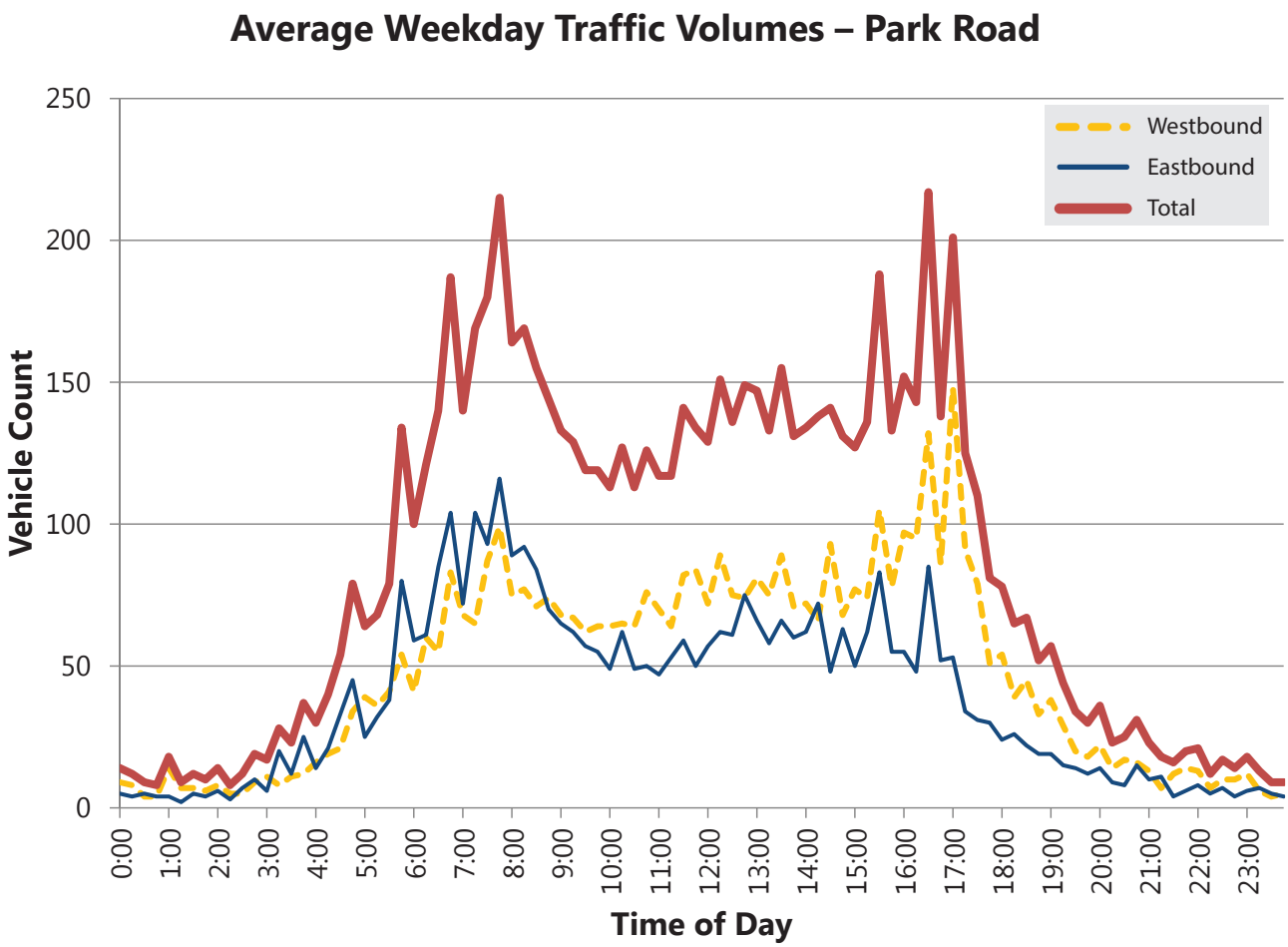
2.9 EXISTING LANE CONFIGURATIONS AND TRAFFIC VOLUMES

Intersection turning movement and vehicle classification counts were originally collected on January 23, 2013 between 6:00 and 9:00 AM, when traffic volumes through the study area generally peak on a typical weekday. This peak period was identified based on an analysis of seven days of roadway segment volumes collected at Park Road just west of the refinery entrance; these counts were collected between Monday, January 7, 2013 and Sunday, January 13, 2013. Due to concerns of counts typically being lower during the month of January, additional turning movement counts at the study intersections along the Bayshore Road were collected between 9:00 AM and Noon and between 1:00 and 4:00 PM in September 2013. Additional roadway segment counts on Park Road were collected between Friday, September 6, 2013 and Thursday, September 12th, 2013. Overall, weekday roadway segment counts collected in September were about 3 percent higher than counts collected in January 2013. The counts collected in September 2013 were used to conduct the traffic operations analysis for this study. Observed weekday traffic volumes by time of day are shown on **Figure 2-1**. As shown on **Figure 2-1,** the peak hour for typical weekday conditions generally occurs between 7:15 and 8:15 AM, which was also confirmed by the intersection counts. The PM peak hour generally occurs between 4:15 and 5:15 PM.

When this study was initiated the time of day in which the project train crossings would occur had not yet been identified. To provide flexibility with the traffic operations analysis, AM peak period counts were collected to determine project impacts when traffic volumes in the area are the highest to present a worst-case scenario of potential Project impacts. However, the project proposes train crossings that would occur during the non-peak hours (avoiding 6:00 AM to 9:00 AM, 12:00 PM to 1:00 PM, and 4:00 PM to 6:00 PM). This study assesses operational impacts for off-peak hours of a typical weekday, including the

2:45 to 3:45 PM hour to be representative of 9:00 AM to 4:00 PM and 6:00 to 7:00 PM conditions, and the 9:00 to 10:00 PM hour, which is representative of conditions from approximately 7:00 PM to 6:00 AM. Although weekday counts were not collected for the non-peak hour between 9:00 and 10:00 PM, the volumes were estimated based on the average daily traffic counts collected on Park Road. The Park Road average daily traffic counts indicate that the hourly volumes between 9:00 and 10:00 PM are about 90 percent lower than the AM peak hour. Thus, the reduction factors derived from the Park Road daily counts were applied to the AM peak hour intersection counts to estimate the non-peak hour intersection volumes.

Field reconnaissance was performed in which lane configurations, turn pocket lengths, and speed limits were documented. These were used to corroborate satellite image observations publicly available online. Existing intersection lane configurations, traffic control, and PM off-peak hour intersection traffic volumes are shown on **Figure 2-2**. Collected count data is provided in **Appendix A**.



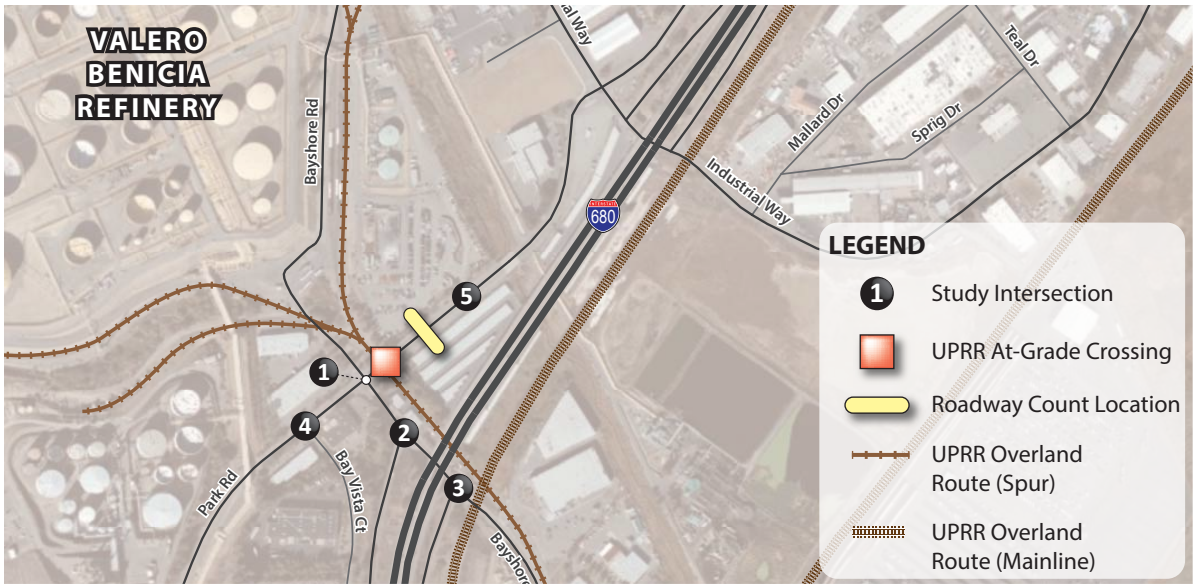
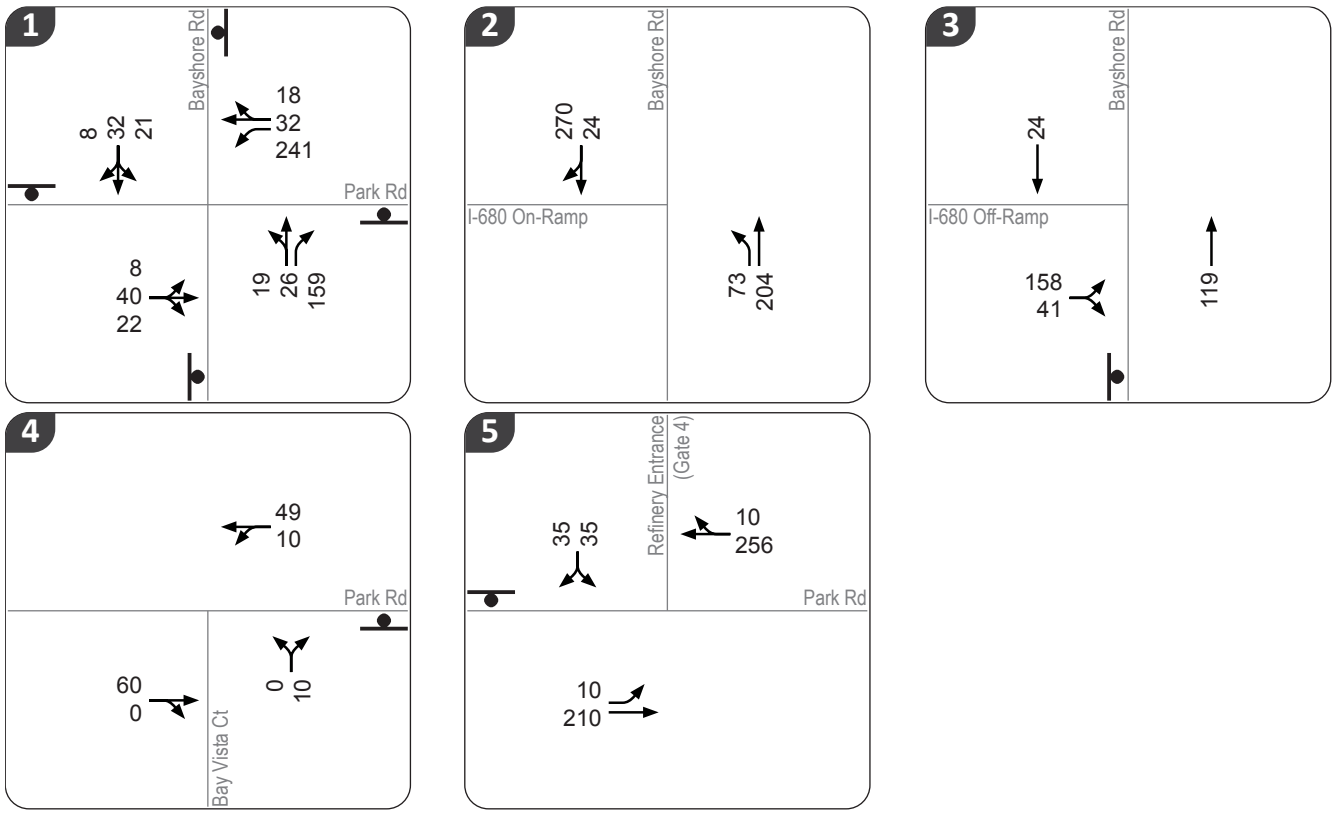


Figure 2-1.

Average Weekday Traffic Volumes by Time of Day – Park Road

WC13-3005_2-1_AvgTrafVol

FEHR PEERS



VOLUMES KEY

XX 2:45 - 3:45 PM Hour Traffic Volumes

Stop Sign

MAP KEY

Study Intersection

UPRR At-Grade Crossing

Roadway Count Location

UPRR Overland Route (Spur)

UPRR Overland Route (Mainline)

Figure 2-2.

Existing Conditions
Intersection 2:45 - 3:45 PM Hour Traffic Volumes and Lane Configurations

WC13-3005_2-2_ExVol

FEHR PEERS

2.10 EXISTING INTERSECTION OPERATIONS

The highest weekday volumes throughout the day generally occur during the AM peak hour (7:15 to 8:15 AM) and the PM peak hour (4:15 to 5:15 PM). Project trains would avoid crossing Park Road between 6:00 AM to 9:00 AM, 12:00 PM to 1:00 PM, and 4:00 PM to 6:00 PM. The 2:45 to 3:45 PM hour was the hour selected for analysis because it represents the highest total volume hour within the off-peak periods in which project trains would cross Park Road. Existing off-peak hour operations at the five study intersections were evaluated based on the HCM 2000 method described in Chapter 1. Below is a description of the traffic operations model development and calibration process, in addition to the off-peak hour LOS and queuing results.

2.10.1 MODEL APPROACH

The traffic operations analysis for the project utilized the VISSIM software platform. VISSIM is a micro-simulation software that analyzes the traffic operations of cars, trucks, transit vehicles, trains, pedestrians, and bicycles. The software can analyze both arterial and freeway corridors, signalized and unsignalized intersections, roundabouts, ramp meters, and at-grade railroad crossings. The development of a VISSIM model requires many components. These components include lane geometries, traffic controls, traffic volumes, and vehicle behavior characteristics.

2.10.2 MODEL VALIDATION

During the validation process, the VISSIM model output is compared against field data to determine if the model output is within acceptable levels and therefore presenting a reasonable approximation of existing operations. The Federal Highway Administration (FHWA) suggests the following validation criteria (*Volume III – Guidelines for Applying Traffic Microsimulation Modeling Software*, Federal Highway Administration, 2003).

- Link volumes for more than 85 percent of cases meet the following criteria:
    - For volumes less than 700 vehicles per hour (vph), within 100 vph
    - For volumes between 700 and 2,700 vph, within 15 percent
    - For volumes greater than 2,700, within 400 vph
- Link volumes for more than 85 percent of cases have a GEH statistic (measuring model volumes versus count volumes) less than 5
- Queuing at bottlenecks match field observations

Based on our previous experience, Fehr & Peers has developed the following additional validation criterion, which has a narrower tolerance for intersection and interchange volumes (which are aggregated link volumes) than the criteria suggested by FHWA.

- Peak-hour volumes at intersections within 5 percent of traffic counts

The VISSIM models were calibrated and validated to the AM peak hour counts and field observations. The calibrated model was then used to evaluate intersection operations for the off-peak hours. **Table 2-4** shows the validation results for the existing conditions VISSIM models for the AM peak hour. The model meets the validation criteria thresholds.

TABLE 2-4
VALIDATION CRITERIA THRESHOLDS COMPARISON

Category	Criteria	Threshold	% Met Target	AM Peak Period	
				% Met	Pass/Fail
Link Volumes	< 700 vph	100 vph	> 85%	100%	Pass
	GEH Statistic	5	> 85%	100%	Pass
Aggregated Volumes	Intersections	5%	100%	100%	Pass
Visual Inspection	Queuing	Match observations		--	Pass

Source: Fehr & Peers, 2013

2.10.3 INTERSECTION OPERATIONS RESULTS

Existing off-peak hour (2:45-3:45 PM) operations at the five study intersections were evaluated based on the methods previously described and the lane configurations and traffic controls shown on **Figure 2-2**. The LOS results are summarized in **Table 2-5** and the queuing results are summarized in **Table 2-6**. Intersection analysis worksheets are provided in **Appendix B**. The existing off-peak hour analysis evaluated two scenarios: existing conditions without train crossings and existing conditions with train crossings. According to the train crossing counts collected in April, train crossing durations greater than 8 minutes occurred on average once a day during the weekdays and typically during the afternoon period. Train crossing durations of up to 16 minutes and 17 seconds were observed along the Park Road at-grade railroad crossing. For this analysis, the baseline condition assumes an existing train crossing duration of 11 minutes and 50 seconds, which is a consistent with the maximum train crossing duration observed at the existing Park Road at-grade crossing on Tuesday, April 16, 2013. A summary of the existing train crossing data is provided in **Table 2-2** and in **Appendix A**.

As shown, all study intersections currently operate at acceptable service levels during the 2:45 to 3:45 PM hour assuming no trains cross during the hour. However, if longer trains with crossing durations greater than 8 minutes in length occur during the PM off-peak hour, the intersection level of service generally degrades to LOS F. Assuming an existing train crossing duration of 11 minutes and 50 seconds along Park Road would degrade all five study intersections to LOS F, as shown in **Table 2-5**. The long train crossing duration would result in vehicle queues on the east side of the tracks that extend upstream from the at-grade railroad crossing to the intersection at Industrial Way along westbound Park Road. Vehicle queues on the west side of the tracks typically extend upstream to the northbound off-ramp from I-680 to Bayshore Road during long train crossings, however, vehicle queues do not back up to the northbound I-680 mainline. Train crossing durations greater than 11 minutes and 50 seconds have been observed along Park Road during a typical weekday afternoon. Generally, the longer the train crossing duration, the higher the probability is for vehicle queues to build up and extend to adjacent study intersections, thus affecting their operations.

TABLE 2-5
EXISTING OFF-PEAK HOUR INTERSECTION LEVEL OF SERVICE[1]

Location	Control[2]	Without Rail Activity		With Rail Activity[4]	
		Delay[3]	LOS	Delay[3]	LOS
1. Park Road / Bayshore Road	AWSC	6	A	**236**	**F**
2. I-680 SB On-Ramp / Bayshore Road	FREE	1	A	**54**	**F**
3. I-680 NB Off-Ramp / Bayshore Road	SSSC	6 (10)	A (A)	**152 (212)**	**F (F)**
4. Park Road / Bay Vista Court	SSSC	1 (4)	A (A)	27 **(51)**	D **(F)**
5. Park Road / Valero Refinery Driveway	SSSC	1 (8)	A (A)	**148 (285)**	**F (F)**

Notes: **Bold** denotes locations where level of service threshold is exceeded.
1. Analysis hour is between 2:45 and 3:45 PM, which represents the highest total volume hour within the off-peak periods (9:00 AM to Noon, 1:00 to 4:00 PM, 6:00 PM to 6:00 AM).
2. AWSC = all way stop controlled intersection, SSSC = side street stop controlled intersection, Free = uncontrolled intersection.
3. Intersection level of service based on average intersection control delay (in seconds) according to the *Highway Capacity Manual* (Transportation Research Board, 2000). For side-street stop-controlled intersections, delay is reported as intersection average (worst case approach).
4. Assumes an existing single train crossing duration of 11 minutes and 50 seconds at the Park Road at-grade railroad crossing.

Source: Fehr & Peers, 2013.

TABLE 2-6
EXISTING OFF-PEAK HOUR INTERSECTION QUEUING[1]

Intersection	Movement[2]	Available Storage (ft)	Without Rail Activity		With Rail Activity[3]	
			Average Queue Length (ft)	Maximum Queue Length (ft)	Average Queue Length (ft)	Maximum Queue Length (ft)
1. Park Road / Bayshore Road	NB-LT	140	25	70	25	70
	NB-R	275	25	85	**400**	**600**
	SB-LTR	220	25	70	60	180
	EB-LTR	250	25	70	135	**370**
	WB-L	200	25	100	**920**	**1,575**
	WB-TR	500	25	75	**920**	**1,575**
2. I-680 SB On-Ramp / Bayshore Road	NB-L	115	0	25	0	25
3. I-680 NB Off-Ramp / Bayshore Road	NB-T	200	0	0	50	**240**
	EB-LR	1,300	25	135	340	975
4. Park Road / Bay Vista Court	NB-LR	275	0	25	0	25
5. Park Road / Valero Refinery Driveway	SB-LR	200	25	50	55	190
	EB-L	150	0	0	0	0
	WB-TR	950	0	0	420	**1,075**

Notes: **Bold** denotes locations where storage length is exceeded.
1. Analysis hour is between 2:45 and 3:45 PM, which represents the highest total volume hour within the off-peak periods (9:00 AM to Noon, 1:00 to 4:00 PM, 6:00 PM to 6:00 AM).
2. NB – northbound, SB – southbound, EB – eastbound, WB – westbound, L – left turn movement, T – through movement, R – right turn movement.
3. Assumes existing sing train crossing duration of 11 minutes and 50 seconds at the Park Road at-grade railroad crossing.

Source: Fehr & Peers, 2013.

3.0 EXISTING PLUS PROJECT CONDITIONS

The proposed Project would expand the proportion of crude oil delivered to the refinery by railcar, to up to 70,000 barrels per day, replacing quantities currently received by ship, but would not increase the amount of crude oil processed at the refinery. Currently the refinery receives crude oil via pipeline or marine vessels. Railcar deliveries would use the existing UPRR track to access the refinery, crossing the existing at-grade railroad crossing at Park Road, just east of the intersection of Park Road/Bayshore Road. The deliveries would arrive at the refinery each day and utilize trains up to 50 railcars in length per delivery, and up to 100 railcar deliveries are expected per day. This chapter discusses the assumptions and analysis results for traffic conditions under Existing Plus Project conditions.

3.1 PROJECT ASSUMPTIONS

The VISSIM model developed for Existing conditions was used to model a single train crossing during the weekday 2:45 to 3:45 PM hour. The 2:45 to 3:45 PM hour was chosen as it represents the highest total volume hour within the off-peak periods in which project trains would cross Park Road. Below is a summary of the Project assumptions for Existing Plus Project conditions:

- Up to 100 railcars will be delivered daily, however, single train deliveries of up to 50 railcars in length are expected
- A minimum headway of one hour between Project train deliveries is assumed
- Typical railcar length is 60 feet
- Up to 200 feet of locomotive is expected per train delivery
- Average travel speed across the Park Road at-grade railroad crossing is 5 mph
- All switching activity between tracks will occur within the Valero refinery site north of Park Road

For the purposes of this study, a single train crossing of 50 railcars in length was assumed to cross Park Road during PM off-peak hour conditions to determine potential impacts to the surrounding transportation network. A train with 200 feet of locomotive and 50 railcars in length would take approximately 7.3 minutes to cross Park Road at a speed of 5 mph. The at-grade crossing traffic controls provide a 30-second buffer time before and after each train crossing on Park Road. Therefore, each 50-railcar train delivery would block traffic on Park Road for approximately 8 minutes and 18 seconds. The estimated blockage time on Park Road due to the proposed project is lower than other existing observed train crossings. The April 2013 maximum observed train crossing duration was 16 minutes and 17 seconds, which is nearly double the blockage time of the train crossings due to the project.

In addition, a project impact analysis was performed for the off-peak hour between 9:00 to 10:00 PM of a typical weekday. Based on the daily traffic volumes on Park Road, this study assumes the 9:00 to 10:00 PM hour to be representative of conditions from approximately 7:00 PM to 6:00 AM.

3.2 INTERSECTION OPERATIONS RESULTS

3.2.1 OFF-PEAK HOUR OPERATIONS RESULTS

The Existing off-peak hours of 2:45 – 3:45 PM and 9:00 – 10:00 PM were evaluated assuming a 50-railcar project train crossing at Park Road, LOS results are presented in **Table 3-1** and queuing results in **Table 3-2**. Four out of the five study intersections are expected to operate at LOS F during the 2:45 – 3:45 PM hour. Vehicle queues associated with the 50-railcar crossing are expected to extend back onto the northbound I-680 off-ramp but not onto the I-680 mainline. Queues are also expected to extend back to the Park Road/Valero Refinery Driveway but will not reach Industrial Way. The segment of Park Road between the at-grade railroad crossing and Industrial Way provides a two-way left-turn lane which will likely be utilized as a queue storage lane by some drivers stuck on westbound Park Road waiting for the 8.3 minute train crossing to clear. The results for the PM off-peak hour are similar to what drivers under Existing No Project conditions already experience. In general, project train crossings that would occur during the off-peak periods between 9:00 AM – Noon and 1:00 – 4:00 PM would result in average intersection delays and maximum intersection queues that are lower than existing train crossings. Train crossings of durations greater than 8 minutes already occur about once a day between the 9:00 AM – 7:30 PM periods, the time of train crossing varies however.

Figure 3-1 provides a graphical comparison of the extent of the maximum queues expected with the project train crossings at Park Road assuming 2:45 – 3:45 PM hour conditions compared to Existing No Project conditions. The analysis for No Project conditions assumes an existing train crossing duration of 11 minutes and 50 seconds. Detailed intersection analysis worksheets are provided in **Appendix B**

Traffic volumes in the evenings and late nights are much lower within the study area compared to the AM and PM peak periods. As shown in **Table 3-1**, during the 9:00 – 10:00 PM hour all intersections are expected to operate at LOS A except for Park Road/Bayshore Road, which would operate at LOS F due to its close proximity to the at-grade railroad crossing. Although the intersection operates at LOS F, the resulting queues would be no longer than 4 vehicles on either approach of the intersection. Although the proposed 50-railcar train crossing would block Park Road for over 8 minutes, the resulting queues would be contained within the provided intersection storage capacity at Park Road/Basyhore Road during the 9:00 – 10:00 PM hour.

Generally, train crossings at the Park Road at-grade intersection that take longer than 5 minutes to cross result in LOS E or F operations at the adjacent intersection of Park Road/Bayshore Road, regardless of the time of day in which the train crossing occurs. Therefore, LOS E or F operations at the Park Road/Bayshore Road intersection when rail activity occurs are part of the baseline condition. The longer the train crossing duration, the higher the probability is for vehicle queues to build up and extend to adjacent study intersections, thus affecting their operations as well.

TABLE 3-1
EXISTING PLUS PROJECT OFF-PEAK HOUR INTERSECTION LEVEL OF SERVICE[1]

Location	Control[2]	Existing No Project 2:45 – 3:45 PM[4]		Existing Plus Project 2:45 – 3:45 PM[5]		Existing Plus Project 9:00 – 10:00 PM[6]	
		Delay[3]	LOS	Delay[3]	LOS	Delay[3]	LOS
1. Park Road / Bayshore Road	AWSC	**236**	**F**	**116**	**F**	**113**	**F**
2. I-680 SB On-Ramp / Bayshore Road	FREE	**54**	**F**	**50**	**F**	1	A
3. I-680 NB Off-Ramp / Bayshore Road	SSSC	**152 (212)**	**F (F)**	**57 (80)**	**F (F)**	5 (5)	A (A)
4. Park Road / Bay Vista Court	SSSC	27 **(51)**	D **(F)**	3 (8)	A (A)	1 (1)	A (A)
5. Park Road / Valero Refinery Driveway	SSSC	**148 (285)**	**F (F)**	**57 (97)**	**F (F)**	1 (5)	A (A)

Notes: **Bold** denotes locations where level of service threshold is exceeded.

1. Analysis hour is between 2:45 and 3:45 PM, which represents the highest total volume hour within the off-peak periods (9:00 AM to 12:00 PM, 1:00 to 4:00 PM, 6:00 PM to 6:00 AM).
2. AWSC = all way stop controlled intersection, SSSC = side street stop controlled intersection, Free = uncontrolled intersection.
3. Intersection level of service based on average intersection control delay (in seconds) according to the *Highway Capacity Manual* (Transportation Research Board, 2000). For side-street stop-controlled intersections, delay is reported as intersection average (worst case approach).
4. Assumes an existing single train crossing duration of 11 minutes and 50 seconds at the Park Road at-grade railroad crossing.
5. Time period representative of the 9:00 AM to 12:00 PM, 1:00 to 4:00 PM, and 6:00 to 7:00 PM periods along westbound and eastbound Park Road. Assumes a single project train crossing duration of 8 minutes and 18 seconds at the Park Road at-grade railroad crossing.
6. Time period representative of the 7:00 PM to 6:00 AM time period along westbound and eastbound Park Road. Assumes a single project train crossing duration of 8 minutes and 18 seconds at the Park Road at-grade railroad crossing.

Source: Fehr & Peers, 2013.

TABLE 3-2
EXISTING PLUS PROJECT OFF-PEAK HOUR INTERSECTION QUEUING[1]

Intersection	Movement[2]	Available Storage (ft)	Existing No Project 2:45 – 3:45 PM[3]		Existing Plus Project 2:45-3:45 PM[4]		Existing Plus Project 9:00 – 10:00 PM[5]	
			Average Queue Length (ft)	Max Queue Length (ft)	Average Queue Length (ft)	Max Queue Length (ft)	Average Queue Length (ft)	Max Queue Length (ft)
1. Park Road / Bayshore Road	NB-LT	140	25	70	25	60	0	30
	NB-R	275	**400**	**600**	250	**600**	25	50
	SB-LTR	220	60	180	30	130	0	30
	EB-LTR	250	135	**370**	65	235	0	30
	WB-L	200	**920**	**1,575**	**505**	**1,220**	25	70
	WB-TR	500	**920**	**1,575**	**505**	**1,220**	25	30
2. I-680 SB On-Ramp / Bayshore Road	NB-L	115	0	25	0	25	0	0
3. I-680 NB Off-Ramp / Bayshore Road	NB-T	200	50	**240**	25	85	0	0
	EB-LR	1,300	340	975	130	520	25	40
4. Park Road / Bay Vista Court	NB-LR	275	0	25	0	25	0	0
5. Park Road / Valero Refinery Driveway	SB-LR	200	55	190	25	95	0	30
	EB-L	150	0	0	0	0	0	0
	WB-TR	950	420	**1,075**	25	720	0	0

Notes: **Bold** denotes locations where storage length is exceeded.

1. Analysis hour is between 2:45 and 3:45 PM, which represents the highest total volume hour within the off-peak periods (9:00 AM to 12:00 PM, 1:00 to 4:00 PM, 6:00 PM to 6:00 AM).
2. NB – northbound, SB – southbound, EB – eastbound, WB – westbound, L – left turn movement, T – through movement, R – right turn movement.
3. Assumes an existing single train crossing duration of 11 minutes and 50 seconds at the Park Road at-grade railroad crossing.
4. Time period representative of the 9:00 AM to 12:00 PM, 1:00 to 4:00 PM, and 6:00 to 7:00 PM periods along westbound and eastbound Park Road. Assumes a single project train crossing duration of 8 minutes and 18 seconds at the Park Road at-grade railroad crossing.
5. Time period representative of the 7:00 PM to 6:00 AM time period along westbound and eastbound Park Road. Assumes a single project train crossing duration of 8 minutes and 18 seconds at the Park Road at-grade railroad crossing.

Source: Fehr & Peers, 2013.

Figure 3-1.

Existing Plus Project Queueing Analysis

WC13-3005_3-1_ExQueue

FEHR PEERS

3.3 EXISTING PROJECT IMPACTS AND MITIGATION MEASURES

The following criteria were applied to evaluate potential impacts associated with increased rail activity on at-grade crossings:

- A Project impact would be considered significant if rail crossing activity causes vehicle queues that impede other traffic, such as queue spillback to the freeway mainline or to an adjacent intersection and traffic not destined over the crossing is unable to continue along the travel way.

The proposed increase of daily crude oil deliveries by rail across Park Road would result in vehicle queues that would spillback onto the I-680/Bayshore Road ramp-terminal intersections if deliveries occur during the 9:00 AM – Noon, 1:00 – 4:00 PM, and 6:00 – 7:00 PM periods. From a queuing perspective, the Project would impede other traffic during the 9:00 AM – Noon, 1:00 – 4:00 PM, and 6:00 – 7:00 PM off-peak hours because vehicle queues that result from the train crossing would likely extend to the I-680/Bayshore Road ramp-terminal intersections, causing queues to build on the off-ramp, although not spilling back to the freeway mainline. Even though project train crossings would affect the operations at the I-680/Bayshore Road ramp-terminal intersections, the maximum queues that result from the 8.3 minute Park Road blockage time would be less than the maximum queues that already develop due to longer train crossings under Existing No Project conditions. Therefore, project impacts at these locations would be ***less-than-significant.***

If the proposed train crossings occur during the 7:00 PM – 6:00 AM period, resulting queues on the west side and east side of the tracks would not exceed the provided storage capacity. Only the intersection of Park Road/Bayshore Road would operate at LOS F conditions during the hour of the crossing, but resulting queues would not extend back and affect the operations of other study intersections.

Existing video data collected at the Park Road at-grade railroad crossing indicates that on average there is one train a day that crosses Park Road with a duration over eight minutes within the 9:00 AM to 7:00 PM period. The longest observed existing train crossing on Park Road was measured at about 16 minutes and 17 seconds, nearly double the duration of a single 50-railcar crossing proposed by the Project. The Proposed project would increase the frequency of 8-minute crossings that occur in the area, but the increased crossing frequency is within the current range of crossing variability. Although the Project would increase the train frequency on Park Road by four train crossings (two trips into the refinery and two trips out of the refinery) a day, the proposed crossing duration of each Project train trip is lower than train crossing durations that already exist today without the Project.

3.3.1 TRANSIT IMPACTS

FAST operates one weekday transit route (Route 40) along both directions of Park Road within the study area; the nearest bus stop is located at the intersection of Park Road/Industrial Way. Route 40 provides four buses in each direction during the AM commute period between 5:30 and 9:00 AM, and five buses in each direction during the PM commute period between 3:30 and 8:00 PM. Project train crossings are not planned to occur during the AM peak period, thus the Project would not affect transit service during the AM peak period.

It is likely that Project train crossings will occur during the 3:30 – 4:00 PM, 6:00 – 8:00 PM period. On average, about one bus per hour travels along Park Road in each direction during the PM period. The chances of buses attempting to cross Park Road in the event of a Project train crossing are small, but possible. Although the Project would increase the train frequency on Park Road by four train crossings a day, the proposed crossing duration of each Project train trip is lower than train crossing durations that already exist today without the Project. In addition, Route 40 travels along congested segments of I-80 and I-680 between the Vacaville Transportation Center and the Walnut Creek BART Station during the weekday commute periods, thus delay experienced by Route 40 buses is variable throughout each day. The potential increase in transit delay incurred by the Project is within the delay variability already experienced by Route 40 during the PM peak commute period.

3.4 EMERGENCY VEHICLE ACCESS

The City of Benicia Fire Department strives to reach the standard of a seven minute response time to all emergency incident types for 90 percent of the total incidents. In 2012, the fire department responded to a total of 27 incidents along the industrial areas of Park Road and Bayshore Road with an average response time of 6 minutes and 35 seconds. The average emergency response time for the Project study area was higher than the average response for the entire City of Benicia.

The same railroad track that crosses Park Road at-grade also crosses the driveways of three industrial parcels south of Park Road. The three driveways south of Park Road are the only access points between the industrial parcels and Bayshore Road. Thus existing train movements within the study area temporarily block their only access point. Video counts collected at the Iron Workers Union Driveway observed train crossings that blocked the driveway for as long as 24 minutes and 50 seconds on a weekday during the month of April 2013, which is about three times the duration of the train crossings proposed by the Project. Thus, workers within the three industrial parcels south of Park Road already experience train crossings blocking the driveways well over 8 minutes.

Although the Project would increase the train frequency within the study area by four train crossings (two trips into the refinery and two trips out of the refinery) a day, the proposed crossing duration of each Project train trip is lower than train crossing durations that already exist today without the Project. The proposed increased crossing frequency is within the current range of crossing variability. According to the 2012 emergency response data provided by the fire department, an average of about two emergency incidents a month occurred along the industrial areas of Park Road and Bayshore Road. The probability of an emergency incident occurring at the same time as a Project train crossing is low. It is unlikely that the Project would cause the average emergency vehicle response time to increase to over 7 minutes for the Park Road and Bayshore Road industrial areas.

Impact 1: Emergency vehicle response time to some portions of the study area would increase during rail crossing events, resulting in a potentially significant impact.

> ***Mitigation Measure 1:*** The Project Applicant shall work with emergency responders in the area to implement the following measures to eliminate or minimize potential Project impacts in regards to emergency vehicle access:
>
> - Coordinate with the City of Benicia Fire Department to prepare an action plan in the event that an emergency occurs during a Project train crossing. The action plan would provide methods of adequately informing the Fire Department of the expected train crossing schedule and alternate routes to access the Park Road and Bayshore Road industrial areas during the event that a train crosses Park Road.
> - The Valero refinery provides an emergency response team on site. The refinery's emergency response team would be available to assist with responding to off-site emergencies within the Park Road and Bayshore Road industrial areas if an emergency occurs during the event of a train crossing on Park Road.
>
> Implementation of these measures would reduce the impact to a ***less-than-significant*** level.

4.0 CUMULATIVE CONDITIONS

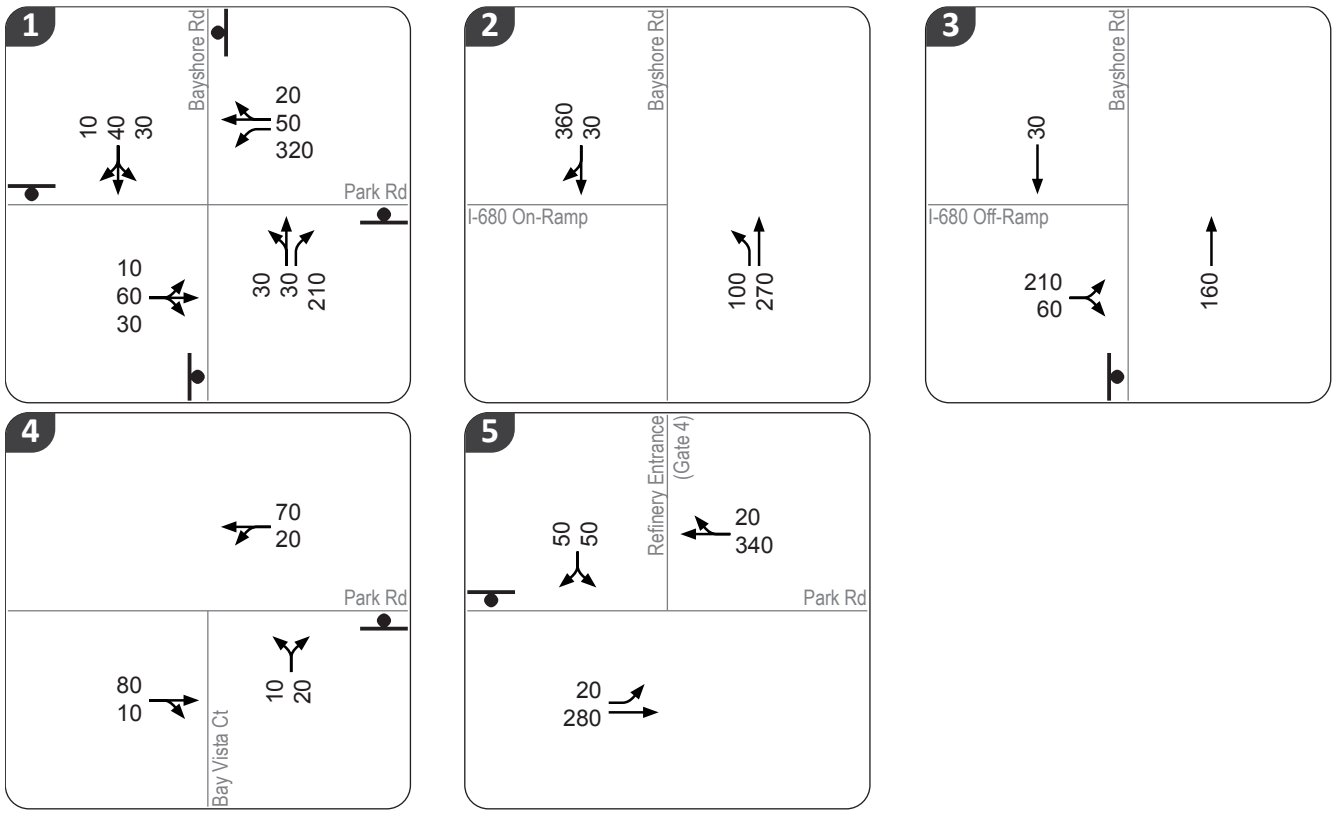
A Cumulative conditions analysis was performed to identify potential impacts in year 2035. This chapter discusses the methodology used to develop Cumulative conditions volume forecasts and traffic operations models under Cumulative No Project and Cumulative Plus Project scenarios.

4.1 CUMULATIVE YEAR VOLUME FORECASTS

The latest version of the Solano-Napa Travel Demand Model (STA Model) was initially utilized to develop year 2035 volume forecasts for each of the study intersections. The STA Model outputs were used to develop annual growth rates for the study area. Two scenario years of the model, 2010 and 2030, were run and annual average growth rates derived. According to the STA model, the annual growth rate for the study area was about 6.6 percent for the AM peak hour. Fehr & Peers obtained peak hour traffic counts collected in January 2006 at the intersection of Park Road/Bayshore Road as part of the *Benicia Business Park EIR*. Comparing the 2013 counts to the 2006 counts indicates that the total intersection volumes have not increased during the seven year period, indicating that an annual growth rate of 6.6 percent may overstate future traffic volumes. Several unfunded roadway improvements are included in the 2030 STA model network, such as widening Park Road to four lanes. A review of the 2030 STA model output also indicates a significant amount of cut-through traffic from I-680 and East 2nd Street on Park Road within the AM peak hour that may overstate future traffic volumes in the area.

Instead of applying model-based growth rates to the existing intersection turning movement counts, a 1.5 percent per year growth rate was applied. This rate is similar to the annual rate of 1.6 percent used in the *Benicia Business Park EIR* for the period between 2006 and 2030. However, according to 2006 and 2013 count data collected at the intersection of Park Road/Bayshore Road, traffic volumes have not increased during the seven year period, potentially due to the recent economic downturn. Therefore, to account for the recent economic downturn, an annual growth rate of 1.5% is reasonable to assume for the study area. **Figure 4-1** presents the weekday 2:45 – 3:45 PM hour intersection forecasts for Cumulative conditions.

In addition, Cumulative intersection forecasts for the 9:00 – 10:00 PM off-peak were estimated by applying a 10 percent reduction factor derived from the existing Park Road daily counts to the Cumulative AM peak hour intersection forecasts. Cumulative 7:15-8:15 AM peak hour forecasts are provided in **Appendix A**, however this report did not evaluate AM peak hour intersection operations as project trains would avoid crossing Park Road during the 6:00 – 9:00 AM peak period.



VOLUMES KEY

XX 2:45 - 3:45 PM Hour Traffic Volumes

Stop Sign

MAP KEY

Study Intersection

UPRR At-Grade Crossing

Roadway Count Location

UPRR Overland Route (Spur)

UPRR Overland Route (Mainline)

Figure 4-1.

Cumulative Conditions
Intersection 2:45 - 3:45 PM Hour Traffic Volumes and Lane Configurations

WC13-3005_4-1_CumuVols

FEHR PEERS

4.2 CUMULATIVE YEAR ROADWAY NETWORK

Standard CEQA practice is to assume future transportation improvements that are reasonably foreseeable. To meet this definition, a planned improvement must be fully funded by the Cumulative Year 2035. According to the *City of Benicia Capital Improvement Program FY 2011-16* (CIP) the following roadway improvements are planned within the study area:

- Park Road widening to four lanes between Industrial Way and Sulphur Springs Creek Bridge
- Bayshore Road extension from Park Road to Industrial Way
- Park Road/Bayshore Road intersection signalization
- I-680/Bayshore Road ramp-terminal intersection signalization
- I-680/Bayshore Road interchange improvements

Although the above improvements are listed in the CIP, City of Benicia staff have confirmed that funding for the improvements has not yet been secured and the timing of their construction is uncertain. Therefore, none of the improvements identified above were assumed as part of the Cumulative traffic operations analysis. The existing lane configurations and traffic controls were assumed to remain in place for the Cumulative condition. The Cumulative year lane configurations and traffic control assumptions are also shown on **Figure 4-1**.

4.3 INTERSECTION OPERATIONS RESULTS

4.3.1 OFF-PEAK HOUR OPERATIONS RESULTS

The Cumulative off-peak hours of 2:45 – 3:45 PM and 9:00 – 10:00 PM were evaluated assuming a 50-railcar project train crossing at Park Road, LOS results are presented in **Table 4-1** and queuing results in **Table 4-2**. All five study intersections are expected to operate at LOS F during the 2:45 – 3:45 PM hour under No Project conditions (assuming a train crossing duration of 11 minutes and 50 seconds), compared to four study intersections that are expected to operate at LOS F as a result of a project train crossing duration of 8 minutes and 18 seconds. Vehicle queues associated with the 50-railcar crossing due to the project are expected to extend back onto the northbound I-680 off-ramp but not onto the I-680 mainline. Queues are also expected to extend back to the Park Road/Valero Refinery Driveway and eventually extend beyond the Park Road/Industrial Way intersection for both Cumulative No Project and Plus Project conditions. The segment of Park Road between the at-grade railroad crossing and Industrial Way provides a two-way left-turn lane which will likely be utilized as a queue storage lane by some drivers stuck on westbound Park Road waiting for the 8.3 minute train crossing to clear. In general, project train

crossings that would occur during the off-peak periods between 9:00 AM – Noon, 1:00 – 4:00 PM, and 6:00 – 7:00 PM would result in average intersection delays and maximum intersection queues that are lower than longer train crossings under No Project conditions. Train crossings of durations greater than 8 minutes already occur about once a day between the 9:00 AM – 7:30 PM periods.

Figure 4-2 provides a graphical comparison of the extent of the maximum queues expected with the project train crossings at Park Road assuming 2:45 – 3:45 PM hour conditions compared to Cumulative No Project conditions. The analysis for No Project conditions assumes an existing train crossing duration of 11 minutes and 50 seconds. Detailed intersection analysis worksheets are provided in **Appendix B**.

Traffic volumes in the evenings and late nights are much lower within the study area compared to the morning peak period. As shown in **Table 4-1**, during the 9:00 – 10:00 PM hour all intersections are expected to operate at LOS A except for Park Road/Bayshore Road, which would operate at LOS F due to its close proximity to the at-grade railroad crossing. Although the intersection operates at LOS F, the resulting queues would be no longer than 5 vehicles on either approach of the intersection. Although the proposed 50-railcar train crossing would block Park Road for over 8 minutes, the resulting queues would be contained within the provided intersection storage capacity at Park Road/Basyhore Road during the 9:00 – 10:00 PM hour.

Generally, train crossings at the Park Road at-grade intersection that take longer than 5 minutes to cross result in LOS E or F operations at the adjacent intersection of Park Road/Bayshore Road, regardless of the time of day in which the train crossing occurs. Therefore, LOS E or F operations at the Park Road/Bayshore Road intersection when rail activity occurs are part of the baseline condition. The longer the train crossing duration, the higher the probability is for vehicle queues to build up and extend to adjacent study intersections, thus affecting their operations as well.

TABLE 4-1
CUMULATIVE PLUS PROJECT OFF-PEAK HOUR INTERSECTION LEVEL OF SERVICE

Location	Control[1]	Cumulative No Project 2:45 – 3:45 PM[3]		Cumulative Plus Project 2:45 – 3:45 PM[4]		Cumulative Plus Project 9:00 – 10:00 PM[5]	
		Delay[2]	LOS	Delay[2]	LOS	Delay[2]	LOS
1. Park Road / Bayshore Road	AWSC	**253**	**F**	**116**	**F**	**102**	**F**
2. I-680 SB On-Ramp / Bayshore Road	FREE	**69**	**F**	**50**	**F**	1	A
3. I-680 NB Off-Ramp / Bayshore Road	SSSC	**148 (220)**	**F (F)**	**109 (158)**	**F (F)**	5 (6)	A (A)
4. Park Road / Bay Vista Court	SSSC	**72 (104)**	**F (F)**	13 (22)	A (C)	1 (1)	A (A)
5. Park Road / Valero Refinery Driveway	SSSC	**170 (375)**	**F (F)**	**114 (223)**	**F (F)**	1 (4)	A (A)

Notes: **Bold** denotes locations where level of service threshold is exceeded.

1. AWSC = all way stop controlled intersection, SSSC = side street stop controlled intersection, Free = uncontrolled intersection.
2. Intersection level of service based on average intersection control delay (in seconds) according to the *Highway Capacity Manual* (Transportation Research Board, 2000). For side-street stop-controlled intersections, delay is reported as intersection average (worst case approach).
3. Assumes an existing single train crossing duration of 11 minutes and 50 seconds at the Park Road at-grade railroad crossing.
4. Time period representative of the 9:00 AM to 12:00 PM, 1:00 to 4:00 PM, and 6:00 to 7:00 PM periods along westbound and eastbound Park Road. Assumes a single project train crossing duration of 8 minutes and 18 seconds at the Park Road at-grade railroad crossing.
5. Time period representative of the 7:00 PM to 6:00 AM time period along westbound and eastbound Park Road. Assumes a single project train crossing duration of 8 minutes and 18 seconds at the Park Road at-grade railroad crossing.

Source: Fehr & Peers, 2013.

TABLE 4-2
CUMULATIVE PLUS PROJECT OFF-PEAK HOUR INTERSECTION QUEUING

Intersection	Movement[1]	Available Storage (ft)	Cumulative No Project 2:45 – 3:45 PM[2]		Cumulative Plus Project 2:45-3:45 PM[3]		Cumulative Plus Project 9:00 – 10:00 PM[4]	
			Average Queue Length (ft)	Max Queue Length (ft)	Average Queue Length (ft)	Max Queue Length (ft)	Average Queue Length (ft)	Max Queue Length (ft)
1. Park Road / Bayshore Road	NB-LT	140	25	65	25	65	0	30
	NB-R	275	**440**	**620**	**295**	**615**	25	50
	SB-LTR	220	120	**305**	50	200	0	30
	EB-LTR	250	220	**510**	100	**350**	0	30
	WB-L	200	**940**	**2,200**	**940**	**1,570**	30	100
	WB-TR	500	**940**	**2,200**	**940**	**1,570**	25	40
2. I-680 SB On-Ramp / Bayshore Road	NB-L	115	25	40	0	25	0	0
3. I-680 NB Off-Ramp / Bayshore Road	NB-T	200	90	**260**	30	**220**	0	0
	EB-LR	1,300	570	**1,640**	330	985	25	50
4. Park Road / Bay Vista Court	NB-LR	275	25	40	0	25	0	0
5. Park Road / Valero Refinery Driveway	SB-LR	200	105	**225**	50	170	0	30
	EB-L	150	0	25	0	25	0	0
	WB-TR	950	440	**1,700**	440	**1,070**	0	0

Notes: **Bold** denotes locations where storage length is exceeded.

1. NB – northbound, SB – southbound, EB – eastbound, WB – westbound, L – left turn movement, T – through movement, R – right turn movement.
2. Assumes an existing single train crossing duration of 11 minutes and 50 seconds at the Park Road at-grade railroad crossing.
3. Time period representative of the 9:00 AM to 12:00 PM, 1:00 to 4:00 PM, and 6:00 to 7:00 PM periods along westbound and eastbound Park Road. Assumes a single project train crossing duration of 8 minutes and 18 seconds at the Park Road at-grade railroad crossing.
4. Time period representative of the 7:00 PM to 6:00 AM time period along westbound and eastbound Park Road. Assumes a single project train crossing duration of 8 minutes and 18 seconds at the Park Road at-grade railroad crossing.

Source: Fehr & Peers, 2013.

4.4 CUMULATIVE PROJECT IMPACTS AND MITIGATION MEASURES

The proposed increase of daily crude oil deliveries by rail across Park Road would result in vehicle queues that would spillback onto the I-680/Bayshore Road ramp-terminal intersections and the intersection of Park Road/Industrial Way if deliveries occur during the 9:00 AM – Noon, 1:00 – 4:00 PM, and 6:00 – 7:00 PM periods. From a queuing perspective, the Project would impede other traffic during the 9:00 AM – Noon, 1:00 – 4:00 PM, and 6:00 – 7:00 PM off-peak hours because vehicle queues that result from the train crossing would likely extend to the I-680/Bayshore Road ramp-terminal intersections and the intersection of Park Road/Industrial Way. Even though project train crossings would affect the operations at these intersections, the maximum queues that result from the 8.3 minute Park Road blockage time would be less than the maximum queues that develop due to longer train crossings under Cumulative No Project conditions. Therefore, project impacts at these locations would be ***less-than-significant.***

If the proposed train crossings occur during the 7:00 PM – 6:00 AM period, resulting queues on the west side and east side of the tracks would not exceed the provided storage capacity. Only the intersection of Park Road/Bayshore Road would operate at LOS F conditions during the hour of the crossing, but resulting queues would not extend back and affect the operations of other study intersections.

Existing video data collected at the Park Road at-grade railroad crossing indicates that on average there is one train a day that crosses Park Road with a duration over eight minutes within the 9:00 AM to 7:00 PM period. The longest observed existing train crossing on Park Road was measured at about 16 minutes and 17 seconds, nearly double the duration of a single 50-railcar crossing proposed by the Project. The Proposed project would increase the frequency of 8-minute crossings that occur in the area, but the increased crossing frequency is within the current range of crossing variability. Although the Project would increase the train frequency on Park Road by four train crossings (two trips into the refinery and two trips out of the refinery) a day, the proposed crossing duration of each Project train trip is lower than train crossing durations that already exist today without the Project.

Figure 4-2.

Cumulative Plus Project Queueing Analysis

WC13-3005_4-2_CumuQueue

FEHR PEERS

APPENDIX A: EXISTING TRAFFIC DATA

Prepared by NDS/ATD

Volumes for: Friday, September 06, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road north of Bayshore Road

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	8	64			23	75				
12:15	2	54			3	76				
12:30	4	51			3	46				
12:45	0	64	14	233	1	44	30	241	44	474
1:00	1	70			3	46				
1:15	8	88			6	50				
1:30	6	68			5	74				
1:45	4	62	19	288	4	48	18	218	37	506
2:00	7	61			6	61				
2:15	4	42			9	61				
2:30	4	64			4	73				
2:45	13	74	28	241	8	59	27	254	55	495
3:00	11	47			8	68				
3:15	10	73			3	60				
3:30	16	80			1	80				
3:45	22	43	59	243	4	77	16	285	75	528
4:00	8	44			3	93				
4:15	15	46			14	43				
4:30	28	79			8	41				
4:45	47	39	98	208	25	69	50	246	148	454
5:00	25	45			30	74				
5:15	46	33			22	50				
5:30	48	29			29	53				
5:45	58	21	177	128	33	28	114	205	291	333
6:00	61	27			33	45				
6:15	60	21			45	27				
6:30	89	20			56	32				
6:45	109	22	319	90	67	27	201	131	520	221
7:00	84	18			75	21				
7:15	84	16			57	21				
7:30	105	11			52	15				
7:45	101	16	374	61	67	12	251	69	625	130
8:00	92	16			46	18				
8:15	90	7			63	6				
8:30	84	5			63	3				
8:45	79	12	345	40	58	14	230	41	575	81
9:00	74	5			63	6				
9:15	59	13			41	12				
9:30	55	8			61	8				
9:45	57	5	245	31	65	10	230	36	475	67
10:00	57	2			54	10				
10:15	63	4			45	5				
10:30	52	11			51	8				
10:45	63	6	235	23	47	11	197	34	432	57
11:00	65	2			63	10				
11:15	63	4			64	3				
11:30	58	4			61	6				
11:45	62	4	248	14	78	2	266	21	514	35
Total	2161	1600	2161	1600	1630	1781	1630	1781	3791	3381
Combined Total	3761		3761		3411		3411		7172	
AM Peak	7:30 AM				11:30 AM					
Vol.	388				290					
P.H.F.	0.924				0.929					
PM Peak		12:45 PM				3:15 PM				
Vol.		290				310				
P.H.F.		0.824				0.833				
Percentage	57.5%	42.5%			47.8%	52.2%				

Volumes for: Friday, September 06, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road just south of the Refinery Entrance (Southbound Total Volume)

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			24	91				
12:15	0	0			3	101				
12:30	0	0			4	78				
12:45	0	0	0	0	1	72	32	342	32	342
1:00	0	0			4	77				
1:15	0	0			6	82				
1:30	0	0			10	91				
1:45	0	0	0	0	5	66	25	316	25	316
2:00	0	0			11	84				
2:15	0	0			15	72				
2:30	0	0			7	87				
2:45	0	0	0	0	15	73	48	316	48	316
3:00	0	0			14	83				
3:15	0	0			6	71				
3:30	0	0			1	104				
3:45	0	0	0	0	8	100	29	358	29	358
4:00	0	0			10	107				
4:15	0	0			30	77				
4:30	0	0			15	87				
4:45	0	0	0	0	36	90	91	361	91	361
5:00	0	0			43	127				
5:15	0	0			34	69				
5:30	0	0			47	57				
5:45	0	0	0	0	52	48	176	301	176	301
6:00	0	0			49	49				
6:15	0	0			47	35				
6:30	0	0			73	49				
6:45	0	0	0	0	82	27	251	160	251	160
7:00	0	0			92	27				
7:15	0	0			86	28				
7:30	0	0			64	18				
7:45	0	0	0	0	108	23	350	96	350	96
8:00	0	0			53	25				
8:15	0	0			82	8				
8:30	0	0			84	3				
8:45	0	0	0	0	95	18	314	54	314	54
9:00	0	0			81	8				
9:15	0	0			56	13				
9:30	0	0			83	11	0			
9:45	0	0	0	0	80	19	300	51	300	51
10:00	0	0			79	11				
10:15	0	0			56	5				
10:30	0	0			74	15				
10:45	0	0	0	0	60	14	269	45	269	45
11:00	0	0			83	14				
11:15	0	0			83	4				
11:30	0	0			98	9				
11:45	0	0	0	0	109	3	373	30	373	30
Total	0	0	0	0	2258	2430	2258	2430	2258	2430
Combined Total	0		0		4688		4688		4688	
AM Peak					11:30 AM					
Vol.					399					
P.H.F.					0.915					
PM Peak						3:30 PM				
Vol.						388				
P.H.F.						0.907				
Percentage					48.2%	51.8%				

Prepared by NDS/ATD

Volumes for: Saturday, September 07, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road north of Bayshore Road

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	1	12			10	20				
12:15	6	17			5	28				
12:30	6	18			3	28				
12:45	1	13	14	60	6	20	24	96	38	156
1:00	5	16			3	21				
1:15	2	19			3	19				
1:30	2	17			3	17				
1:45	1	14	10	66	2	20	11	77	21	143
2:00	3	13			4	21				
2:15	4	27			2	16				
2:30	3	11			2	15				
2:45	8	25	18	76	3	16	11	68	29	144
3:00	3	13			10	21				
3:15	8	20			1	24				
3:30	14	20			2	23				
3:45	6	18	31	71	3	13	16	81	47	152
4:00	10	15			5	16				
4:15	8	11			3	17				
4:30	5	18			1	12				
4:45	12	10	35	54	5	17	14	62	49	116
5:00	8	15			8	17				
5:15	7	13			8	14				
5:30	10	10			10	11				
5:45	23	20	48	58	13	10	39	52	87	110
6:00	19	11			10	6				
6:15	18	18			11	10				
6:30	39	10			30	13				
6:45	49	7	125	46	14	7	65	36	190	82
7:00	20	19			13	10				
7:15	30	8			19	13				
7:30	21	10			13	8				
7:45	25	9	96	46	17	5	62	36	158	82
8:00	16	11			30	11				
8:15	20	7			10	3				
8:30	11	6			13	7				
8:45	17	7	64	31	21	7	74	28	138	59
9:00	11	3			19	4				
9:15	18	7			19	7				
9:30	26	9			30	3				
9:45	23	5	78	24	13	4	81	18	159	42
10:00	22	5			24	8				
10:15	10	10			29	3				
10:30	13	2			8	8				
10:45	12	7	57	24	22	1	83	20	140	44
11:00	24	3			12	2				
11:15	19	7			14	3				
11:30	26	1			25	4				
11:45	14	5	83	16	19	4	70	13	153	29
Total	659	572	659	572	550	587	550	587	1209	1159
Combined Total	1231		1231		1137		1137		2368	
AM Peak	6:30 AM				9:30 AM					
Vol.	138				96					
P.H.F.	0.704				0.800					
PM Peak		2:45 PM				12:15 PM				
Vol.		78				97				
P.H.F.		0.780				0.866				
Percentage	53.5%	46.5%			48.4%	51.6%				

Volumes for: Saturday, September 07, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road just south of the Refinery Entrance (Southbound Total Volume)

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			13	32				
12:15	0	0			12	38				
12:30	0	0			3	33				
12:45	0	0	0	0	8	24	36	127	36	127
1:00	0	0			3	30				
1:15	0	0			4	30				
1:30	0	0			5	25				
1:45	0	0	0	0	8	23	20	108	20	108
2:00	0	0			4	34				
2:15	0	0			5	18				
2:30	0	0			4	21				
2:45	0	0	0	0	7	18	20	91	20	91
3:00	0	0			13	26				
3:15	0	0			3	31				
3:30	0	0			2	24				
3:45	0	0	0	0	5	13	23	94	23	94
4:00	0	0			11	20				
4:15	0	0			5	21				
4:30	0	0			1	18				
4:45	0	0	0	0	15	22	32	81	32	81
5:00	0	0			8	21				
5:15	0	0			15	24				
5:30	0	0			12	11				
5:45	0	0	0	0	18	13	53	69	53	69
6:00	0	0			13	9				
6:15	0	0			15	13				
6:30	0	0			35	16				
6:45	0	0	0	0	21	9	84	47	84	47
7:00	0	0			16	13				
7:15	0	0			21	15				
7:30	0	0			13	9				
7:45	0	0	0	0	18	7	68	44	68	44
8:00	0	0			34	11				
8:15	0	0			12	3				
8:30	0	0			15	10				
8:45	0	0	0	0	22	7	83	31	83	31
9:00	0	0			24	4				
9:15	0	0			26	9				
9:30	0	0			31	3	0			
9:45	0	0	0	0	21	6	102	22	102	22
10:00	0	0			31	9				
10:15	0	0			37	3				
10:30	0	0			14	9				
10:45	0	0	0	0	25	1	107	22	107	22
11:00	0	0			15	3				
11:15	0	0			25	5				
11:30	0	0			30	5				
11:45	0	0	0	0	23	5	93	18	93	18
Total	0	0	0	0	721	754	721	754	721	754
Combined Total	0		0		1475		1475		1475	
AM Peak					11:45 AM					
Vol.					126					
P.H.F.					0.829					
PM Peak						12:00 PM				
Vol.						127				
P.H.F.						0.836				
Percentage					48.9%	51.1%				

Prepared by NDS/ATD

Volumes for: Sunday, September 08, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road north of Bayshore Road

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	3	16			3	9				
12:15	4	8			2	7				
12:30	1	9			1	6				
12:45	4	5	12	38	2	3	8	25	20	63
1:00	0	9			1	13				
1:15	3	14			3	13				
1:30	0	10			1	9				
1:45	4	12	7	45	0	9	5	44	12	89
2:00	3	10			1	11				
2:15	2	4			0	8				
2:30	4	12			3	5				
2:45	4	14	13	40	0	11	4	35	17	75
3:00	4	7			3	20				
3:15	6	13			0	9				
3:30	6	11			2	16				
3:45	2	12	18	43	1	13	6	58	24	101
4:00	2	9			2	19				
4:15	2	8			2	12				
4:30	4	12			3	8				
4:45	6	5	14	34	6	9	13	48	27	82
5:00	5	12			5	19				
5:15	2	13			1	10				
5:30	3	19			5	11				
5:45	4	10	14	54	9	9	20	49	34	103
6:00	11	8			3	5				
6:15	8	8			10	11				
6:30	12	10			3	5				
6:45	18	6	49	32	6	4	22	25	71	57
7:00	11	7			9	7				
7:15	8	4			10	4				
7:30	19	6			7	4				
7:45	13	9	51	26	10	4	36	19	87	45
8:00	10	6			7	3				
8:15	6	6			7	5				
8:30	4	2			5	2				
8:45	3	3	23	17	2	3	21	13	44	30
9:00	9	5			6	4				
9:15	11	4			10	8				
9:30	7	4			9	3				
9:45	5	5	32	18	5	2	30	17	62	35
10:00	7	5			9	3				
10:15	9	11			3	4				
10:30	9	4			16	8				
10:45	16	6	41	26	14	3	42	18	83	44
11:00	15	3			15	2				
11:15	3	2			9	3				
11:30	10	2			13	3				
11:45	5	4	33	11	11	2	48	10	81	21
Total	307	384	307	384	255	361	255	361	562	745
Combined Total	691		691		616		616		1307	
AM Peak	6:45 AM				10:30 AM					
Vol.	56				54					
P.H.F.	0.737				0.844					
PM Peak		5:00 PM				3:30 PM				
Vol.		54				60				
P.H.F.		0.711				0.789				
Percentage	44.4%	55.6%			41.4%	58.6%				

Prepared by NDS/ATD

Volumes for: Sunday, September 08, 2013 City: Benicia Project #: 13-7499-001

Location: Park Road just south of the Refinery Entrance (Southbound Total Volume)

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			6	10				
12:15	0	0			2	8				
12:30	0	0			3	7				
12:45	0	0	0	0	4	6	15	31	15	31
1:00	0	0			1	15				
1:15	0	0			5	15				
1:30	0	0			2	9				
1:45	0	0	0	0	1	11	9	50	9	50
2:00	0	0			1	16				
2:15	0	0			0	10				
2:30	0	0			5	8				
2:45	0	0	0	0	0	13	6	47	6	47
3:00	0	0			3	30				
3:15	0	0			1	10				
3:30	0	0			6	25				
3:45	0	0	0	0	3	15	13	80	13	80
4:00	0	0			5	30				
4:15	0	0			3	17				
4:30	0	0			3	13				
4:45	0	0	0	0	11	13	22	73	22	73
5:00	0	0			5	24				
5:15	0	0			1	15				
5:30	0	0			10	18				
5:45	0	0	0	0	10	9	26	66	26	66
6:00	0	0			4	7				
6:15	0	0			12	15				
6:30	0	0			3	7				
6:45	0	0	0	0	8	5	27	34	27	34
7:00	0	0			13	8				
7:15	0	0			13	6				
7:30	0	0			8	5				
7:45	0	0	0	0	11	4	45	23	45	23
8:00	0	0			10	3				
8:15	0	0			9	12				
8:30	0	0			5	4				
8:45	0	0	0	0	3	7	27	26	27	26
9:00	0	0			8	5				
9:15	0	0			13	9				
9:30	0	0			10	3	0			
9:45	0	0	0	0	5	2	36	19	36	19
10:00	0	0			11	5				
10:15	0	0			3	6				
10:30	0	0			17	8				
10:45	0	0	0	0	16	3	47	22	47	22
11:00	0	0			16	2				
11:15	0	0			13	3				
11:30	0	0			17	3				
11:45	0	0	0	0	13	5	59	13	59	13
Total	0	0	0	0	332	484	332	484	332	484
Combined Total	0		0		816		816		816	
AM Peak					10:30 AM					
Vol.					62					
P.H.F.					0.912					
PM Peak						3:30 PM				
Vol.						87				
P.H.F.						0.725				
Percentage					40.7%	59.3%				

Prepared by NDS/ATD

Volumes for: Monday, September 09, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road north of Bayshore Road

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	3	57			2	78				
12:15	2	49			4	61				
12:30	5	61			4	64				
12:45	5	57	15	224	4	35	14	238	29	462
1:00	4	88			4	64				
1:15	3	59			2	70				
1:30	4	52			0	60				
1:45	4	58	15	257	2	42	8	236	23	493
2:00	3	60			2	46				
2:15	3	66			2	50				
2:30	4	50			2	73				
2:45	13	56	23	232	2	67	8	236	31	468
3:00	9	63			3	52				
3:15	3	59			6	54				
3:30	13	83			5	65				
3:45	21	59	46	264	3	65	17	236	63	500
4:00	13	57			7	84				
4:15	26	45			7	91				
4:30	27	86			8	87				
4:45	45	45	111	233	24	72	46	334	157	567
5:00	25	39			22	67				
5:15	36	30			13	72				
5:30	56	26			30	44				
5:45	61	32	178	127	50	52	115	235	293	362
6:00	51	27			38	33				
6:15	45	21			32	30				
6:30	77	22			53	34				
6:45	98	15	271	85	74	20	197	117	468	202
7:00	78	18			48	24				
7:15	98	7			56	20				
7:30	103	12			80	13				
7:45	85	10	364	47	94	16	278	73	642	120
8:00	106	12			79	15				
8:15	110	8			58	13				
8:30	64	6			68	2				
8:45	78	8	358	34	55	8	260	38	618	72
9:00	48	5			41	11				
9:15	56	7			48	4				
9:30	49	9			36	12				
9:45	58	10	211	31	45	11	170	38	381	69
10:00	52	3			63	11				
10:15	52	1			42	5				
10:30	47	3			42	11				
10:45	42	1	193	8	48	1	195	28	388	36
11:00	52	6			43	5				
11:15	47	5			52	5				
11:30	55	5			50	5				
11:45	65	8	219	24	50	2	195	17	414	41
Total	2004	1566	2004	1566	1503	1826	1503	1826	3507	3392
Combined Total	3570		3570		3329		3329		6899	
AM Peak	7:30 AM				7:30 AM					
Vol.	404				311					
P.H.F.	0.918				0.827					
PM Peak		12:30 PM				4:00 PM				
Vol.		265				334				
P.H.F.		0.753				0.918				
Percentage	56.1%	43.9%			45.1%	54.9%				

Prepared by NDS/ATD

Volumes for: Monday, September 09, 2013 City: Benicia Project #: 13-7499-001

Location: Park Road just south of the Refinery Entrance (Southbound Total Volume)

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			2	116				
12:15	0	0			6	73				
12:30	0	0			8	76				
12:45	0	0	0	0	5	57	21	322	21	322
1:00	0	0			8	90				
1:15	0	0			4	75				
1:30	0	0			1	70				
1:45	0	0	0	0	3	60	16	295	16	295
2:00	0	0			6	63				
2:15	0	0			3	97				
2:30	0	0			5	91				
2:45	0	0	0	0	2	80	16	331	16	331
3:00	0	0			7	81				
3:15	0	0			14	72				
3:30	0	0			10	104				
3:45	0	0	0	0	8	75	39	332	39	332
4:00	0	0			16	98				
4:15	0	0			22	120				
4:30	0	0			15	155				
4:45	0	0	0	0	34	87	87	460	87	460
5:00	0	0			39	152				
5:15	0	0			18	89				
5:30	0	0			48	46				
5:45	0	0	0	0	58	58	163	345	163	345
6:00	0	0			55	41				
6:15	0	0			41	42				
6:30	0	0			61	34				
6:45	0	0	0	0	76	26	233	143	233	143
7:00	0	0			61	27				
7:15	0	0			70	23				
7:30	0	0			97	17				
7:45	0	0	0	0	105	16	333	83	333	83
8:00	0	0			118	19				
8:15	0	0			78	15				
8:30	0	0			75	3				
8:45	0	0	0	0	67	10	338	47	338	47
9:00	0	0			52	14				
9:15	0	0			62	4				
9:30	0	0			47	15	0			
9:45	0	0	0	0	70	16	231	49	231	49
10:00	0	0			77	11				
10:15	0	0			62	9				
10:30	0	0			58	12				
10:45	0	0	0	0	68	1	265	33	265	33
11:00	0	0			58	6				
11:15	0	0			63	5				
11:30	0	0			65	6				
11:45	0	0	0	0	61	4	247	21	247	21
Total	0	0	0	0	1989	2461	1989	2461	1989	2461
Combined Total	0		0		4450		4450		4450	
AM Peak					7:30 AM					
Vol.					398					
P.H.F.					0.843					
PM Peak						4:15 PM				
Vol.						514				
P.H.F.						0.829				
Percentage					44.7%	55.3%				

Prepared by NDS/ATD

Volumes for: Tuesday, September 10, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road north of Bayshore Road

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	5	78			7	39				
12:15	2	49			7	55				
12:30	5	65			3	53				
12:45	4	65	16	257	1	68	18	215	34	472
1:00	3	54			11	35				
1:15	4	59			4	48				
1:30	7	66			6	58				
1:45	9	55	23	234	6	46	27	187	50	421
2:00	6	54			2	53				
2:15	2	76			3	44				
2:30	4	40			6	71				
2:45	10	56	22	226	5	46	16	214	38	440
3:00	3	44			4	53				
3:15	20	52			5	56				
3:30	8	83			3	96				
3:45	27	47	58	226	7	58	19	263	77	489
4:00	11	54			6	56				
4:15	26	51			9	63				
4:30	34	86			9	66				
4:45	41	48	112	239	20	85	44	270	156	509
5:00	34	50			19	111				
5:15	39	39			28	71				
5:30	37	30			39	63				
5:45	85	30	195	149	43	44	129	289	324	438
6:00	59	31			32	53				
6:15	56	21			44	27				
6:30	88	25			43	38				
6:45	106	15	309	92	74	29	193	147	502	239
7:00	74	26			54	21				
7:15	114	15			51	24				
7:30	98	9			55	17				
7:45	123	10	409	60	61	12	221	74	630	134
8:00	80	13			68	15				
8:15	86	5			62	4				
8:30	85	9			60	11				
8:45	67	12	318	39	54	7	244	37	562	76
9:00	68	2			47	9				
9:15	64	9			48	6				
9:30	58	3			44	12				
9:45	55	7	245	21	36	15	175	42	420	63
10:00	63	6			47	8				
10:15	63	7			28	3				
10:30	46	6			45	6				
10:45	40	4	212	23	44	7	164	24	376	47
11:00	39	8			46	11				
11:15	52	8			46	4				
11:30	54	6			60	1				
11:45	24	4	169	26	29	2	181	18	350	44
Total	2088	1592	2088	1592	1431	1780	1431	1780	3519	3372
Combined Total	3680		3680		3211		3211		6891	
AM Peak	7:15 AM				7:45 AM					
Vol.	415				251					
P.H.F.	0.843				0.923					
PM Peak		12:00 PM				4:30 PM				
Vol.		257				333				
P.H.F.		0.824				0.750				
Percentage	56.7%	43.3%			44.6%	55.4%				

Volumes for: Tuesday, September 10, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road just south of the Refinery Entrance (Southbound Total Volume)

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			7	81				
12:15	0	0			11	73				
12:30	0	0			5	64				
12:45	0	0	0	0	1	78	24	296	24	296
1:00	0	0			12	55				
1:15	0	0			4	63				
1:30	0	0			6	69				
1:45	0	0	0	0	11	72	33	259	33	259
2:00	0	0			7	68				
2:15	0	0			5	55				
2:30	0	0			9	78				
2:45	0	0	0	0	6	63	27	264	27	264
3:00	0	0			11	83				
3:15	0	0			8	59				
3:30	0	0			8	97				
3:45	0	0	0	0	9	64	36	303	36	303
4:00	0	0			16	76				
4:15	0	0			17	99				
4:30	0	0			17	130				
4:45	0	0	0	0	33	102	83	407	83	407
5:00	0	0			33	141				
5:15	0	0			47	83				
5:30	0	0			53	66				
5:45	0	0	0	0	60	65	193	355	193	355
6:00	0	0			42	58				
6:15	0	0			55	36				
6:30	0	0			58	45				
6:45	0	0	0	0	93	32	248	171	248	171
7:00	0	0			62	28				
7:15	0	0			66	30				
7:30	0	0			69	20				
7:45	0	0	0	0	86	16	283	94	283	94
8:00	0	0			80	19				
8:15	0	0			74	6				
8:30	0	0			81	15				
8:45	0	0	0	0	60	14	295	54	295	54
9:00	0	0			62	13				
9:15	0	0			51	6				
9:30	0	0			51	20	0			
9:45	0	0	0	0	49	21	213	60	213	60
10:00	0	0			55	12				
10:15	0	0			48	5				
10:30	0	0			50	7				
10:45	0	0	0	0	57	11	210	35	210	35
11:00	0	0			65	18				
11:15	0	0			66	4				
11:30	0	0			73	3				
11:45	0	0	0	0	40	4	244	29	244	29
Total	0	0	0	0	1889	2327	1889	2327	1889	2327
Combined Total	0		0		4216		4216		4216	
AM Peak					7:45 AM					
Vol.					321					
P.H.F.					0.933					
PM Peak						4:15 PM				
Vol.						472				
P.H.F.						0.837				
Percentage					44.8%	55.2%				

Prepared by NDS/ATD

Volumes for: Wednesday, September 11, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road north of Bayshore Road

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	5	55			8	75				
12:15	9	63			10	73				
12:30	4	53			2	53				
12:45	5	81	23	252	5	50	25	251	48	503
1:00	6	73			15	58				
1:15	1	63			4	55				
1:30	5	65			4	79				
1:45	1	64	13	265	2	50	25	242	38	507
2:00	6	59			8	43				
2:15	5	70			2	66				
2:30	7	53			2	78				
2:45	13	56	31	238	9	60	21	247	52	485
3:00	13	54			6	55				
3:15	22	61			4	66				
3:30	8	83			6	102				
3:45	25	52	68	250	7	65	23	288	91	538
4:00	17	46			8	82				
4:15	21	52			12	73				
4:30	30	85			13	88				
4:45	47	56	115	239	19	59	52	302	167	541
5:00	17	62			27	46				
5:15	29	33			23	92				
5:30	43	27			33	60				
5:45	85	34	174	156	41	45	124	243	298	399
6:00	55	21			28	45				
6:15	63	27			51	32				
6:30	80	24			50	48				
6:45	107	18	305	90	76	27	205	152	510	242
7:00	62	13			44	37				
7:15	97	14			45	18				
7:30	98	21			61	15				
7:45	111	9	368	57	78	15	228	85	596	142
8:00	83	18			54	14				
8:15	92	15			57	14				
8:30	83	4			47	7				
8:45	74	12	332	49	68	14	226	49	558	98
9:00	61	6			50	10				
9:15	53	10			60	6				
9:30	57	5			52	6				
9:45	59	4	230	25	49	5	211	27	441	52
10:00	46	7			36	11				
10:15	53	3			52	6				
10:30	42	6			40	6				
10:45	60	3	201	19	47	7	175	30	376	49
11:00	48	4			45	6				
11:15	57	8			52	3				
11:30	48	4			62	3				
11:45	63	4	216	20	78	3	237	15	453	35
Total	2076	1660	2076	1660	1552	1931	1552	1931	3628	3591
Combined Total	3736		3736		3483		3483		7219	
AM Peak	7:15 AM				11:30 AM					
Vol.	389				288					
P.H.F.	0.876				0.923					
PM Peak		12:45 PM				3:30 PM				
Vol.		282				322				
P.H.F.		0.870				0.789				
Percentage	55.6%	44.4%			44.6%	55.4%				

Volumes for: Wednesday, September 11, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road just south of the Refinery Entrance (Southbound Total Volume)

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			9	94				
12:15	0	0			11	90				
12:30	0	0			3	76				
12:45	0	0	0	0	9	75	32	335	32	335
1:00	0	0			19	86				
1:15	0	0			8	66				
1:30	0	0			6	97				
1:45	0	0	0	0	2	66	35	315	35	315
2:00	0	0			9	74				
2:15	0	0			5	81				
2:30	0	0			3	97				
2:45	0	0	0	0	15	75	32	327	32	327
3:00	0	0			10	75				
3:15	0	0			12	75				
3:30	0	0			15	121				
3:45	0	0	0	0	12	76	49	347	49	347
4:00	0	0			12	111				
4:15	0	0			28	86				
4:30	0	0			17	123				
4:45	0	0	0	0	32	71	89	391	89	391
5:00	0	0			41	161				
5:15	0	0			33	93				
5:30	0	0			39	78				
5:45	0	0	0	0	58	47	171	379	171	379
6:00	0	0			46	56				
6:15	0	0			69	38				
6:30	0	0			53	56				
6:45	0	0	0	0	78	36	246	186	246	186
7:00	0	0			55	45				
7:15	0	0			53	23				
7:30	0	0			78	20				
7:45	0	0	0	0	94	20	280	108	280	108
8:00	0	0			59	19				
8:15	0	0			69	18				
8:30	0	0			55	12				
8:45	0	0	0	0	86	17	269	66	269	66
9:00	0	0			71	10				
9:15	0	0			72	8				
9:30	0	0			61	7	0			
9:45	0	0	0	0	67	6	271	31	271	31
10:00	0	0			68	17				
10:15	0	0			75	7				
10:30	0	0			54	10				
10:45	0	0	0	0	75	10	272	44	272	44
11:00	0	0			64	9				
11:15	0	0			77	4				
11:30	0	0			100	4				
11:45	0	0	0	0	110	5	351	22	351	22
Total	0	0	0	0	2097	2551	2097	2551	2097	2551
Combined Total	0		0		4648		4648		4648	
AM Peak					11:30 AM					
Vol.					394					
P.H.F.					0.895					
PM Peak						4:30 PM				
Vol.						448				
P.H.F.						0.696				
Percentage					45.1%	54.9%				

Prepared by NDS/ATD

Volumes for: Thursday, September 12, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road north of Bayshore Road

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	6	38			9	36				
12:15	1	74			1	39				
12:30	6	64			3	64				
12:45	3	79	16	255	1	52	14	191	30	446
1:00	2	71			6	66				
1:15	0	52			4	51				
1:30	3	66			7	70				
1:45	1	61	6	250	6	52	23	239	29	489
2:00	6	72			7	53				
2:15	2	71			2	52				
2:30	11	52			2	84				
2:45	8	76	27	271	3	50	14	239	41	510
3:00	2	52			11	57				
3:15	17	73			2	74				
3:30	19	83			4	68				
3:45	22	65	60	273	8	70	25	269	85	542
4:00	14	65			12	97				
4:15	15	41			7	56				
4:30	34	83			16	81				
4:45	46	51	109	240	25	59	60	293	169	533
5:00	25	48			28	103				
5:15	27	30			19	63				
5:30	35	36			19	64				
5:45	70	27	157	141	34	33	100	263	257	404
6:00	63	19			24	43				
6:15	64	31			43	40				
6:30	86	18			43	33				
6:45	98	25	311	93	62	23	172	139	483	232
7:00	79	17			56	34				
7:15	100	17			61	25				
7:30	84	13			90	13				
7:45	115	17	378	64	85	13	292	85	670	149
8:00	104	12			68	18				
8:15	97	8			55	17				
8:30	84	10			62	17				
8:45	68	21	353	51	51	13	236	65	589	116
9:00	65	22			55	9				
9:15	69	13			59	6				
9:30	56	5			48	9				
9:45	52	7	242	47	54	9	216	33	458	80
10:00	39	10			48	5				
10:15	71	6			50	8				
10:30	58	9			56	6				
10:45	50	5	218	30	50	8	204	27	422	57
11:00	53	5			61	8				
11:15	50	5			38	6				
11:30	74	4			49	5				
11:45	63	5	240	19	80	6	228	25	468	44
Total	2117	1734	2117	1734	1584	1868	1584	1868	3701	3602
Combined Total	3851		3851		3452		3452		7303	
AM Peak	7:15 AM				7:15 AM					
Vol.	403				304					
P.H.F.	0.876				0.844					
PM Peak		12:15 PM				3:15 PM				
Vol.		288				309				
P.H.F.		0.911				0.796				
Percentage	55.0%	45.0%			45.9%	54.1%				

Volumes for: Thursday, September 12, 2013 City: Benicia Project #: 13-7499-001
Location: Park Road just south of the Refinery Entrance (Southbound Total Volume)

Start	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			10	42				
12:15	0	0			2	103				
12:30	0	0			4	86				
12:45	0	0	0	0	3	70	19	301	19	301
1:00	0	0			10	103				
1:15	0	0			8	95				
1:30	0	0			8	101				
1:45	0	0	0	0	6	76	32	375	32	375
2:00	0	0			7	75				
2:15	0	0			6	62				
2:30	0	0			4	104				
2:45	0	0	0	0	6	66	23	307	23	307
3:00	0	0			13	73				
3:15	0	0			5	88				
3:30	0	0			11	97				
3:45	0	0	0	0	16	95	45	353	45	353
4:00	0	0			19	105				
4:15	0	0			13	100				
4:30	0	0			28	142				
4:45	0	0	0	0	36	86	96	433	96	433
5:00	0	0			42	141				
5:15	0	0			27	96				
5:30	0	0			32	92				
5:45	0	0	0	0	43	40	144	369	144	369
6:00	0	0			36	48				
6:15	0	0			55	42				
6:30	0	0			55	34				
6:45	0	0	0	0	77	32	223	156	223	156
7:00	0	0			87	41				
7:15	0	0			77	33				
7:30	0	0			115	21				
7:45	0	0	0	0	118	17	397	112	397	112
8:00	0	0			85	27				
8:15	0	0			87	19				
8:30	0	0			76	24				
8:45	0	0	0	0	76	16	324	86	324	86
9:00	0	0			70	16				
9:15	0	0			79	7				
9:30	0	0			73	9	0			
9:45	0	0	0	0	75	15	297	47	297	47
10:00	0	0			70	10				
10:15	0	0			71	9				
10:30	0	0			87	12				
10:45	0	0	0	0	96	10	324	41	324	41
11:00	0	0			82	10				
11:15	0	0			48	10				
11:30	0	0			74	5				
11:45	0	0	0	0	101	7	305	32	305	32
Total	0	0	0	0	2229	2612	2229	2612	2229	2612
Combined Total	0		0		4841		4841		4841	
AM Peak					7:30 AM					
Vol.					405					
P.H.F.					0.858					
PM Peak						4:15 PM				
Vol.						469				
P.H.F.						0.826				
Percentage					46.0%	54.0%				

ALL TRAFFIC DATA

City of Benicia
All Vehicles on Unshifted
Heavy Trucks on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7498-001 I-680 Northbound Off-Ramp-Bayshore Road.p
Date : 9/10/2013

Unshifted Count = All Vehicles

	Southbound					Bayshore Road Westbound					I-680 Northbound Off-Ramp Northbound					Bayshore Road Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
09:00	0	0	0	0	0	0	11	0	0	11	64	0	9	0	73	0	6	0	0	6	90	0
09:15	0	0	0	0	0	0	9	0	0	9	58	0	13	0	71	0	5	0	0	5	85	0
09:30	0	0	0	0	0	0	33	0	0	33	42	0	15	0	57	0	3	0	0	3	93	0
09:45	0	0	0	0	0	0	21	0	0	21	45	0	10	0	55	0	5	0	0	5	81	0
Total	0	0	0	0	0	0	74	0	0	74	209	0	47	0	256	0	19	0	0	19	349	0
10:00	0	0	0	0	0	0	12	0	0	12	47	0	7	0	54	0	5	0	0	5	71	0
10:15	0	0	0	0	0	0	21	0	0	21	48	0	9	0	57	0	5	0	0	5	83	0
10:30	0	0	0	0	0	0	13	0	0	13	36	0	8	0	44	0	7	0	0	7	64	0
10:45	0	0	0	0	0	0	16	0	0	16	37	0	8	0	45	0	6	0	0	6	67	0
Total	0	0	0	0	0	0	62	0	0	62	168	0	32	0	200	0	23	0	0	23	285	0
11:00	0	0	0	0	0	0	13	0	0	13	35	0	7	0	42	0	5	0	0	5	60	0
11:15	0	0	0	0	0	0	9	0	0	9	48	0	10	0	58	0	4	0	0	4	71	0
11:30	0	0	0	0	0	0	15	0	0	15	38	0	9	0	47	0	6	0	0	6	68	0
11:45	0	0	0	0	0	0	10	0	0	10	48	0	11	0	59	0	5	0	0	5	74	0
Total	0	0	0	0	0	0	47	0	0	47	169	0	37	0	206	0	20	0	0	20	273	0
13:00	0	0	0	0	0	0	24	0	0	24	59	0	10	0	69	0	9	0	0	9	102	0
13:15	0	0	0	0	0	0	13	0	0	13	51	0	7	0	58	0	7	0	0	7	78	0
13:30	0	0	0	0	0	0	16	0	0	16	59	0	12	0	71	0	8	0	0	8	95	0
13:45	0	0	0	0	0	0	8	0	0	8	45	0	7	0	52	0	3	0	0	3	63	0
Total	0	0	0	0	0	0	61	0	0	61	214	0	36	0	250	0	27	0	0	27	338	0
14:00	0	0	0	0	0	0	13	0	0	13	52	0	5	0	57	0	7	0	0	7	77	0
14:15	0	0	0	0	0	0	22	0	0	22	42	0	9	0	51	0	4	0	0	4	77	0
14:30	0	0	0	0	0	0	12	0	0	12	42	0	4	0	46	0	9	0	0	9	67	0
14:45	0	0	0	0	0	0	34	0	0	34	48	0	12	0	60	0	4	0	0	4	98	0
Total	0	0	0	0	0	0	81	0	0	81	184	0	30	0	214	0	24	0	0	24	319	0
15:00	0	0	0	0	0	0	19	0	0	19	39	0	12	0	51	0	9	0	0	9	79	0
15:15	0	0	0	0	0	0	20	0	0	20	31	0	12	0	43	0	5	0	0	5	68	0
15:30	0	0	0	0	0	0	42	0	0	42	40	0	5	0	45	0	6	0	0	6	93	0
15:45	0	0	0	0	0	0	18	0	0	18	48	0	6	0	54	0	9	0	0	9	81	0
Total	0	0	0	0	0	0	99	0	0	99	158	0	35	0	193	0	29	0	0	29	321	0
Grand Total	0	0	0	0	0	0	424	0	0	424	1102	0	217	0	1319	0	142	0	0	142	1885	0
Apprch %	0.0%	0.0%	0.0%			0.0%	100.0%	0.0%			83.5%	0.0%	16.5%			0.0%	100.0%	0.0%				
Total %	0.0%	0.0%	0.0%		0.0%	0.0%	22.5%	0.0%		22.5%	58.5%	0.0%	11.5%		70.0%	0.0%	7.5%	0.0%		7.5%	100.0%	

AM PEAK HOUR	Southbound					Bayshore Road Westbound					I-680 Northbound Off-Ramp Northbound					Bayshore Road Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 09:00 to 10:00																					
Peak Hour For Entire Intersection Begins at 09:00																					
09:00	0	0	0		0	0	11	0		11	64	0	9		73	0	6	0		6	90
09:15	0	0	0		0	0	9	0		9	58	0	13		71	0	5	0		5	85
09:30	0	0	0		0	0	33	0		33	42	0	15		57	0	3	0		3	93
09:45	0	0	0		0	0	21	0		21	45	0	10		55	0	5	0		5	81
Total Volume	0	0	0		0	0	74	0		74	209	0	47		256	0	19	0		19	349
% App Total	0.0%	0.0%	0.0%			0.0%	100.0%	0.0%			81.6%	0.0%	18.4%			0.0%	100.0%	0.0%			
PHF	.000	.000	.000		.000	.000	.561	.000		.561	.816	.000	.783		.877	.000	.792	.000		.792	.938

PM PEAK HOUR	Southbound					Bayshore Road Westbound					I-680 Northbound Off-Ramp Northbound					Bayshore Road Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 13:00 to 14:00																					
Peak Hour For Entire Intersection Begins at 13:00																					
13:00	0	0	0		0	0	24	0		24	59	0	10		69	0	9	0		9	102
13:15	0	0	0		0	0	13	0		13	51	0	7		58	0	7	0		7	78
13:30	0	0	0		0	0	16	0		16	59	0	12		71	0	8	0		8	95
13:45	0	0	0		0	0	8	0		8	45	0	7		52	0	3	0		3	63
Total Volume	0	0	0		0	0	61	0		61	214	0	36		250	0	27	0		27	338
% App Total	0.0%	0.0%	0.0%			0.0%	100.0%	0.0%			85.6%	0.0%	14.4%			0.0%	100.0%	0.0%			
PHF	.000	.000	.000		.000	.000	.635	.000		.635	.907	.000	.750		.880	.000	.750	.000		.750	.828

ALL TRAFFIC DATA

City of Benicia
All Vehicles on Unshifted
Heavy Trucks on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7498-002 I-680 Southbound On-Ramp-Bayshore Road.p
Date : 9/10/2013

Unshifted Count = All Vehicles

	I-680 Southbound On-Ramp Southbound					Bayshore Road Westbound					Driveway Northbound					Bayshore Road Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
09:00	0	0	0	0	0	12	64	0	0	76	0	0	0	0	0	0	5	40	0	45	121	0
09:15	0	0	0	0	0	3	62	0	0	65	0	0	0	0	0	0	5	44	0	49	114	0
09:30	0	0	0	0	0	17	60	0	0	77	0	0	0	0	0	0	3	36	0	39	116	0
09:45	0	0	0	0	0	13	52	0	0	65	0	0	0	0	0	0	6	39	0	45	110	0
Total	0	0	0	0	0	45	238	0	0	283	0	0	0	0	0	0	19	159	0	178	461	0
10:00	0	0	0	0	0	11	49	0	0	60	0	0	0	0	0	0	4	45	0	49	109	0
10:15	0	0	0	0	0	17	50	0	0	67	0	0	0	0	0	0	5	30	0	35	102	0
10:30	0	0	0	0	0	7	44	0	0	51	0	0	0	0	0	0	6	38	0	44	95	0
10:45	0	0	0	0	0	15	36	0	0	51	0	0	0	0	0	0	7	36	0	43	94	0
Total	0	0	0	0	0	50	179	0	0	229	0	0	0	0	0	0	22	149	0	171	400	0
11:00	0	0	0	0	0	11	38	0	0	49	0	0	0	0	0	0	5	50	0	55	104	0
11:15	0	0	0	0	0	3	52	0	0	55	0	0	0	0	0	0	4	42	0	46	101	0
11:30	0	0	0	0	0	9	45	0	0	54	0	0	0	0	0	0	6	55	0	61	115	0
11:45	0	0	0	0	0	9	42	0	0	51	0	0	0	0	0	0	5	30	0	35	86	0
Total	0	0	0	0	0	32	177	0	0	209	0	0	0	0	0	0	20	177	0	197	406	0
13:00	0	0	0	0	0	19	61	0	0	80	0	0	0	0	0	0	8	43	0	51	131	0
13:15	0	0	0	0	0	10	55	0	0	65	0	0	0	0	0	0	7	47	0	54	119	0
13:30	0	0	0	0	0	10	64	0	0	74	0	1	0	0	1	0	7	52	0	59	134	0
13:45	0	0	0	0	0	5	49	0	0	54	0	0	0	0	0	0	3	58	0	61	115	0
Total	0	0	0	0	0	44	229	0	0	273	0	1	0	0	1	0	25	200	0	225	499	0
14:00	0	0	0	0	0	5	61	0	0	66	0	0	0	0	0	0	7	54	0	61	127	0
14:15	0	0	0	0	0	10	52	0	0	62	0	0	0	0	0	0	4	61	0	65	127	0
14:30	0	0	0	0	0	10	45	0	0	55	1	0	0	0	1	0	10	71	0	81	137	0
14:45	0	0	0	0	0	25	56	0	0	81	1	0	0	0	1	0	4	59	0	63	145	0
Total	0	0	0	0	0	50	214	0	0	264	2	0	0	0	2	0	25	245	0	270	536	0
15:00	0	0	0	0	0	13	48	0	0	61	0	1	0	0	1	0	9	66	0	75	137	0
15:15	0	0	0	0	0	15	34	0	0	49	0	0	0	0	0	0	5	48	0	53	102	0
15:30	0	0	0	0	0	20	65	0	0	85	0	1	0	0	1	0	6	97	0	103	189	0
15:45	0	0	0	0	0	10	53	0	0	63	0	0	0	0	0	0	9	56	0	65	128	0
Total	0	0	0	0	0	58	200	0	0	258	0	2	0	0	2	0	29	267	0	296	556	0
Grand Total	0	0	0	0	0	279	1237	0	0	1516	2	3	0	0	5	0	140	1197	0	1337	2858	0
Apprch %	0.0%	0.0%	0.0%			18.4%	81.6%	0.0%			40.0%	60.0%	0.0%			0.0%	10.5%	89.5%				
Total %	0.0%	0.0%	0.0%		0.0%	9.8%	43.3%	0.0%		53.0%	0.1%	0.1%	0.0%		0.2%	0.0%	4.9%	41.9%		46.8%	100.0%	

AM PEAK HOUR	I-680 Southbound On-Ramp Southbound					Bayshore Road Westbound					Driveway Northbound					Bayshore Road Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 09:00 to 10:00																					
Peak Hour For Entire Intersection Begins at 09:00																					
09:00	0	0	0		0	12	64	0		76	0	0	0		0	0	5	40		45	121
09:15	0	0	0		0	3	62	0		65	0	0	0		0	0	5	44		49	114
09:30	0	0	0		0	17	60	0		77	0	0	0		0	0	3	36		39	116
09:45	0	0	0		0	13	52	0		65	0	0	0		0	0	6	39		45	110
Total Volume	0	0	0		0	45	238	0		283	0	0	0		0	0	19	159		178	461
% App Total	0.0%	0.0%	0.0%			15.9%	84.1%	0.0%			0.0%	0.0%	0.0%			0.0%	10.7%	89.3%			
PHF	.000	.000	.000		.000	.662	.930	.000		.919	.000	.000	.000		.000	.000	.792	.903		.908	.952

PM PEAK HOUR	I-680 Southbound On-Ramp Southbound					Bayshore Road Westbound					Driveway Northbound					Bayshore Road Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 14:45 to 15:45																					
Peak Hour For Entire Intersection Begins at 14:45																					
14:45	0	0	0		0	25	56	0		81	1	0	0		1	0	4	59		63	145
15:00	0	0	0		0	13	48	0		61	0	1	0		1	0	9	66		75	137
15:15	0	0	0		0	15	34	0		49	0	0	0		0	0	5	48		53	102
15:30	0	0	0		0	20	65	0		85	0	1	0		1	0	6	97		103	189
Total Volume	0	0	0		0	73	203	0		276	1	2	0		3	0	24	270		294	573
% App Total	0.0%	0.0%	0.0%			26.4%	73.6%	0.0%			33.3%	66.7%	0.0%			0.0%	8.2%	91.8%			
PHF	.000	.000	.000		.000	.730	.781	.000		.812	.250	.500	.000		.750	.000	.667	.696		.714	.758

ALL TRAFFIC DATA

City of Benicia
All Vehicles on Unshifted
Heavy Trucks on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7498-003 Park Road-Bayshore Road.ppd
Date : 9/10/2013

Unshifted Count = All Vehicles

	Park Road Southbound					Bayshore Road Westbound					Park Road Northbound					Bayshore Road Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
09:00	41	9	7	0	57	6	2	58	0	66	1	6	5	0	12	2	2	1	0	5	140	0
09:15	40	9	6	0	55	9	2	47	0	58	3	13	9	0	25	8	4	2	0	14	152	0
09:30	31	6	8	0	45	9	2	52	0	63	1	3	5	0	9	5	1	2	0	8	125	0
09:45	37	9	9	0	55	4	1	42	0	47	2	5	3	0	10	5	8	1	0	14	126	0
Total	149	33	30	0	212	28	7	199	0	234	7	27	22	0	56	20	15	6	0	41	543	0
10:00	38	9	7	0	54	4	2	43	0	49	2	14	7	0	23	8	1	4	0	13	139	0
10:15	31	3	4	0	38	1	1	44	0	46	0	9	5	0	14	11	3	1	0	15	113	0
10:30	41	4	3	0	48	3	5	39	0	47	4	5	2	0	11	4	2	2	0	8	114	0
10:45	36	6	5	0	47	4	3	28	0	35	0	3	3	0	6	7	2	0	0	9	97	0
Total	146	22	19	0	187	12	11	154	0	177	6	31	17	0	54	30	8	7	0	45	463	0
11:00	47	12	3	0	62	3	3	35	0	41	1	3	5	0	9	5	5	1	0	11	123	0
11:15	36	8	9	0	53	3	3	44	0	50	1	6	1	0	8	4	5	2	0	11	122	0
11:30	48	12	12	0	72	5	4	36	0	45	2	10	6	0	18	11	9	5	0	25	160	0
11:45	23	5	4	0	32	4	4	15	0	23	4	5	5	0	14	2	3	3	0	8	77	0
Total	154	37	28	0	219	15	14	130	0	159	8	24	17	0	49	22	22	11	0	55	482	0
13:00	41	7	10	0	58	8	3	51	0	62	1	8	8	0	17	5	5	2	0	12	149	0
13:15	48	6	3	0	57	5	5	49	0	59	3	7	4	0	14	3	1	2	0	6	136	0
13:30	51	0	5	0	56	4	3	49	0	56	0	5	2	0	7	3	2	0	0	5	124	0
13:45	64	7	6	0	77	3	3	48	0	54	1	5	3	0	9	5	4	3	0	12	152	0
Total	204	20	24	0	248	20	14	197	0	231	5	25	17	0	47	16	12	7	0	35	561	0
14:00	47	10	6	0	63	7	1	50	0	58	2	6	6	0	14	2	4	2	0	8	143	0
14:15	47	6	4	0	57	1	5	53	0	59	2	14	9	0	25	5	7	4	0	16	157	0
14:30	66	7	6	0	79	3	5	33	0	41	2	6	7	0	15	3	8	1	0	12	147	0
14:45	52	7	2	0	61	4	7	47	0	58	1	6	3	0	10	3	8	1	0	12	141	0
Total	212	30	18	0	260	15	18	183	0	216	7	32	25	0	64	13	27	8	0	48	588	0
15:00	62	13	4	0	79	6	6	33	0	45	1	12	8	0	21	5	5	4	0	14	159	0
15:15	46	3	3	0	52	4	9	21	0	34	2	6	5	0	13	9	5	0	0	14	113	0
15:30	81	9	9	0	99	5	4	58	0	67	4	16	6	0	26	4	14	3	0	21	213	0
15:45	49	6	4	0	59	3	3	43	0	49	0	3	7	0	10	6	6	0	0	12	130	0
Total	238	31	20	0	289	18	22	155	0	195	7	37	26	0	70	24	30	7	0	61	615	0
Grand Total	1103	173	139	0	1415	108	86	1018	0	1212	40	176	124	0	340	125	114	46	0	285	3252	0
Apprch %	78.0%	12.2%	9.8%			8.9%	7.1%	84.0%			11.8%	51.8%	36.5%			43.9%	40.0%	16.1%				
Total %	33.9%	5.3%	4.3%		43.5%	3.3%	2.6%	31.3%		37.3%	1.2%	5.4%	3.8%		10.5%	3.8%	3.5%	1.4%		8.8%	100.0%	

AM PEAK HOUR	Park Road Southbound					Bayshore Road Westbound					Park Road Northbound					Bayshore Road Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 09:00 to 10:00																					
Peak Hour For Entire Intersection Begins at 09:00																					
09:00	41	9	7		57	6	2	58		66	1	6	5		12	2	2	1		5	140
09:15	40	9	6		55	9	2	47		58	3	13	9		25	8	4	2		14	152
09:30	31	6	8		45	9	2	52		63	1	3	5		9	5	1	2		8	125
09:45	37	9	9		55	4	1	42		47	2	5	3		10	5	8	1		14	126
Total Volume	149	33	30		212	28	7	199		234	7	27	22		56	20	15	6		41	543
% App Total	70.3%	15.6%	14.2%			12.0%	3.0%	85.0%			12.5%	48.2%	39.3%			48.8%	36.6%	14.6%			
PHF	.909	.917	.833		.930	.778	.875	.858		.886	.583	.519	.611		.560	.625	.469	.750		.732	.893

PM PEAK HOUR	Park Road Southbound					Bayshore Road Westbound					Park Road Northbound					Bayshore Road Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 14:45 to 15:45																					
Peak Hour For Entire Intersection Begins at 14:45																					
14:45	52	7	2		61	4	7	47		58	1	6	3		10	3	8	1		12	141
15:00	62	13	4		79	6	6	33		45	1	12	8		21	5	5	4		14	159
15:15	46	3	3		52	4	9	21		34	2	6	5		13	9	5	0		14	113
15:30	81	9	9		99	5	4	58		67	4	16	6		26	4	14	3		21	213
Total Volume	241	32	18		291	19	26	159		204	8	40	22		70	21	32	8		61	626
% App Total	82.8%	11.0%	6.2%			9.3%	12.7%	77.9%			11.4%	57.1%	31.4%			34.4%	52.5%	13.1%			
PHF	.744	.615	.500		.735	.792	.722	.685		.761	.500	.625	.688		.673	.583	.571	.500		.726	.735

13-7217 Benicia Train Crossing Study

Monday, April 15, 2013

Park Road Crossing

Train #	Start Time	End Time	# of Cars	Direction	Left or Right Track?	Moving Back and Forth?	Crossing Duration
1	10:43:30	10:44:20	2	NB	Right	No	0:00:50
2	10:53:20	10:54:45	5	NB	Right	No	0:01:25
3	10:55:46	10:57:16	5	SB	Left	No	0:01:30
4	11:48:34	11:50:23	11	SB	Left	No	0:01:49
5	11:54:01	11:56:02	11	NB	Right	No	0:02:01
6	12:15:31	12:16:25	2	SB	Right	No	0:00:54
7	12:17:51	12:18:44	2	NB	Left	No	0:00:53
8	12:29:48	12:31:41	7	SB	Left	No	0:01:53
9	12:32:37	12:34:05	7	NB	Right	No	0:01:28
10	13:10:10	13:12:16	7	SB	Right	No	0:02:06
11	13:14:00	13:16:40	7	NB	Left	No	0:02:40
12	13:43:23	13:44:30	2	SB	Left	No	0:01:07
13	13:46:11	13:47:05	2	NB	Right	No	0:00:54
14	14:20:28	14:25:12	9	SB	Right	No	0:04:44
15	18:51:44	18:53:46	9	NB	Left	No	0:02:02
16	19:08:07	19:08:48	2	SB	Left	No	0:00:41
17	19:09:17	19:10:10	2	NB	Right	No	0:00:53
18	19:15:00	19:16:35	9	SB	Right	No	0:01:35

Iron Workers Union Driveway Crossing

Train #	Start Time	End Time	# of Cars	Direction	Moving Back and Forth?	Crossing Duration
1	10:40:54	10:41:10	2	NB	No	0:00:16
2	14:24:26	14:25:09	9	SB	No	0:00:43
3	18:49:50	18:50:35	9	NB	No	0:00:45
4	19:15:51	19:16:31	9	SB	No	0:00:40

13-7217 Benicia Train Crossing Study

Tuesday, April 16, 2013

Park Road Crossing

Train #	Start Time	End Time	# of Cars	Direction	Left or Right Track?	Moving Back and Forth?	Crossing Duration
1	13:14:15	13:26:06	16	NB	Right	No	0:11:51
2	17:20:01	17:21:30	2	SB to NB	Right to Left	Yes	0:01:29
3	17:37:07	17:38:20	10	SB	Left	No	0:01:13
4	18:12:31	18:13:57	10	NB	Left	No	0:01:26
5	18:22:18	18:24:19	3	SB to NB	Left to Right	Yes	0:02:01
6	18:32:09	18:40:05	18	SB to NB	Right	Yes	0:07:56
7	18:47:35	18:50:59	35	SB	Right	No	0:03:24

Iron Workers Union Driveway Crossing

Train #	Start Time	End Time	# of Cars	Direction	Moving Back and Forth?	Crossing Duration
1	13:05:10	13:22:48	16	NB	No	0:17:38
2	17:37:38	17:38:18	10	SB	No	0:00:40
3	18:11:30	18:12:08	10	NB	No	0:00:38
4	18:36:35	18:38:32	5	SB to NB	Yes	0:01:57
5	18:48:21	18:50:52	35	SB	No	0:02:31

13-7217 Benicia Train Crossing Study

Wednesday, April 17, 2013

Park Road Crossing

Train #	Start Time	End Time	# of Cars	Direction	Left or Right Track?	Moving Back and Forth?	Crossing Duration
1	13:51:08	14:07:25	31	NB to SB	Right	Yes	0:16:17
2	14:09:55	14:18:35	31	NB	Right	No	0:08:40
3	16:51:33	16:53:17	4	SB	Right	No	0:01:44
4	16:54:06	16:55:26	4	NB	Left	No	0:01:20
5	17:34:04	17:35:20	9	SB	Left	No	0:01:16
6	18:14:07	18:15:25	9	NB	Left	No	0:01:18
7	18:25:07	18:26:06	2	SB	Left	No	0:00:59
8	18:26:25	18:27:24	2	NB	Right	No	0:00:59
9	18:34:10	18:36:18	20	SB	Right	No	0:02:08

Iron Workers Union Driveway Crossing

Train #	Start Time	End Time	# of Cars	Direction	Moving Back and Forth?	Crossing Duration
1	13:48:48	14:13:38	43	NB	Yes	0:24:50
2	17:36:02	17:36:42	9	SB	No	0:00:40
3	18:14:19	18:14:57	9	NB	No	0:00:38
4	18:36:15	18:37:41	20	SB	No	0:01:26

13-7217 Benicia Train Crossing Study

Thursday, April 18, 2013

Park Road Crossing

Train #	Start Time	End Time	# of Cars	Direction	Left or Right Track?	Moving Back and Forth?	Crossing Duration
1	11:20:15	11:24:30	26	NB	Right	No	0:04:15
2	13:51:10	13:59:32	16+	SB to NB	Right	Yes	0:08:22

missing video from 1627 to 2400

Iron Workers Union Driveway Crossing

Train #	Start Time	End Time	# of Cars	Direction	Moving Back and Forth?	Crossing Duration
1	6:30:49	6:34:56	26	NB	Yes	0:04:07
2	11:15:35	11:22:37	26	NB	No	0:07:02
3	13:53:54	13:55:30	3+	SB to NB	Yes	0:01:36
4	17:18:39	17:19:20	10	SB	No	0:00:41
5	17:57:36	17:58:11	9	NB	No	0:00:35
6	18:22:04	18:24:14	26	SB	No	0:02:10

13-7217 Benicia Train Crossing Study

Friday, April 19, 2013

Park Road Crossing

Train #	Start Time	End Time	# of Cars	Direction	Left or Right Track?	Moving Back and Forth?	Crossing Duration
1	9:29:07	9:30:37	2	NB	Right	No	0:01:30
2	10:19:03	10:21:08	2	SB to NB	Right to Left	Yes	0:02:05
3	10:43:04	10:43:44	10	SB	Left	No	0:00:40
4	12:19:38	12:27:55	24	NB	Right to Left	Yes	0:08:17
5	12:42:57	12:43:52	2	SB	Left	No	0:00:55
6	12:44:25	12:45:23	2	NB	Right	No	0:00:58
7	12:48:29	12:52:10	9+	SB to NB	Right	Yes	0:03:41
8	14:00:14	14:01:38	3+	SB to NB	Right	Yes	0:01:24
9	14:10:07	14:16:52	25	SB	Right	No	0:06:45

missing video from 0000 to 0603

Iron Workers Union Driveway Crossing

Train #	Start Time	End Time	# of Cars	Direction	Moving Back and Forth?	Crossing Duration
1	9:27:51	9:28:06	2	NB	No	0:00:15
2	10:43:33	10:44:16	10	SB	No	0:00:43
3	12:17:56	12:20:22	24	NB	No	0:02:26
4	14:15:06	14:16:57	25	SB	No	0:01:51

13-7217 Benicia Train Crossing Study

Saturday, April 20, 2013

Park Road Crossing

Train #	Start Time	End Time	# of Cars	Direction	Left or Right Track?	Moving Back and Forth?	Crossing Duration
1	12:54:10	13:00:06	16	NB	Right	No	0:05:56
2	17:10:32	17:11:58	10	SB	Left	No	0:01:26
3	17:51:43	17:52:58	9	NB	Left	No	0:01:15
4	18:03:01	18:03:59	2	SB	Left	No	0:00:58

Iron Workers Union Driveway Crossing

Train #	Start Time	End Time	# of Cars	Direction	Moving Back and Forth?	Crossing Duration
1	12:52:53	12:54:22	16	NB	No	0:01:29
2	17:11:38	17:12:17	10	SB	No	0:00:39
3	17:50:37	17:51:10	9	NB	No	0:00:33
4	18:03:51	18:04:06	2	SB	No	0:00:15

13-7217 Benicia Train Crossing Study

Sunday, April 21, 2013

Park Road Crossing

Train #	Start Time	End Time	# of Cars	Direction	Left or Right Track?	Moving Back and Forth?	Crossing Duration
1	12:17:58	12:19:52	18	NB	Right	No	0:01:54
2	13:36:26	13:37:20	2	SB	Right	No	0:00:54
3	13:38:02	13:38:56	2	NB	Left	No	0:00:54
4	14:04:05	14:05:32	9	SB	Left	No	0:01:27
5	14:54:03	14:55:45	9	NB	Right	No	0:01:42
6	15:06:29	15:07:28	2	SB	Left	No	0:00:59
7	17:35:25	17:37:05	2	NB	Right	No	0:01:40
8	17:55:24	17:57:36	6+	SB to NB	Right	Yes	0:02:12
9	18:00:02	18:00:55	2	SB	Right	No	0:00:53

Iron Workers Union Driveway Crossing

Train #	Start Time	End Time	# of Cars	Direction	Moving Back and Forth?	Crossing Duration
1	12:16:05	12:19:26	18	NB	No	0:03:21
2	14:06:44	14:07:15	9	SB	No	0:00:31
3	14:54:32	14:55:05	9	NB	No	0:00:33
4	15:08:55	15:09:08	2	SB	No	0:00:13
5	17:34:40	17:34:53	2	NB	No	0:00:13
6	18:02:28	18:02:40	2	SB	No	0:00:12

UPPR DATA - Delivery Schedule Estimate
Park Road Rail Crossing --- Estimate only based on partial load data

Outbound Loads and Empties

Date	Tankcars	Footage	Boxcar	Footage	Total Cars	Total Footage
1/4/2013	16	960	1	50	17	1010
1/5/2013	23	1380	9	450	32	1830
1/6/2013	16	960	1	50	17	1010
1/7/2013	20	1200	6	300	26	1500
1/8/2013	11	660	11	550	22	1210
1/9/2013	23	1380	5	250	28	1630
1/10/2013	20	1200	8	400	28	1600
1/11/2013	13	780	0	0	13	780
1/12/2013	38	2280	7	350	45	2630
1/13/2013	11	660		0	11	660
1/14/2013	12	720		0	12	720

Inbound Loads and Empties

Date	Tankcars	Footage	Boxcar	Footage	Total Cars	Total Footage
1/4/2013	7	420	0	0	7	420
1/5/2013	11	660	0	0	11	660
1/6/2013	16	960	1	50	17	1010
1/7/2013	34	2040	9	450	43	2490
1/8/2013	0	0	0	0	0	0
1/9/2013	20	1200	6	300	26	1500
1/10/2013	15	900	11	550	26	1450
1/11/2013	16	960	5	250	21	1210
1/12/2013	25	1500	8	400	33	1900
1/13/2013	9	540	0	0	9	540
1/14/2013	34	2040	7	350	41	2390

Assumptions:
60' tankcars
50' boxcars
Empty movements are estimates only; based on cars on spot average 2 days
7 cars per day added to Valero tank cars inbound and outbound (coke turn)

UPPR DATA - Delivery Schedule Estimate

Benicia Inbound Loads (Auto excluded)

Waybill Date	Sys Dest Circ7	CONSIGNEE	Units	Mgrl Car Kind	Cmdy Desc
1/6/2013	RV385	CROWN IMPORTS	1	BOX50	BEER
1/6/2013	RV385	VALERO MARKETING SUPPLY	9	TANK	LPG
1/7/2013	RV385	CROWN IMPORTS	9	BOX50	BEER
1/7/2013	RV385	VALERO MARKETING SUPPLY	16	TANK	LPG
1/9/2013	RV385	CROWN IMPORTS	6	BOX50	BEER
1/9/2013	RV385	VALERO MARKETING SUPPLY	9	TANK	LPG
1/10/2013	RV385	CROWN IMPORTS	11	BOX50	BEER
1/10/2013	RV385	VALERO MARKETING SUPPLY	4	TANK	LPG
1/11/2013	RV385	CROWN IMPORTS	5	BOX50	BEER
1/11/2013	RV385	VALERO MARKETING SUPPLY	5	TANK	LPG
1/12/2013	RV385	CROWN IMPORTS	8	BOX50	BEER
1/12/2013	RV385	VALERO MARKETING SUPPLY	13	TANK	LPG
1/13/2013	RV385	VALERO MARKETING SUPPLY	2	TANK	LPG
1/14/2013	RV385	CROWN IMPORTS	7	BOX50	BEER
1/14/2013	RV385	VALERO MARKETING SUPPLY	27	TANK	LPG

Outbound Empties - Not actual data - estimated assuming 2 days loaded spot to empty outbound move

Date	Units	Car Type	Load/Empty
1/4/2013	1	BOXPL050	Empty
1/4/2013	9	TANK	Empty
1/5/2013	9	BOXPL050	Empty
1/5/2013	16	TANK	Empty
1/7/2013	6	BOXPL050	Empty
1/7/2013	9	TANK	Empty
1/8/2013	11	BOXPL050	Empty
1/8/2013	4	TANK	Empty
1/9/2013	5	BOXPL050	Empty
1/9/2013	5	TANK	Empty
1/10/2013	8	BOXPL050	Empty
1/10/2013	13	TANK	Empty
1/11/2013	2	TANK	Empty
1/12/2013	7	BOXPL050	Empty
1/12/2013	27	TANK	Empty

Benicia Outbound Loads (Auto excluded)

Waybill Date	Sys Orig Circ7	Shpr Name	Units	Mgrl Car Kind	Cmdy Desc
1/7/2013	RV385	VALERO MARKETING SUPPLY	4	TANK	LPG
1/9/2013	RV385	VALERO MARKETING SUPPLY	11	TANK	LPG
1/11/2013	RV385	VALERO MARKETING SUPPLY	4	TANK	LPG
1/12/2013	RV385	VALERO MARKETING SUPPLY	4	TANK	LPG
1/13/2013	RV385	VALERO MARKETING SUPPLY	4	TANK	LPG
1/14/2013	RV385	VALERO MARKETING SUPPLY	4	TANK	LPG
1/14/2013	RV385	VALERO MARKETING SUPPLY	1	TANK	CAUS SODA LIQ

Inbound Empties - Not actual data - estimated assuming on 2 days empty spot to loaded outbound move

Date	Units	Car Type	Load/Empty
1/5/2013	4	Tank	Empty
1/7/2013	11	Tank	Empty
1/9/2013	4	Tank	Empty
1/10/2013	4	Tank	Empty
1/11/2013	4	Tank	Empty
1/12/2013	5	Tank	Empty

Add 7 loads, 7 empties pet coke tank cars daily

Volumes for: Monday, January 07, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of Refinery Entrance (Day 1).

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	6	79			1	54				
12:15	3	49			1	60				
12:30	4	59			6	51				
12:45	1	65	14	252	0	64	8	229	22	481
1:00	5	47			2	55				
1:15	3	59			3	22				
1:30	1	81			1	47				
1:45	3	13	12	200	3	14	9	138	21	338
2:00	4	94			1	38				
2:15	0	65			1	42				
2:30	3	61			1	51				
2:45	3	54	10	274	3	76	6	207	16	481
3:00	6	61			2	62				
3:15	3	51			5	68				
3:30	11	52			3	67				
3:45	6	92	26	256	2	95	12	292	38	548
4:00	27	56			3	76				
4:15	19	54			3	85				
4:30	12	48			6	71				
4:45	28	65	86	223	5	93	17	325	103	548
5:00	35	36			24	67				
5:15	25	36			16	89				
5:30	37	33			16	63				
5:45	47	49	144	154	14	68	70	287	214	441
6:00	63	22			34	53				
6:15	65	20			33	38				
6:30	64	19			47	23				
6:45	75	24	267	85	56	27	170	141	437	226
7:00	86	16			65	20				
7:15	104	7			43	9				
7:30	106	6			63	11				
7:45	92	5	388	34	62	7	233	47	621	81
8:00	106	6			72	6				
8:15	102	8			43	12				
8:30	88	10			70	9				
8:45	75	6	371	30	51	5	236	32	607	62
9:00	88	8			56	6				
9:15	61	3			45	9				
9:30	50	5			54	7				
9:45	67	10	266	26	42	6	197	28	463	54
10:00	57	5			33	5				
10:15	61	11			48	12				
10:30	73	8			36	4				
10:45	44	2	235	26	53	2	170	23	405	49
11:00	41	2			47	1				
11:15	53	2			42	6				
11:30	41	6			16	4				
11:45	39	4	174	14	20	4	125	15	299	29
Total	1993	1574	1993	1574	1253	1764	1253	1764	3246	3338
Combined Total	3567		3567		3017		3017		6584	
AM Peak	7:15 AM				7:45 AM					
Vol.	408				247					
P.H.F.	0.962				0.858					
PM Peak		2:00 PM				3:45 PM				
Vol.		274				327				
P.H.F.		0.729				0.861				
Percentage	55.9%	44.1%			41.5%	58.5%				

Prepared by NDS/ATD

Volumes for: Monday, January 07, 2013 City: Benicia Project #: 13-7021-001

Location: Park Road just west of the Refinery Entrance.

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			3	68				
12:15	0	0			2	85				
12:30	0	0			11	79				
12:45	0	0	0	0	0	74	16	306	16	306
1:00	0	0			3	66				
1:15	0	0			3	68				
1:30	0	0			2	74				
1:45	0	0	0	0	4	18	12	226	12	226
2:00	0	0			3	82				
2:15	0	0			3	57				
2:30	0	0			3	63				
2:45	0	0	0	0	5	98	14	300	14	300
3:00	0	0			4	70				
3:15	0	0			8	87				
3:30	0	0			5	87				
3:45	0	0	0	0	6	121	23	365	23	365
4:00	0	0			6	89				
4:15	0	0			7	130				
4:30	0	0			17	81				
4:45	0	0	0	0	9	146	39	446	39	446
5:00	0	0			36	93				
5:15	0	0			32	122				
5:30	0	0			25	83				
5:45	0	0	0	0	24	94	117	392	117	392
6:00	0	0			51	57				
6:15	0	0			43	45				
6:30	0	0			55	35				
6:45	0	0	0	0	71	33	220	170	220	170
7:00	0	0			70	27				
7:15	0	0			55	17				
7:30	0	0			75	12				
7:45	0	0	0	0	68	11	268	67	268	67
8:00	0	0			83	10				
8:15	0	0			55	19				
8:30	0	0			82	15				
8:45	0	0	0	0	65	10	285	54	285	54
9:00	0	0			69	7				
9:15	0	0			61	15				
9:30	0	0			62	9				
9:45	0	0	0	0	64	7	256	38	256	38
10:00	0	0			47	14				
10:15	0	0			59	16				
10:30	0	0			56	5				
10:45	0	0	0	0	73	4	235	39	235	39
11:00	0	0			58	3				
11:15	0	0			70	6				
11:30	0	0			53	4				
11:45	0	0	0	0	50	8	231	21	231	21
Total	0	0	0	0	1716	2424	1716	2424	1716	2424
Combined Total	0		0		4140		4140		4140	
AM Peak					7:45 AM					
Vol.					288					
P.H.F.					0.867					
PM Peak						4:15 PM				
Vol.						450				
P.H.F.						0.771				
Percentage					41.4%	58.6%				

Prepared by NDS/ATD

Volumes for: Tuesday, January 08, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of Refinery Entrance (Day 2).

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	6	61			6	71				
12:15	6	73			10	62				
12:30	6	69			2	59				
12:45	3	65	21	268	6	57	24	249	45	517
1:00	3	80			3	39				
1:15	5	51			14	58				
1:30	1	61			3	36				
1:45	0	55	9	247	2	60	22	193	31	440
2:00	6	65			2	37				
2:15	5	68			0	59				
2:30	3	72			6	58				
2:45	3	62	17	267	2	71	10	225	27	492
3:00	4	54			2	59				
3:15	7	50			7	61				
3:30	11	61			2	59				
3:45	12	88	34	253	6	86	17	265	51	518
4:00	26	52			6	84				
4:15	25	72			8	84				
4:30	16	51			10	75				
4:45	24	73	91	248	9	64	33	307	124	555
5:00	31	40			14	71				
5:15	26	55			15	114				
5:30	36	39			19	62				
5:45	41	41	134	175	22	60	70	307	204	482
6:00	63	27			37	60				
6:15	54	33			32	39				
6:30	76	15			51	32				
6:45	72	22	265	97	50	27	170	158	435	255
7:00	105	22			67	24				
7:15	95	12			57	25				
7:30	108	15			47	14				
7:45	100	12	408	61	51	16	222	79	630	140
8:00	114	12			78	18				
8:15	94	10			67	17				
8:30	83	10			59	14				
8:45	66	9	357	41	42	8	246	57	603	98
9:00	71	8			51	6				
9:15	60	3			55	15				
9:30	52	9			48	14				
9:45	62	3	245	23	58	9	212	44	457	67
10:00	67	9			44	7				
10:15	56	5			37	13				
10:30	64	5			60	4				
10:45	59	6	246	25	40	3	181	27	427	52
11:00	31	1			42	0				
11:15	45	5			33	8				
11:30	51	3			56	2				
11:45	48	1	175	10	62	1	193	11	368	21
Total	2002	1715	2002	1715	1400	1922	1400	1922	3402	3637
Combined Total	3717		3717		3322		3322		7039	
AM Peak	7:15 AM				7:45 AM					
Vol.	417				255					
P.H.F.	0.914				0.817					
PM Peak		12:15 PM				3:45 PM				
Vol.		287				329				
P.H.F.		0.897				0.956				
Percentage	53.9%	46.1%			42.1%	57.9%				

Volumes for: Tuesday, January 08, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of the Refinery Entrance.

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			9	82				
12:15	0	0			12	76				
12:30	0	0			2	70				
12:45	0	0	0	0	9	82	32	310	32	310
1:00	0	0			3	74				
1:15	0	0			18	71				
1:30	0	0			6	50				
1:45	0	0	0	0	5	79	32	274	32	274
2:00	0	0			3	57				
2:15	0	0			1	78				
2:30	0	0			12	62				
2:45	0	0	0	0	3	98	19	295	19	295
3:00	0	0			3	68				
3:15	0	0			9	85				
3:30	0	0			8	76				
3:45	0	0	0	0	15	107	35	336	35	336
4:00	0	0			7	90				
4:15	0	0			12	86				
4:30	0	0			23	91				
4:45	0	0	0	0	15	149	57	416	57	416
5:00	0	0			24	77				
5:15	0	0			30	169				
5:30	0	0			34	89				
5:45	0	0	0	0	33	80	121	415	121	415
6:00	0	0			58	74				
6:15	0	0			43	54				
6:30	0	0			61	38				
6:45	0	0	0	0	65	35	227	201	227	201
7:00	0	0			70	28				
7:15	0	0			68	25				
7:30	0	0			55	15				
7:45	0	0	0	0	70	22	263	90	263	90
8:00	0	0			86	25				
8:15	0	0			78	23				
8:30	0	0			73	18				
8:45	0	0	0	0	51	13	288	79	288	79
9:00	0	0			63	7				
9:15	0	0			65	18				
9:30	0	0			57	18				
9:45	0	0	0	0	74	13	259	56	259	56
10:00	0	0			59	7				
10:15	0	0			49	16				
10:30	0	0			82	7				
10:45	0	0	0	0	51	3	241	33	241	33
11:00	0	0			67	0				
11:15	0	0			48	9				
11:30	0	0			74	2				
11:45	0	0	0	0	68	1	257	12	257	12
Total	0	0	0	0	1831	2517	1831	2517	1831	2517
Combined Total	0		0		4348		4348		4348	
AM Peak					7:45 AM					
Vol.					307					
P.H.F.					0.892					
PM Peak						4:30 PM				
Vol.						486				
P.H.F.						0.719				
Percentage					42.1%	57.9%				

Prepared by NDS/ATD

Volumes for: Wednesday, January 09, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of Refinery Entrance (Day 3).

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	3	75			0	58				
12:15	4	63			6	59				
12:30	5	62			8	55				
12:45	7	78	19	278	4	54	18	226	37	504
1:00	9	64			5	54				
1:15	2	75			13	53				
1:30	4	60			8	46				
1:45	2	60	17	259	7	42	33	195	50	454
2:00	2	60			0	24				
2:15	2	65			2	36				
2:30	2	70			0	55				
2:45	7	54	13	249	0	75	2	190	15	439
3:00	5	59			4	59				
3:15	3	59			8	58				
3:30	9	57			2	60				
3:45	10	77	27	252	5	74	19	251	46	503
4:00	23	61			2	78				
4:15	20	56			9	94				
4:30	15	59			6	66				
4:45	30	77	88	253	7	67	24	305	112	558
5:00	36	49			10	70				
5:15	20	50			17	80				
5:30	31	27			14	71				
5:45	42	79	129	205	16	79	57	300	186	505
6:00	77	92			36	39				
6:15	64	66			32	41				
6:30	70	24			48	27				
6:45	69	20	280	202	60	29	176	136	456	338
7:00	109	21			72	22				
7:15	105	19			46	21				
7:30	113	12			47	17				
7:45	102	16	429	68	71	12	236	72	665	140
8:00	110	15			87	8				
8:15	110	6			62	16				
8:30	76	9			49	9				
8:45	83	7	379	37	59	7	257	40	636	77
9:00	57	6			53	6				
9:15	78	9			59	9				
9:30	55	4			47	9				
9:45	50	2	240	21	49	10	208	34	448	55
10:00	53	9			53	2				
10:15	54	9			50	7				
10:30	41	6			41	3				
10:45	51	3	199	27	41	5	185	17	384	44
11:00	47	5			38	5				
11:15	47	1			55	6				
11:30	51	2			49	7				
11:45	60	5	205	13	60	4	202	22	407	35
Total	2025	1864	2025	1864	1417	1788	1417	1788	3442	3652
Combined Total	3889		3889		3205		3205		7094	
AM Peak	7:30 AM				7:45 AM					
Vol.	435				269					
P.H.F.	0.962				0.773					
PM Peak		12:30 PM				3:45 PM				
Vol.		279				312				
P.H.F.		0.894				0.830				
Percentage	52.1%	47.9%			44.2%	55.8%				

Prepared by NDS/ATD

Volumes for: Wednesday, January 09, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of the Refinery Entrance.

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			0	82				
12:15	0	0			8	79				
12:30	0	0			10	93				
12:45	0	0	0	0	4	72	22	326	22	326
1:00	0	0			5	72				
1:15	0	0			14	68				
1:30	0	0			10	62				
1:45	0	0	0	0	9	82	38	284	38	284
2:00	0	0			1	49				
2:15	0	0			3	77				
2:30	0	0			3	71				
2:45	0	0	0	0	1	94	8	291	8	291
3:00	0	0			5	75				
3:15	0	0			10	81				
3:30	0	0			6	82				
3:45	0	0	0	0	10	118	31	356	31	356
4:00	0	0			6	92				
4:15	0	0			10	119				
4:30	0	0			10	100				
4:45	0	0	0	0	14	176	40	487	40	487
5:00	0	0			22	85				
5:15	0	0			24	124				
5:30	0	0			25	77				
5:45	0	0	0	0	30	89	101	375	101	375
6:00	0	0			42	40				
6:15	0	0			50	45				
6:30	0	0			59	31				
6:45	0	0	0	0	77	37	228	153	228	153
7:00	0	0			75	23				
7:15	0	0			53	26				
7:30	0	0			55	31				
7:45	0	0	0	0	79	14	262	94	262	94
8:00	0	0			103	11				
8:15	0	0			73	17				
8:30	0	0			62	13				
8:45	0	0	0	0	67	15	305	56	305	56
9:00	0	0			71	9				
9:15	0	0			73	11				
9:30	0	0			64	10				
9:45	0	0	0	0	64	12	272	42	272	42
10:00	0	0			63	4				
10:15	0	0			65	10				
10:30	0	0			56	5				
10:45	0	0	0	0	62	6	246	25	246	25
11:00	0	0			61	13				
11:15	0	0			91	6				
11:30	0	0			64	11				
11:45	0	0	0	0	73	4	289	34	289	34
Total	0	0	0	0	1842	2523	1842	2523	1842	2523
Combined Total	0		0		4365		4365		4365	
AM Peak					11:45 AM					
Vol.					327					
P.H.F.					0.879					
PM Peak						4:00 PM				
Vol.						487				
P.H.F.						0.692				
Percentage					42.2%	57.8%				

Prepared by NDS/ATD

Volumes for: Thursday, January 10, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of Refinery Entrance (Day 4).

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	2	66			4	50				
12:15	9	58			4	62				
12:30	0	42			6	57				
12:45	5	59	16	225	4	47	18	216	34	441
1:00	3	67			3	41				
1:15	2	51			10	51				
1:30	1	76			6	45				
1:45	1	62	7	256	3	58	22	195	29	451
2:00	4	67			1	46				
2:15	1	61			3	41				
2:30	1	75			1	49				
2:45	3	47	9	250	3	70	8	206	17	456
3:00	10	66			4	53				
3:15	9	58			6	63				
3:30	10	64			4	54				
3:45	12	92	41	280	5	96	19	266	60	546
4:00	28	61			5	72				
4:15	22	52			8	107				
4:30	15	52			10	65				
4:45	24	55	89	220	9	113	32	357	121	577
5:00	35	35			13	61				
5:15	20	46			15	84				
5:30	40	33			13	69				
5:45	54	43	149	157	24	79	65	293	214	450
6:00	64	29			34	50				
6:15	69	28			32	41				
6:30	68	34			41	32				
6:45	66	24	267	115	51	36	158	159	425	274
7:00	96	24			71	34				
7:15	106	16			47	22				
7:30	108	14			59	11				
7:45	91	14	401	68	65	12	242	79	643	147
8:00	105	12			80	17				
8:15	95	10			64	14				
8:30	78	5			52	6				
8:45	63	27	341	54	38	8	234	45	575	99
9:00	79	10			59	10				
9:15	62	9			43	5				
9:30	59	11			48	13				
9:45	55	3	255	33	40	8	190	36	445	69
10:00	51	5			49	5				
10:15	52	10			42	11				
10:30	41	7			37	8				
10:45	47	3	191	25	39	5	167	29	358	54
11:00	53	3			43	5				
11:15	50	1			43	7				
11:30	46	5			52	2				
11:45	55	5	204	14	38	2	176	16	380	30
Total	1970	1697	1970	1697	1331	1897	1331	1897	3301	3594
Combined Total	3667		3667		3228		3228		6895	
AM Peak	7:15 AM				7:30 AM					
Vol.	410				268					
P.H.F.	0.949				0.838					
PM Peak		3:00 PM				4:00 PM				
Vol.		280				357				
P.H.F.		0.761				0.790				
Percentage	53.7%	46.3%			41.2%	58.8%				

Prepared by NDS/ATD

Volumes for: Thursday, January 10, 2013 City: Benicia Project #: 13-7021-001

Location: Park Road just west of the Refinery Entrance.

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			9	86				
12:15	0	0			4	77				
12:30	0	0			7	82				
12:45	0	0	0	0	5	67	25	312	25	312
1:00	0	0			5	63				
1:15	0	0			18	64				
1:30	0	0			10	60				
1:45	0	0	0	0	6	93	39	280	39	280
2:00	0	0			1	64				
2:15	0	0			4	56				
2:30	0	0			2	63				
2:45	0	0	0	0	5	94	12	277	12	277
3:00	0	0			7	76				
3:15	0	0			7	82				
3:30	0	0			14	69				
3:45	0	0	0	0	9	113	37	340	37	340
4:00	0	0			7	77				
4:15	0	0			8	120				
4:30	0	0			14	108				
4:45	0	0	0	0	15	141	44	446	44	446
5:00	0	0			20	116				
5:15	0	0			32	151				
5:30	0	0			26	91				
5:45	0	0	0	0	44	105	122	463	122	463
6:00	0	0			51	67				
6:15	0	0			42	43				
6:30	0	0			55	40				
6:45	0	0	0	0	64	43	212	193	212	193
7:00	0	0			90	35				
7:15	0	0			57	25				
7:30	0	0			73	20				
7:45	0	0	0	0	80	18	300	98	300	98
8:00	0	0			85	22				
8:15	0	0			79	20				
8:30	0	0			58	8				
8:45	0	0	0	0	58	13	280	63	280	63
9:00	0	0			66	16				
9:15	0	0			64	7				
9:30	0	0			70	21				
9:45	0	0	0	0	50	10	250	54	250	54
10:00	0	0			61	7				
10:15	0	0			54	13				
10:30	0	0			53	12				
10:45	0	0	0	0	58	5	226	37	226	37
11:00	0	0			57	5				
11:15	0	0			56	7				
11:30	0	0			66	4				
11:45	0	0	0	0	70	2	249	18	249	18
Total	0	0	0	0	1796	2581	1796	2581	1796	2581
Combined Total	0		0		4377		4377		4377	
AM Peak					7:30 AM					
Vol.					317					
P.H.F.					0.932					
PM Peak						4:30 PM				
Vol.						516				
P.H.F.						0.854				
Percentage					41.0%	59.0%				

Prepared by NDS/ATD

Volumes for: Friday, January 11, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of Refinery Entrance (Day 5).

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	7	60			6	55				
12:15	8	55			14	51				
12:30	2	51			5	61				
12:45	5	51	22	217	5	68	30	235	52	452
1:00	1	84			7	58				
1:15	3	72			11	56				
1:30	1	79			3	60				
1:45	3	74	8	309	3	64	24	238	32	547
2:00	4	65			1	56				
2:15	1	68			0	56				
2:30	5	64			4	62				
2:45	7	49	17	246	2	87	7	261	24	507
3:00	8	53			5	59				
3:15	5	63			6	60				
3:30	11	60			7	66				
3:45	16	72	40	248	5	82	23	267	63	515
4:00	27	45			1	70				
4:15	18	43			10	97				
4:30	19	44			8	70				
4:45	27	67	91	199	10	58	29	295	120	494
5:00	38	30			15	59				
5:15	20	34			11	76				
5:30	38	30			16	65				
5:45	37	28	133	122	17	54	59	254	192	376
6:00	84	23			30	38				
6:15	53	15			33	24				
6:30	60	22			32	22				
6:45	82	14	279	74	55	18	150	102	429	176
7:00	89	18			63	27				
7:15	121	15			47	16				
7:30	96	12			54	15				
7:45	103	11	409	56	65	15	229	73	638	129
8:00	107	8			96	14				
8:15	90	13			54	6				
8:30	88	5			65	14				
8:45	71	3	356	29	42	10	257	44	613	73
9:00	69	10			39	2				
9:15	54	12			36	6				
9:30	57	5			46	7				
9:45	36	1	216	28	41	3	162	18	378	46
10:00	30	3			11	10				
10:15	73	6			31	11				
10:30	39	4			41	4				
10:45	41	3	183	16	40	2	123	27	306	43
11:00	44	6			32	5				
11:15	52	1			34	7				
11:30	46	4			45	4				
11:45	73	5	215	16	54	2	165	18	380	34
Total	1969	1560	1969	1560	1258	1832	1258	1832	3227	3392
Combined Total	3529		3529		3090		3090		6619	
AM Peak	7:15 AM				7:45 AM					
Vol.	427				280					
P.H.F.	0.882				0.729					
PM Peak		1:00 PM				3:45 PM				
Vol.		309				319				
P.H.F.		0.920				0.822				
Percentage	55.8%	44.2%			40.7%	59.3%				

Prepared by NDS/ATD

Volumes for: Friday, January 11, 2013 City: Benicia Project #: 13-7021-001

Location: Park Road just west of the Refinery Entrance.

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			8	62				
12:15	0	0			16	68				
12:30	0	0			6	73				
12:45	0	0	0	0	5	79	35	282	35	282
1:00	0	0			11	83				
1:15	0	0			16	74				
1:30	0	0			6	79				
1:45	0	0	0	0	7	85	40	321	40	321
2:00	0	0			1	73				
2:15	0	0			2	71				
2:30	0	0			8	79				
2:45	0	0	0	0	2	103	13	326	13	326
3:00	0	0			10	76				
3:15	0	0			7	74				
3:30	0	0			12	75				
3:45	0	0	0	0	10	104	39	329	39	329
4:00	0	0			3	85				
4:15	0	0			17	123				
4:30	0	0			11	95				
4:45	0	0	0	0	23	138	54	441	54	441
5:00	0	0			22	70				
5:15	0	0			22	103				
5:30	0	0			23	79				
5:45	0	0	0	0	29	69	96	321	96	321
6:00	0	0			46	42				
6:15	0	0			59	31				
6:30	0	0			42	22				
6:45	0	0	0	0	64	22	211	117	211	117
7:00	0	0			71	30				
7:15	0	0			62	20				
7:30	0	0			65	18				
7:45	0	0	0	0	75	17	273	85	273	85
8:00	0	0			105	17				
8:15	0	0			62	8				
8:30	0	0			79	23				
8:45	0	0	0	0	49	12	295	60	295	60
9:00	0	0			83	2				
9:15	0	0			53	10				
9:30	0	0			70	8				
9:45	0	0	0	0	59	4	265	24	265	24
10:00	0	0			54	12				
10:15	0	0			46	19				
10:30	0	0			58	4				
10:45	0	0	0	0	52	2	210	37	210	37
11:00	0	0			52	7				
11:15	0	0			54	8				
11:30	0	0			56	6				
11:45	0	0	0	0	67	3	229	24	229	24
Total	0	0	0	0	1760	2367	1760	2367	1760	2367
Combined Total	0		0		4127		4127		4127	
AM Peak					7:45 AM					
Vol.					321					
P.H.F.					0.764					
PM Peak						4:00 PM				
Vol.						441				
P.H.F.						0.799				
Percentage					42.6%	57.4%				

Prepared by NDS/ATD

Volumes for: Saturday, January 12, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of Refinery Entrance (Day 6).

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	5	14			1	19				
12:15	5	17			7	25				
12:30	0	15			4	16				
12:45	2	14	12	60	8	22	20	82	32	142
1:00	4	14			2	17				
1:15	5	22			9	11				
1:30	2	18			9	17				
1:45	4	14	15	68	3	19	23	64	38	132
2:00	5	18			3	14				
2:15	0	25			4	26				
2:30	3	24			2	22				
2:45	0	22	8	89	0	17	9	79	17	168
3:00	8	27			3	22				
3:15	0	12			4	27				
3:30	6	14			1	23				
3:45	8	21	22	74	4	20	12	92	34	166
4:00	12	13			6	17				
4:15	8	11			4	19				
4:30	8	6			4	18				
4:45	7	11	35	41	5	15	19	69	54	110
5:00	11	8			5	12				
5:15	9	10			9	17				
5:30	12	5			13	12				
5:45	12	5	44	28	5	7	32	48	76	76
6:00	25	8			7	10				
6:15	21	6			16	6				
6:30	18	4			14	3				
6:45	30	8	94	26	11	4	48	23	142	49
7:00	31	12			2	5				
7:15	26	1			13	12				
7:30	34	10			10	4				
7:45	19	7	110	30	12	2	37	23	147	53
8:00	18	4			18	8				
8:15	11	4			16	2				
8:30	22	3			17	3				
8:45	21	5	72	16	25	2	76	15	148	31
9:00	16	8			22	3				
9:15	12	5			18	4				
9:30	18	1			16	4				
9:45	13	2	59	16	14	0	70	11	129	27
10:00	21	8			18	2				
10:15	17	8			14	6				
10:30	11	4			20	2				
10:45	8	2	57	22	14	2	66	12	123	34
11:00	17	5			17	3				
11:15	15	1			18	3				
11:30	10	3			13	1				
11:45	15	1	57	10	27	4	75	11	132	21
Total	585	480	585	480	487	529	487	529	1072	1009
Combined Total	1065		1065		1016		1016		2081	
AM Peak	6:45 AM				11:45 AM					
Vol.	121				87					
P.H.F.	0.890				0.806					
PM Peak		2:15 PM				3:00 PM				
Vol.		98				92				
P.H.F.		0.907				0.852				
Percentage	54.9%	45.1%			47.9%	52.1%				

Prepared by NDS/ATD

Volumes for: Saturday, January 12, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of the Refinery Entrance.

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			2	25				
12:15	0	0			7	30				
12:30	0	0			7	16				
12:45	0	0	0	0	9	27	25	98	25	98
1:00	0	0			3	19				
1:15	0	0			12	11				
1:30	0	0			11	23				
1:45	0	0	0	0	5	21	31	74	31	74
2:00	0	0			5	20				
2:15	0	0			11	30				
2:30	0	0			4	25				
2:45	0	0	0	0	0	18	20	93	20	93
3:00	0	0			5	26				
3:15	0	0			6	28				
3:30	0	0			2	30				
3:45	0	0	0	0	8	26	21	110	21	110
4:00	0	0			12	17				
4:15	0	0			9	25				
4:30	0	0			10	20				
4:45	0	0	0	0	7	19	38	81	38	81
5:00	0	0			10	13				
5:15	0	0			17	22				
5:30	0	0			14	14				
5:45	0	0	0	0	8	9	49	58	49	58
6:00	0	0			11	11				
6:15	0	0			22	9				
6:30	0	0			18	4				
6:45	0	0	0	0	15	5	66	29	66	29
7:00	0	0			7	6				
7:15	0	0			19	14				
7:30	0	0			13	5				
7:45	0	0	0	0	21	3	60	28	60	28
8:00	0	0			21	9				
8:15	0	0			18	4				
8:30	0	0			22	3				
8:45	0	0	0	0	29	2	90	18	90	18
9:00	0	0			25	3				
9:15	0	0			21	4				
9:30	0	0			17	4				
9:45	0	0	0	0	18	0	81	11	81	11
10:00	0	0			27	4				
10:15	0	0			18	9				
10:30	0	0			20	2				
10:45	0	0	0	0	19	2	84	17	84	17
11:00	0	0			24	5				
11:15	0	0			23	3				
11:30	0	0			15	2				
11:45	0	0	0	0	33	4	95	14	95	14
Total	0	0	0	0	660	631	660	631	660	631
Combined Total	0		0		1291		1291		1291	
AM Peak					11:45 AM					
Vol.					104					
P.H.F.					0.788					
PM Peak						3:00 PM				
Vol.						110				
P.H.F.						0.917				
Percentage					51.1%	48.9%				

Prepared by NDS/ATD

Volumes for: Sunday, January 13, 2013 City: Benicia Project #: 13-7021-001
Location: Park Road just west of Refinery Entrance (Day 7).

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	5	12			2	10				
12:15	3	9			8	5				
12:30	4	10			0	5				
12:45	1	11	13	42	2	23	12	43	25	85
1:00	1	7			4	5				
1:15	3	5			3	5				
1:30	0	9			1	7				
1:45	1	7	5	28	0	3	8	20	13	48
2:00	2	12			1	10				
2:15	0	13			2	9				
2:30	1	8			0	13				
2:45	1	12	4	45	1	8	4	40	8	85
3:00	1	8			1	9				
3:15	1	6			2	10				
3:30	4	11			2	11				
3:45	5	11	11	36	1	10	6	40	17	76
4:00	11	9			2	8				
4:15	7	5			5	10				
4:30	0	12			1	14				
4:45	4	11	22	37	5	7	13	39	35	76
5:00	2	7			3	10				
5:15	5	13			3	11				
5:30	5	8			5	12				
5:45	5	7	17	35	3	9	14	42	31	77
6:00	9	8			1	4				
6:15	6	9			1	3				
6:30	5	12			4	6				
6:45	8	6	28	35	3	4	9	17	37	52
7:00	7	2			5	4				
7:15	8	7			4	6				
7:30	2	6			4	4				
7:45	5	5	22	20	5	6	18	20	40	40
8:00	12	4			5	2				
8:15	13	3			10	3				
8:30	7	4			5	2				
8:45	4	4	36	15	3	12	23	19	59	34
9:00	3	3			4	4				
9:15	10	8			3	4				
9:30	5	1			5	2				
9:45	5	6	23	18	6	4	18	14	41	32
10:00	4	4			4	1				
10:15	7	2			3	7				
10:30	4	2			8	6				
10:45	4	0	19	8	6	1	21	15	40	23
11:00	6	1			4	2				
11:15	5	4			4	2				
11:30	8	2			11	1				
11:45	12	4	31	11	5	2	24	7	55	18
Total	231	330	231	330	170	316	170	316	401	646
Combined Total	561		561		486		486		1047	
AM Peak	11:45 AM				11:30 AM					
Vol.	43				31					
P.H.F.	0.896				0.705					
PM Peak		2:00 PM				12:00 PM				
Vol.		45				43				
P.H.F.		0.865				0.467				
Percentage	41.2%	58.8%			35.0%	65.0%				

Prepared by NDS/ATD

Volumes for: Sunday, January 13, 2013 City: Benicia Project #: 13-7021-001

Location: Park Road just west of the Refinery Entrance.

Start	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	0			2	11				
12:15	0	0			10	7				
12:30	0	0			0	16				
12:45	0	0	0	0	2	25	14	59	14	59
1:00	0	0			4	9				
1:15	0	0			3	5				
1:30	0	0			5	10				
1:45	0	0	0	0	0	10	12	34	12	34
2:00	0	0			2	13				
2:15	0	0			3	16				
2:30	0	0			0	13				
2:45	0	0	0	0	1	8	6	50	6	50
3:00	0	0			1	14				
3:15	0	0			2	11				
3:30	0	0			2	13				
3:45	0	0	0	0	1	18	6	56	6	56
4:00	0	0			4	12				
4:15	0	0			8	11				
4:30	0	0			5	18				
4:45	0	0	0	0	8	14	25	55	25	55
5:00	0	0			6	13				
5:15	0	0			5	17				
5:30	0	0			5	15				
5:45	0	0	0	0	3	10	19	55	19	55
6:00	0	0			1	6				
6:15	0	0			2	4				
6:30	0	0			7	7				
6:45	0	0	0	0	4	6	14	23	14	23
7:00	0	0			7	7				
7:15	0	0			4	8				
7:30	0	0			7	7				
7:45	0	0	0	0	6	6	24	28	24	28
8:00	0	0			7	4				
8:15	0	0			13	3				
8:30	0	0			5	9				
8:45	0	0	0	0	3	15	28	31	28	31
9:00	0	0			10	4				
9:15	0	0			3	6				
9:30	0	0			7	3				
9:45	0	0	0	0	9	7	29	20	29	20
10:00	0	0			4	2				
10:15	0	0			4	9				
10:30	0	0			9	6				
10:45	0	0	0	0	9	4	26	21	26	21
11:00	0	0			10	2				
11:15	0	0			4	2				
11:30	0	0			12	1				
11:45	0	0	0	0	6	2	32	7	32	7
Total	0	0	0	0	235	439	235	439	235	439
Combined Total	0		0		674		674		674	
AM Peak					11:45 AM					
Vol.					40					
P.H.F.					0.625					
PM Peak						4:30 PM				
Vol.						62				
P.H.F.						0.861				
Percentage					34.9%	65.1%				

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-003 Bayshore-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Unshifted

	Bayshore Road Southbound				Park Road Westbound				Bayshore Road Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	3	2	0	5	36	1	4	41	4	2	58	64	2	0	0	2	112
06:15	1	1	0	2	41	7	6	54	1	3	66	70	0	2	0	2	128
06:30	1	3	0	4	43	6	12	61	5	8	77	90	0	3	0	3	158
06:45	1	3	0	4	46	11	23	80	10	14	99	123	0	8	1	9	216
Total	6	9	0	15	166	25	45	236	20	27	300	347	2	13	1	16	614
07:00	1	2	4	7	39	5	6	50	5	5	101	111	3	2	0	5	173
07:15	4	6	1	11	32	5	15	52	7	8	104	119	2	3	2	7	189
07:30	6	1	2	9	49	9	24	82	2	5	77	84	0	3	2	5	180
07:45	5	3	1	9	62	15	18	95	11	9	104	124	2	6	2	10	238
Total	16	12	8	36	182	34	63	279	25	27	386	438	7	14	6	27	780
08:00	7	2	0	9	44	11	6	61	8	4	83	95	0	7	6	13	178
08:15	8	3	1	12	47	2	9	58	3	1	67	71	1	3	1	5	146
08:30	5	2	4	11	49	4	9	62	10	5	69	84	0	4	1	5	162
08:45	4	2	0	6	44	7	7	58	3	3	60	66	2	4	0	6	136
Total	24	9	5	38	184	24	31	239	24	13	279	316	3	18	8	29	622
Grand Total	46	30	13	89	532	83	139	754	69	67	965	1101	12	45	15	72	2016
Apprch %	51.7	33.7	14.6		70.6	11	18.4		6.3	6.1	87.6		16.7	62.5	20.8		
Total %	2.3	1.5	0.6	4.4	26.4	4.1	6.9	37.4	3.4	3.3	47.9	54.6	0.6	2.2	0.7	3.6	

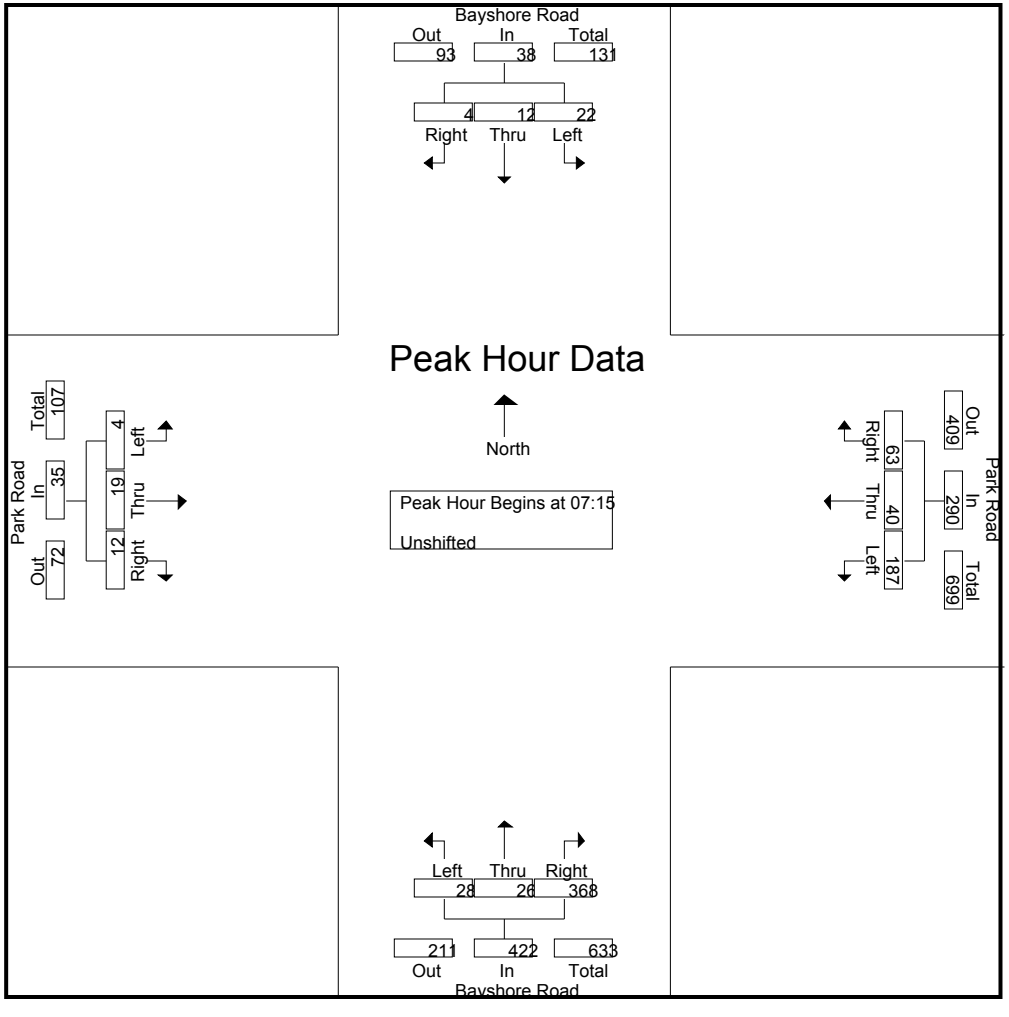
	Bayshore Road Southbound				Park Road Westbound				Bayshore Road Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15																	
07:15	4	**6**	1	**11**	32	5	15	52	7	8	**104**	119	**2**	3	2	7	189
07:30	6	1	**2**	9	49	9	**24**	82	2	5	77	84	0	3	2	5	180
07:45	5	3	1	9	**62**	**15**	18	**95**	**11**	**9**	104	**124**	2	6	2	10	**238**
08:00	**7**	2	0	9	44	11	6	61	8	4	83	95	0	**7**	**6**	**13**	178
Total Volume	22	12	4	38	187	40	63	290	28	26	368	422	4	19	12	35	785
% App. Total	57.9	31.6	10.5		64.5	13.8	21.7		6.6	6.2	87.2		11.4	54.3	34.3		
PHF	.786	.500	.500	.864	.754	.667	.656	.763	.636	.722	.885	.851	.500	.679	.500	.673	.825

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-003 Bayshore-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-003 Bayshore-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Bank 1

	Bayshore Road Southbound				Park Road Westbound				Bayshore Road Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	0	1	0	1	13	0	1	14	0	0	7	7	0	0	0	0	22
06:15	1	0	0	1	11	0	3	14	0	0	10	10	0	0	0	0	25
06:30	0	3	0	3	11	0	2	13	0	1	8	9	0	1	0	1	26
06:45	1	1	0	2	12	0	1	13	0	1	2	3	0	1	0	1	19
Total	2	5	0	7	47	0	7	54	0	2	27	29	0	2	0	2	92
07:00	0	1	0	1	13	0	1	14	0	1	14	15	0	0	0	0	30
07:15	0	3	0	3	4	0	2	6	0	3	5	8	0	0	0	0	17
07:30	0	1	0	1	7	2	1	10	0	2	4	6	0	0	2	2	19
07:45	2	1	0	3	19	0	0	19	0	1	7	8	0	1	2	3	33
Total	2	6	0	8	43	2	4	49	0	7	30	37	0	1	4	5	99
08:00	1	2	0	3	9	0	1	10	0	2	6	8	0	2	0	2	23
08:15	3	3	0	6	13	0	1	14	1	0	3	4	0	1	0	1	25
08:30	0	2	0	2	18	0	0	18	0	2	12	14	0	0	0	0	34
08:45	0	1	0	1	20	0	1	21	0	2	6	8	0	1	0	1	31
Total	4	8	0	12	60	0	3	63	1	6	27	34	0	4	0	4	113
Grand Total	8	19	0	27	150	2	14	166	1	15	84	100	0	7	4	11	304
Apprch %	29.6	70.4	0		90.4	1.2	8.4		1	15	84		0	63.6	36.4		
Total %	2.6	6.2	0	8.9	49.3	0.7	4.6	54.6	0.3	4.9	27.6	32.9	0	2.3	1.3	3.6	

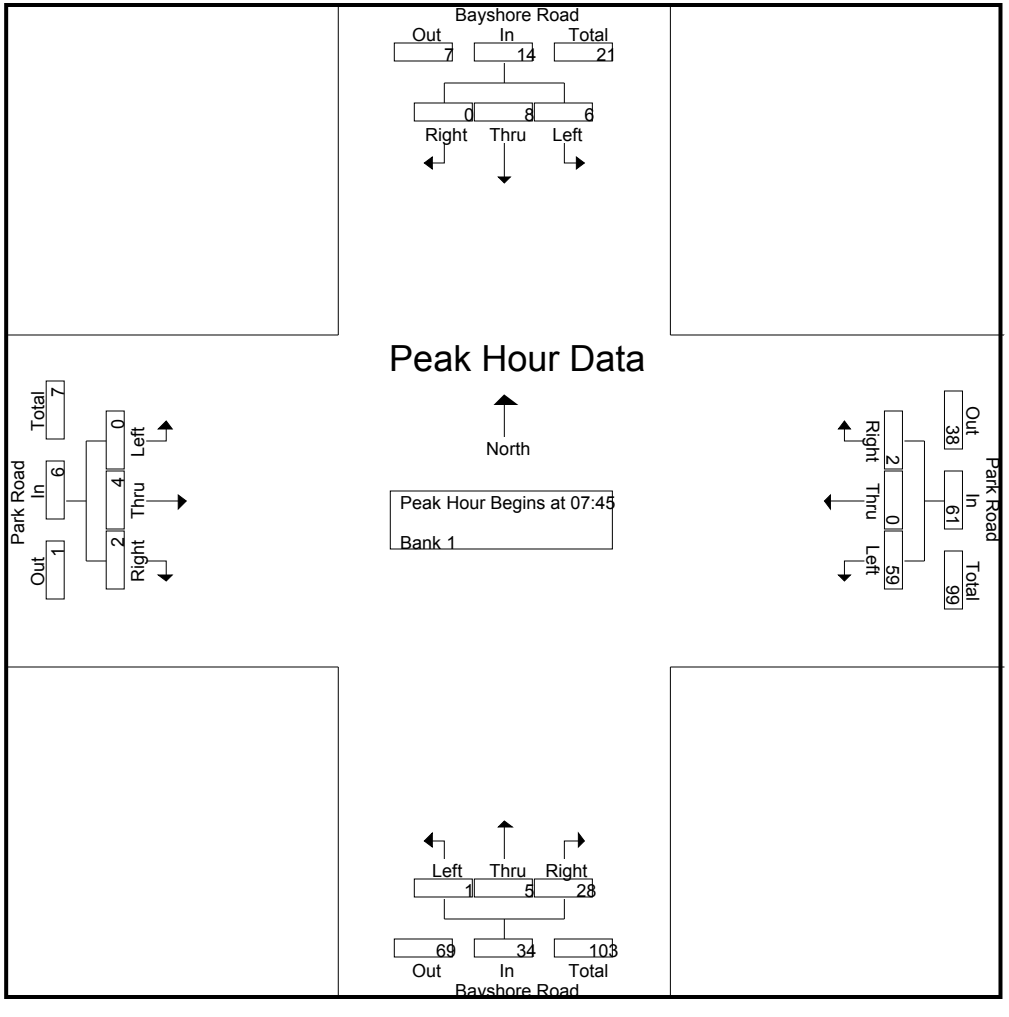
	Bayshore Road Southbound				Park Road Westbound				Bayshore Road Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	2	1	0	3	**19**	0	0	**19**	0	1	7	8	0	1	**2**	**3**	33
08:00	1	2	0	3	9	0	**1**	10	0	**2**	6	8	0	**2**	0	2	23
08:15	**3**	**3**	0	**6**	13	0	1	14	**1**	0	3	4	0	1	0	1	25
08:30	0	2	0	2	18	0	0	18	0	2	**12**	**14**	0	0	0	0	**34**
Total Volume	6	8	0	14	59	0	2	61	1	5	28	34	0	4	2	6	115
% App. Total	42.9	57.1	0		96.7	0	3.3		2.9	14.7	82.4		0	66.7	33.3		
PHF	.500	.667	.000	.583	.776	.000	.500	.803	.250	.625	.583	.607	.000	.500	.250	.500	.846

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-003 Bayshore-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-002 Bayshore-I 680 SB On Ramp
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Unshifted

	Bayshore Road Southbound				Driveway Westbound				Bayshore Road Northbound				I-680 SB On-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	0	9	30	39	0	0	0	0	2	64	0	66	0	0	0	0	105
06:15	0	8	33	41	0	0	0	0	3	70	0	73	0	0	0	0	114
06:30	0	11	36	47	0	0	0	0	3	93	0	96	0	0	0	0	143
06:45	0	9	39	48	0	0	0	0	2	126	0	128	0	0	0	0	176
Total	0	37	138	175	0	0	0	0	10	353	0	363	0	0	0	0	538
07:00	0	10	33	43	0	0	0	0	5	107	0	112	0	0	0	0	155
07:15	0	5	36	41	0	0	0	0	4	122	0	126	0	0	0	0	167
07:30	0	2	50	52	0	0	0	0	3	85	0	88	0	0	0	0	140
07:45	0	19	51	70	0	0	1	1	7	125	0	132	0	0	0	0	203
Total	0	36	170	206	0	0	1	1	19	439	0	458	0	0	0	0	665
08:00	0	4	47	51	2	1	0	3	8	97	2	107	0	0	0	0	161
08:15	0	2	49	51	1	0	0	1	4	73	1	78	0	0	0	0	130
08:30	1	9	43	53	0	0	0	0	4	82	2	88	0	0	0	0	141
08:45	0	4	43	47	0	0	1	1	5	66	1	72	0	0	0	0	120
Total	1	19	182	202	3	1	1	5	21	318	6	345	0	0	0	0	552
Grand Total	1	92	490	583	3	1	2	6	50	1110	6	1166	0	0	0	0	1755
Apprch %	0.2	15.8	84		50	16.7	33.3		4.3	95.2	0.5		0	0	0		
Total %	0.1	5.2	27.9	33.2	0.2	0.1	0.1	0.3	2.8	63.2	0.3	66.4	0	0	0	0	

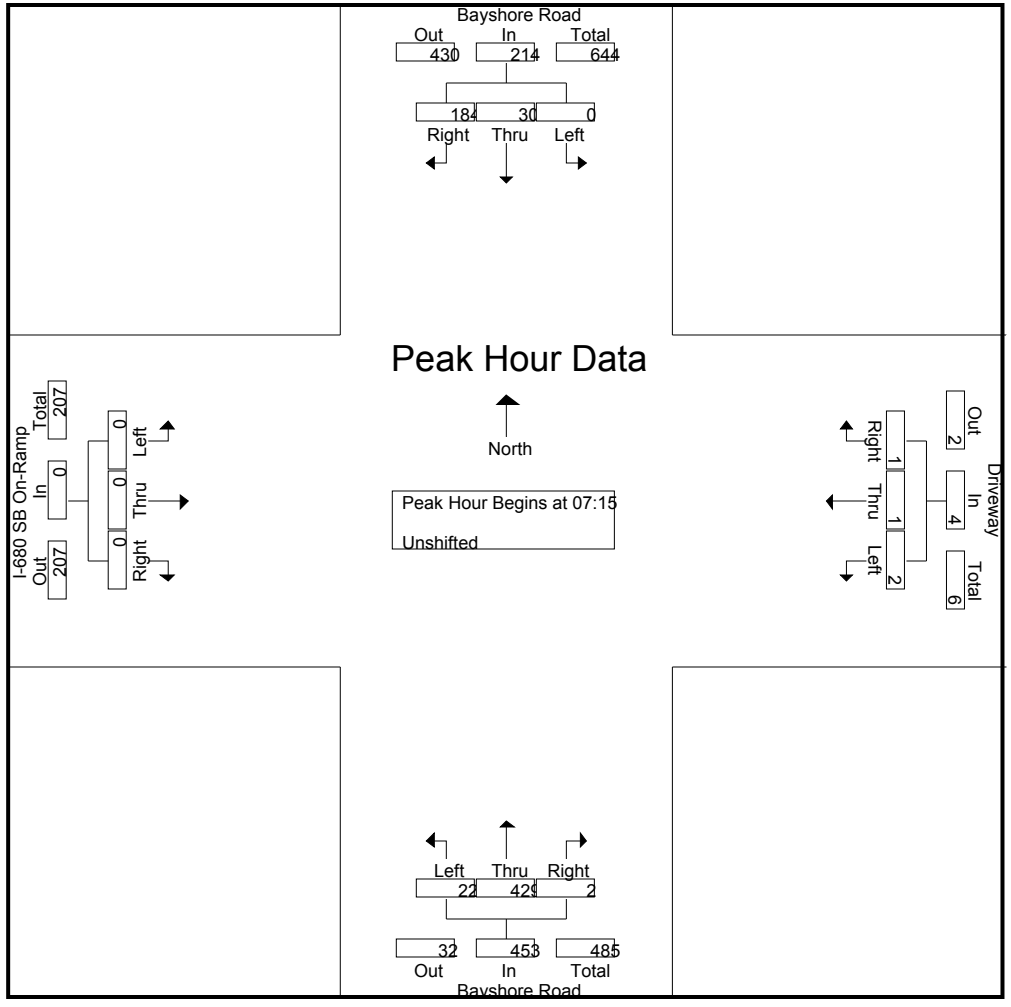
	Bayshore Road Southbound				Driveway Westbound				Bayshore Road Northbound				I-680 SB On-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15																	
07:15	0	5	36	41	0	0	0	0	4	122	0	126	0	0	0	0	167
07:30	0	2	50	52	0	0	0	0	3	85	0	88	0	0	0	0	140
07:45	0	**19**	**51**	**70**	0	0	**1**	1	7	**125**	0	**132**	0	0	0	0	**203**
08:00	0	4	47	51	**2**	**1**	0	**3**	**8**	97	**2**	107	0	0	0	0	161
Total Volume	0	30	184	214	2	1	1	4	22	429	2	453	0	0	0	0	671
% App. Total	0	14	86		50	25	25		4.9	94.7	0.4		0	0	0		
PHF	.000	.395	.902	.764	.250	.250	.250	.333	.688	.858	.250	.858	.000	.000	.000	.000	.826

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-002 Bayshore-I 680 SB On Ramp
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-002 Bayshore-I 680 SB On Ramp
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Bank 1

	Bayshore Road Southbound				Driveway Westbound				Bayshore Road Northbound				I-680 SB On-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	0	1	13	14	0	0	0	0	0	8	0	8	0	0	0	0	22
06:15	0	1	11	12	0	0	0	0	0	9	0	9	0	0	0	0	21
06:30	0	0	13	13	0	0	0	0	1	9	0	10	0	0	0	0	23
06:45	0	0	14	14	0	0	0	0	1	4	0	5	0	0	0	0	19
Total	0	2	51	53	0	0	0	0	2	30	0	32	0	0	0	0	85
07:00	0	2	12	14	0	0	0	0	3	14	0	17	0	0	0	0	31
07:15	0	0	7	7	0	0	0	0	3	8	0	11	0	0	0	0	18
07:30	0	0	12	12	0	0	0	0	1	7	0	8	0	0	0	0	20
07:45	0	2	19	21	0	0	0	0	0	8	0	8	0	0	0	0	29
Total	0	4	50	54	0	0	0	0	7	37	0	44	0	0	0	0	98
08:00	0	2	10	12	0	0	0	0	1	9	0	10	0	0	0	0	22
08:15	0	0	16	16	0	0	0	0	1	4	0	5	0	0	0	0	21
08:30	0	2	17	19	0	0	0	0	0	15	0	15	0	0	0	0	34
08:45	0	0	22	22	0	0	0	0	0	7	0	7	0	0	0	0	29
Total	0	4	65	69	0	0	0	0	2	35	0	37	0	0	0	0	106
Grand Total	0	10	166	176	0	0	0	0	11	102	0	113	0	0	0	0	289
Apprch %	0	5.7	94.3		0	0	0		9.7	90.3	0		0	0	0		
Total %	0	3.5	57.4	60.9	0	0	0	0	3.8	35.3	0	39.1	0	0	0	0	

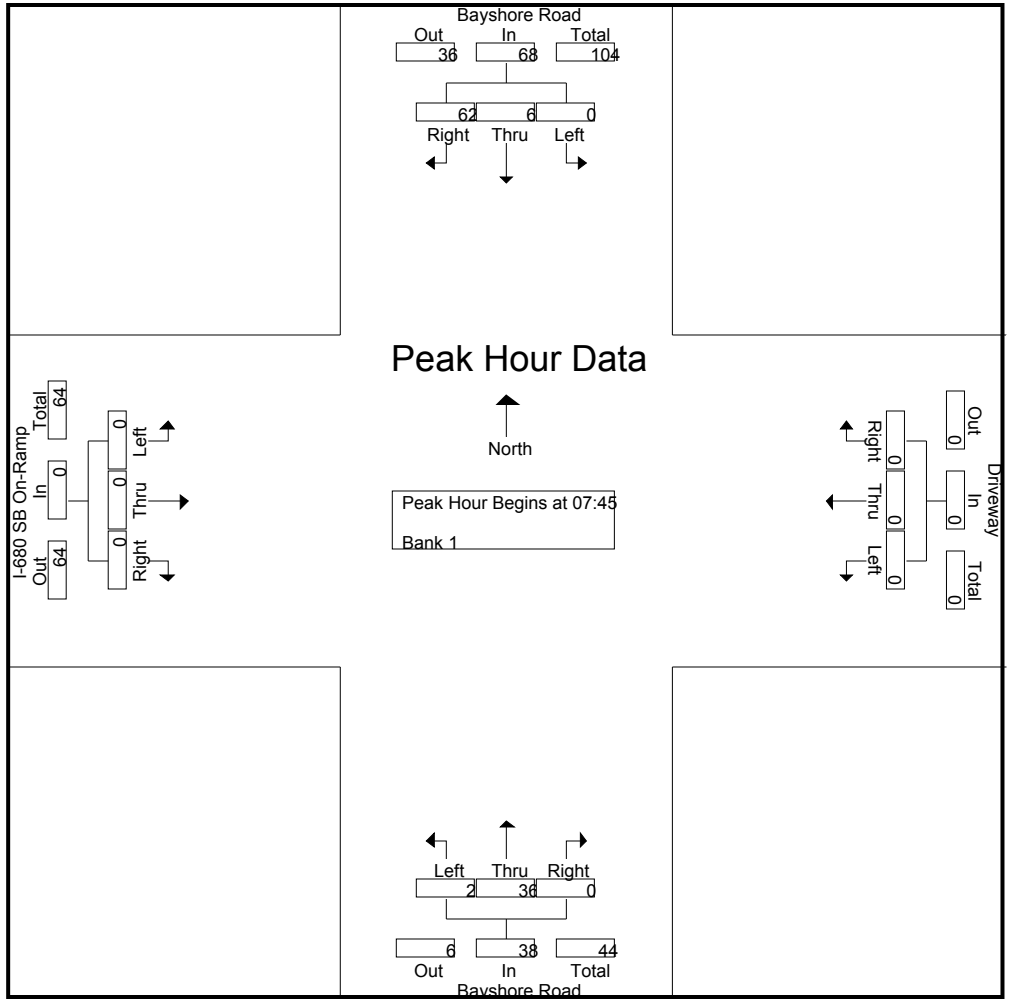
	Bayshore Road Southbound				Driveway Westbound				Bayshore Road Northbound				I-680 SB On-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	0	**2**	**19**	**21**	0	0	0	0	0	8	0	8	0	0	0	0	29
08:00	0	2	10	12	0	0	0	0	**1**	9	0	10	0	0	0	0	22
08:15	0	0	16	16	0	0	0	0	1	4	0	5	0	0	0	0	21
08:30	0	2	17	19	0	0	0	0	0	**15**	0	**15**	0	0	0	0	**34**
Total Volume	0	6	62	68	0	0	0	0	2	36	0	38	0	0	0	0	106
% App. Total	0	8.8	91.2		0	0	0		5.3	94.7	0		0	0	0		
PHF	.000	.750	.816	.810	.000	.000	.000	.000	.500	.600	.000	.633	.000	.000	.000	.000	.779

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-002 Bayshore-I 680 SB On Ramp
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-001 Bayshore-I 680 NB Off Ramp
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Unshifted

	Bayshore Road Southbound				Driveway Westbound				Bayshore Road Northbound				I-680 NB Off-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	0	9	0	9	0	0	0	0	0	3	0	3	65	0	7	72	84
06:15	0	8	0	8	0	0	0	0	0	4	0	4	70	0	9	79	91
06:30	0	10	0	10	0	0	0	0	0	3	0	3	91	0	9	100	113
06:45	0	10	0	10	0	0	0	0	0	3	0	3	128	0	22	150	163
Total	0	37	0	37	0	0	0	0	0	13	0	13	354	0	47	401	451
07:00	0	9	0	9	0	0	0	0	0	6	0	6	103	0	14	117	132
07:15	0	6	0	6	0	0	0	0	0	8	0	8	119	0	11	130	144
07:30	0	3	0	3	0	0	0	0	0	7	0	7	80	1	8	89	99
07:45	0	17	0	17	0	0	0	0	0	8	0	8	125	2	16	143	168
Total	0	35	0	35	0	0	0	0	0	29	0	29	427	3	49	479	543
08:00	1	7	0	8	0	0	0	0	0	12	0	12	94	0	11	105	125
08:15	0	3	0	3	0	0	0	0	0	9	0	9	73	0	7	80	92
08:30	1	8	0	9	0	0	0	0	0	11	0	11	73	1	8	82	102
08:45	0	4	0	4	0	0	0	0	0	8	0	8	64	0	3	67	79
Total	2	22	0	24	0	0	0	0	0	40	0	40	304	1	29	334	398
Grand Total	2	94	0	96	0	0	0	0	0	82	0	82	1085	4	125	1214	1392
Apprch %	2.1	97.9	0		0	0	0		0	100	0		89.4	0.3	10.3		
Total %	0.1	6.8	0	6.9	0	0	0	0	0	5.9	0	5.9	77.9	0.3	9	87.2	

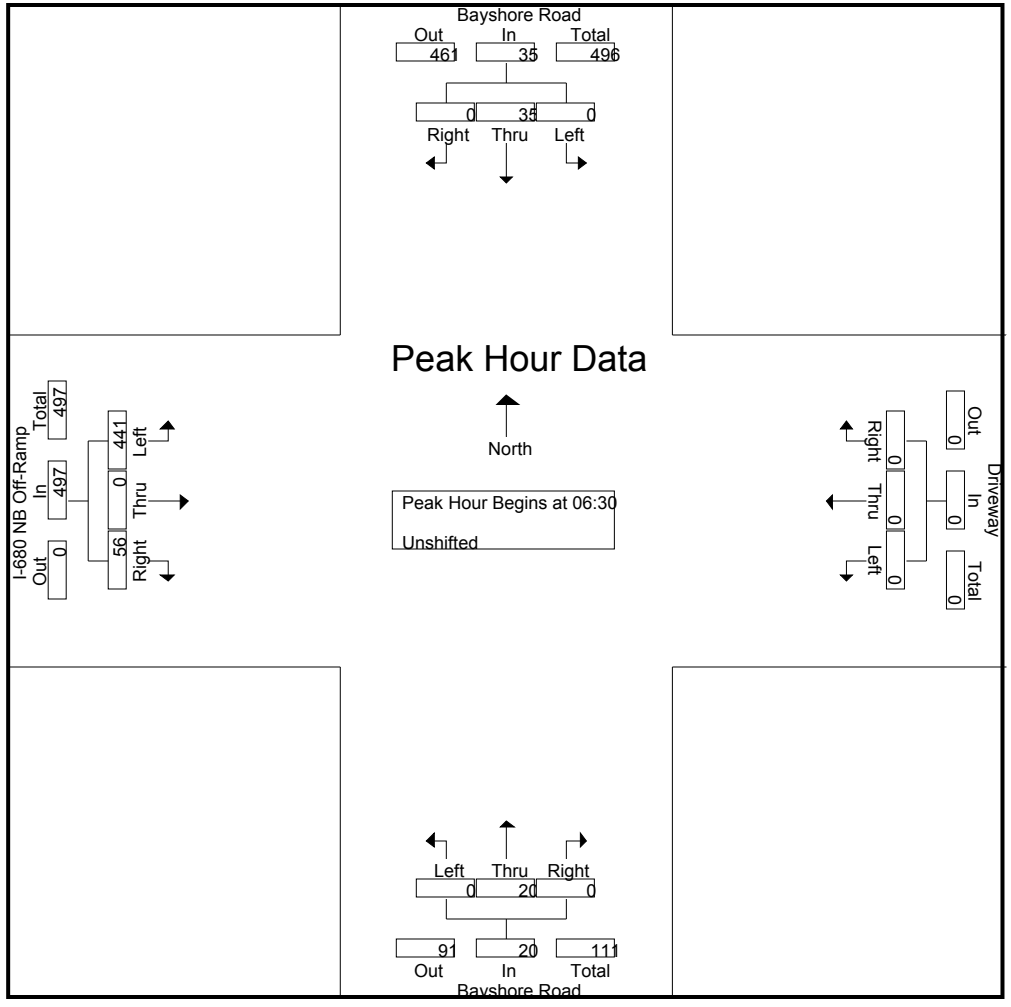
	Bayshore Road Southbound				Driveway Westbound				Bayshore Road Northbound				I-680 NB Off-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:30																	
06:30	0	**10**	0	**10**	0	0	0	0	0	3	0	3	91	0	9	100	113
06:45	0	10	0	10	0	0	0	0	0	3	0	3	**128**	0	**22**	**150**	**163**
07:00	0	9	0	9	0	0	0	0	0	6	0	6	103	0	14	117	132
07:15	0	6	0	6	0	0	0	0	0	**8**	0	**8**	119	0	11	130	144
Total Volume	0	35	0	35	0	0	0	0	0	20	0	20	441	0	56	497	552
% App. Total	0	100	0		0	0	0		0	100	0		88.7	0	11.3		
PHF	.000	.875	.000	.875	.000	.000	.000	.000	.000	.625	.000	.625	.861	.000	.636	.828	.847

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-001 Bayshore-I 680 NB Off Ramp
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-001 Bayshore-I 680 NB Off Ramp
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Bank 1

	Bayshore Road Southbound				Driveway Westbound				Bayshore Road Northbound				I-680 NB Off-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	0	1	0	1	0	0	0	0	0	0	0	0	7	0	0	7	8
06:15	0	1	0	1	0	0	0	0	0	2	0	2	8	0	0	8	11
06:30	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8	8
06:45	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	7	7
Total	0	2	0	2	0	0	0	0	0	2	0	2	30	0	0	30	34
07:00	0	2	0	2	0	0	0	0	0	2	0	2	12	0	0	12	16
07:15	0	0	0	0	0	0	0	0	0	2	0	2	9	0	0	9	11
07:30	0	0	0	0	0	0	0	0	0	1	0	1	8	0	0	8	9
07:45	0	2	0	2	0	0	0	0	0	1	0	1	6	0	0	6	9
Total	0	4	0	4	0	0	0	0	0	6	0	6	35	0	0	35	45
08:00	0	1	0	1	0	0	0	0	0	2	0	2	9	0	1	10	13
08:15	0	1	0	1	0	0	0	0	0	0	0	0	5	0	0	5	6
08:30	0	1	0	1	0	0	0	0	0	2	0	2	11	0	0	11	14
08:45	0	0	0	0	0	0	0	0	0	2	0	2	6	0	0	6	8
Total	0	3	0	3	0	0	0	0	0	6	0	6	31	0	1	32	41
Grand Total	0	9	0	9	0	0	0	0	0	14	0	14	96	0	1	97	120
Apprch %	0	100	0		0	0	0		0	100	0		99	0	1		
Total %	0	7.5	0	7.5	0	0	0	0	0	11.7	0	11.7	80	0	0.8	80.8	

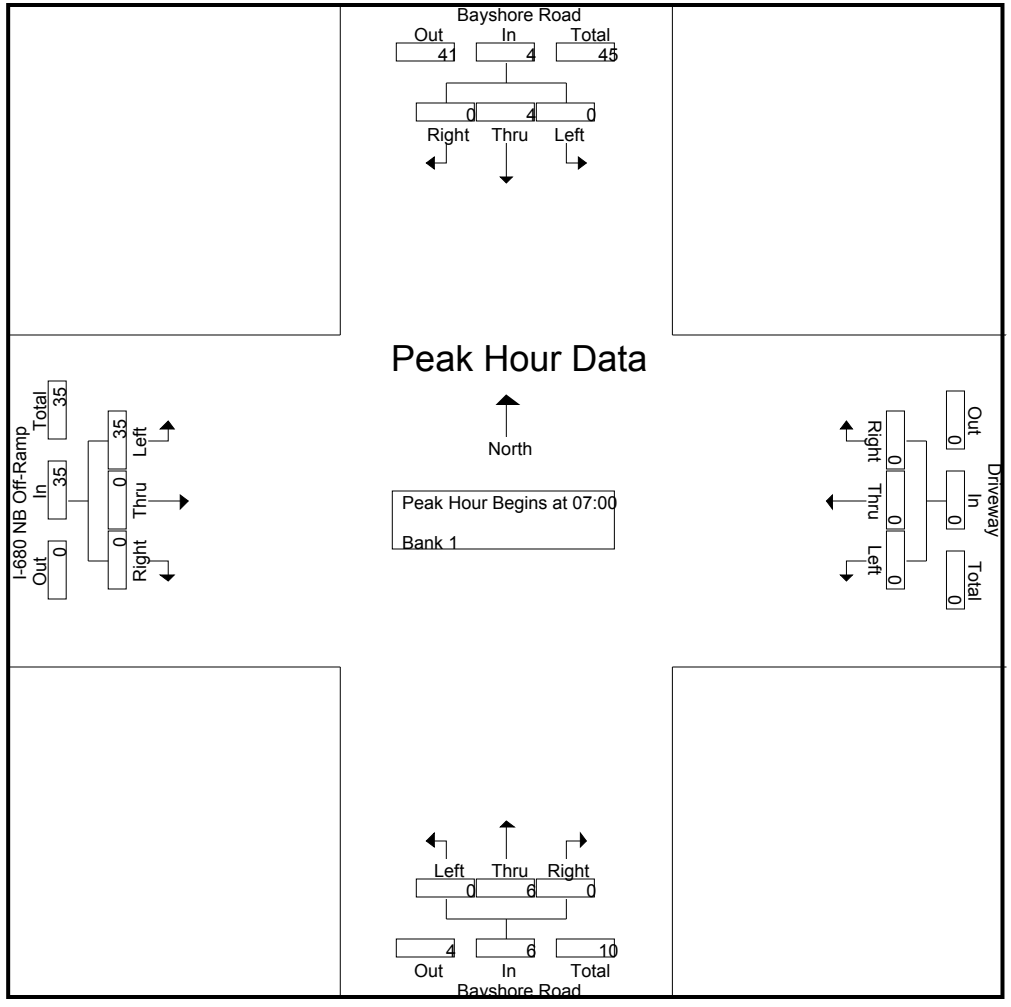
	Bayshore Road Southbound				Driveway Westbound				Bayshore Road Northbound				I-680 NB Off-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00																	
07:00	0	**2**	0	**2**	0	0	0	0	0	**2**	0	**2**	**12**	0	0	**12**	**16**
07:15	0	0	0	0	0	0	0	0	0	2	0	2	9	0	0	9	11
07:30	0	0	0	0	0	0	0	0	0	1	0	1	8	0	0	8	9
07:45	0	2	0	2	0	0	0	0	0	1	0	1	6	0	0	6	9
Total Volume	0	4	0	4	0	0	0	0	0	6	0	6	35	0	0	35	45
% App. Total	0	100	0		0	0	0		0	100	0		100	0	0		
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.000	.750	.000	.750	.729	.000	.000	.729	.703

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-001 Bayshore-I 680 NB Off Ramp
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-004 Bay Vista-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Unshifted

	Southbound				Park Road Westbound				Bay Vista Court Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	0	0	0	0	1	5	0	6	0	0	0	0	0	2	0	2	8
06:15	0	0	0	0	0	8	0	8	0	0	0	0	0	2	0	2	10
06:30	0	0	0	0	4	7	0	11	0	0	0	0	0	3	0	3	14
06:45	0	0	0	0	7	14	0	21	0	0	0	0	0	9	0	9	30
Total	0	0	0	0	12	34	0	46	0	0	0	0	0	16	0	16	62
07:00	0	0	0	0	2	11	0	13	0	0	1	1	0	4	0	4	18
07:15	0	0	0	0	2	10	0	12	0	0	0	0	0	8	0	8	20
07:30	0	0	0	0	0	11	0	11	0	0	0	0	0	4	0	4	15
07:45	0	0	0	0	9	15	0	24	0	0	0	0	0	14	0	14	38
Total	0	0	0	0	13	47	0	60	0	0	1	1	0	30	0	30	91
08:00	0	0	0	0	8	11	0	19	0	0	4	4	0	4	0	4	27
08:15	0	0	0	0	0	6	0	6	0	0	0	0	0	4	0	4	10
08:30	0	0	0	0	7	11	0	18	1	0	0	1	0	4	0	4	23
08:45	0	0	0	0	2	9	0	11	0	0	0	0	0	7	0	7	18
Total	0	0	0	0	17	37	0	54	1	0	4	5	0	19	0	19	78
Grand Total	0	0	0	0	42	118	0	160	1	0	5	6	0	65	0	65	231
Apprch %	0	0	0		26.2	73.8	0		16.7	0	83.3		0	100	0		
Total %	0	0	0	0	18.2	51.1	0	69.3	0.4	0	2.2	2.6	0	28.1	0	28.1	

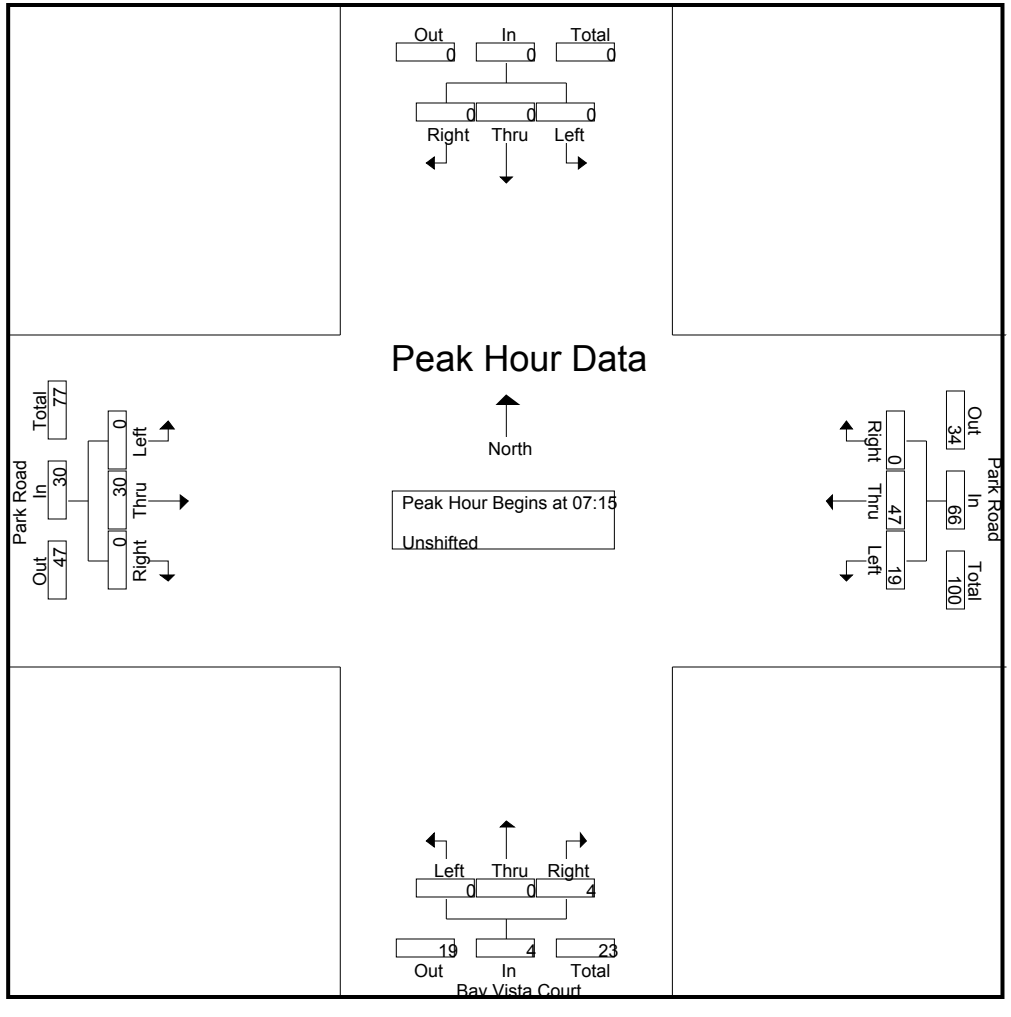
	Southbound				Park Road Westbound				Bay Vista Court Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15																	
07:15	0	0	0	0	2	10	0	12	0	0	0	0	0	8	0	8	20
07:30	0	0	0	0	0	11	0	11	0	0	0	0	0	4	0	4	15
07:45	0	0	0	0	**9**	**15**	0	**24**	0	0	0	0	0	**14**	0	**14**	**38**
08:00	0	0	0	0	8	11	0	19	0	0	**4**	**4**	0	4	0	4	27
Total Volume	0	0	0	0	19	47	0	66	0	0	4	4	0	30	0	30	100
% App. Total	0	0	0		28.8	71.2	0		0	0	100		0	100	0		
PHF	.000	.000	.000	.000	.528	.783	.000	.688	.000	.000	.250	.250	.000	.536	.000	.536	.658

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-004 Bay Vista-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-004 Bay Vista-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Bank 1

	Southbound				Park Road Westbound				Bay Vista Court Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
06:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
07:30	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	2	4
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Total	0	0	0	0	0	2	0	2	0	0	0	0	0	5	0	5	7
08:00	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
08:30	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0	2
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	1	0	1	1	0	1	2	0	2	0	2	5
Grand Total	0	0	0	0	0	3	0	3	1	0	1	2	0	10	0	10	15
Apprch %	0	0	0		0	100	0		50	0	50		0	100	0		
Total %	0	0	0	0	0	20	0	20	6.7	0	6.7	13.3	0	66.7	0	66.7	

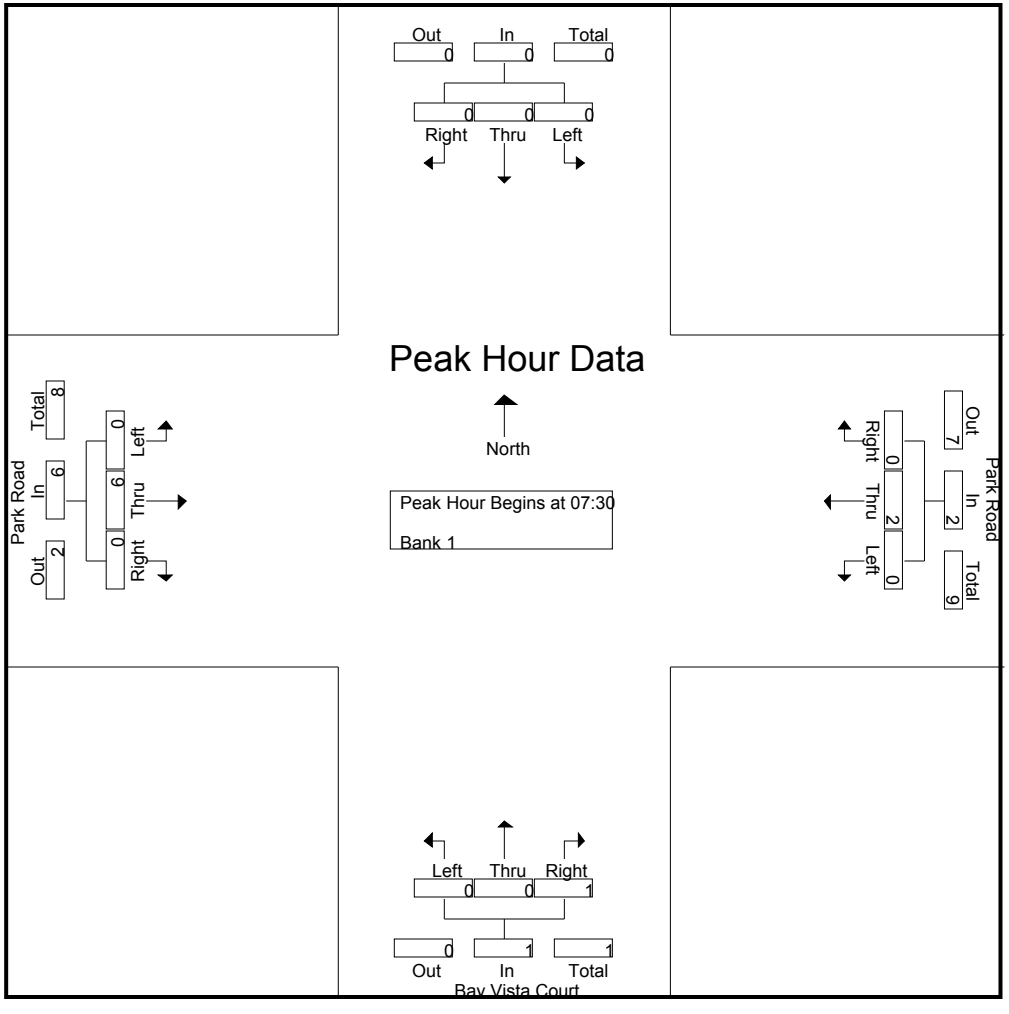
	Southbound				Park Road Westbound				Bay Vista Court Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	0	0	0	0	**2**	0	**2**	0	0	0	0	0	2	0	2	**4**
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	0	**3**	3
08:00	0	0	0	0	0	0	0	0	0	0	**1**	**1**	0	0	0	0	1
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	0	0	0	2	0	2	0	0	1	1	0	6	0	6	9
% App. Total	0	0	0		0	100	0		0	0	100		0	100	0		
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.250	.250	.000	.500	.000	.500	.563

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-004 Bay Vista-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-005 Valero Refinery-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Unshifted

	Valero Refinery Entrance Southbound				Park Road Westbound				Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	1	0	0	1	0	38	1	39	0	0	0	0	5	56	0	61	101
06:15	2	0	0	2	0	51	7	58	0	0	0	0	10	57	0	67	127
06:30	0	0	6	6	0	54	8	62	0	0	0	0	9	75	0	84	152
06:45	0	0	3	3	0	78	4	82	0	0	0	0	2	103	0	105	190
Total	3	0	9	12	0	221	20	241	0	0	0	0	26	291	0	317	570
07:00	0	0	2	2	0	48	8	56	0	0	0	0	12	90	0	102	160
07:15	0	0	5	5	0	45	16	61	0	0	0	0	25	89	0	114	180
07:30	1	0	9	10	0	75	17	92	0	0	0	0	8	80	0	88	190
07:45	0	0	7	7	0	88	3	91	0	0	0	0	0	114	0	114	212
Total	1	0	23	24	0	256	44	300	0	0	0	0	45	373	0	418	742
08:00	0	0	0	0	0	61	0	61	0	0	0	0	0	101	0	101	162
08:15	0	0	1	1	0	58	3	61	0	0	0	0	0	79	0	79	141
08:30	1	0	1	2	0	61	1	62	0	0	0	0	0	81	0	81	145
08:45	0	0	0	0	0	60	1	61	0	0	0	0	0	65	0	65	126
Total	1	0	2	3	0	240	5	245	0	0	0	0	0	326	0	326	574
Grand Total	5	0	34	39	0	717	69	786	0	0	0	0	71	990	0	1061	1886
Apprch %	12.8	0	87.2		0	91.2	8.8		0	0	0		6.7	93.3	0		
Total %	0.3	0	1.8	2.1	0	38	3.7	41.7	0	0	0	0	3.8	52.5	0	56.3	

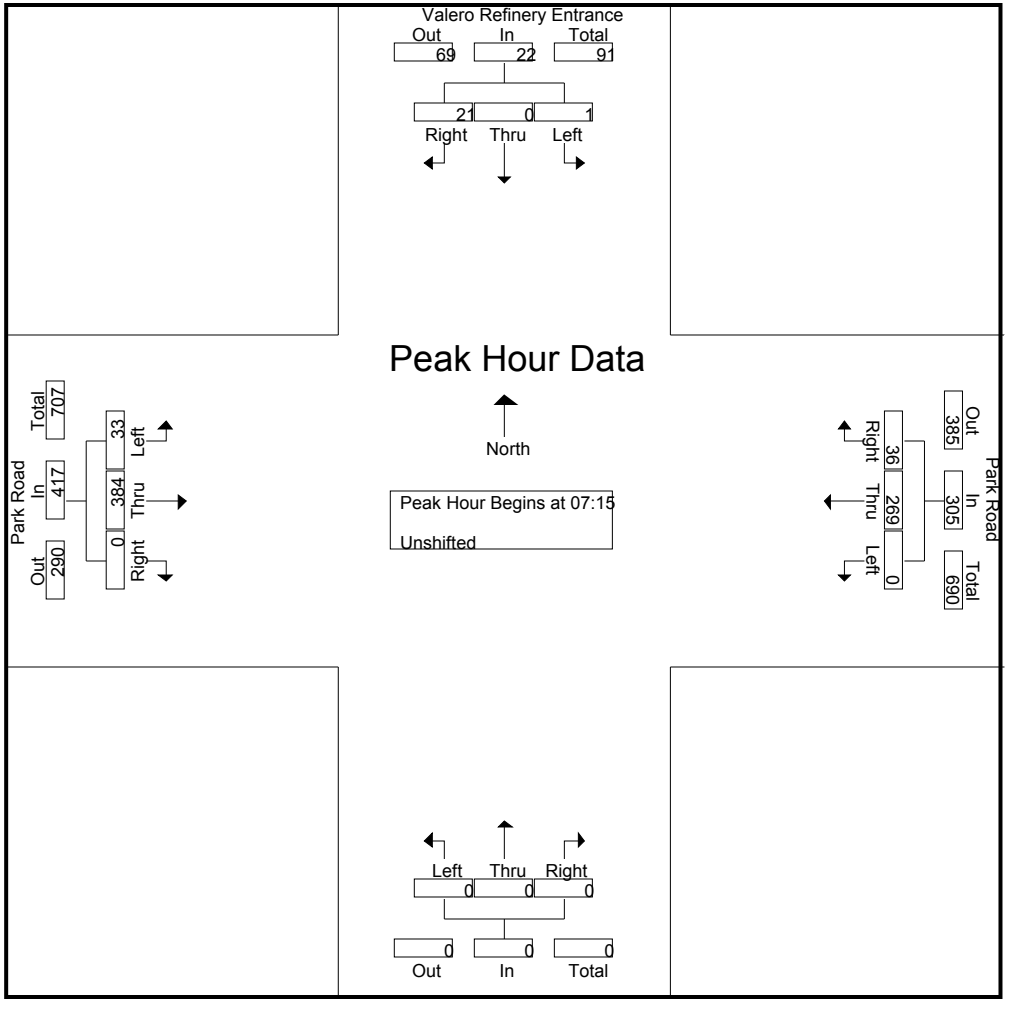
	Valero Refinery Entrance Southbound				Park Road Westbound				Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15																	
07:15	0	0	5	5	0	45	16	61	0	0	0	0	**25**	89	0	**114**	180
07:30	**1**	0	**9**	**10**	0	75	**17**	**92**	0	0	0	0	8	80	0	88	190
07:45	0	0	7	7	0	**88**	3	91	0	0	0	0	0	**114**	0	114	**212**
08:00	0	0	0	0	0	61	0	61	0	0	0	0	0	101	0	101	162
Total Volume	1	0	21	22	0	269	36	305	0	0	0	0	33	384	0	417	744
% App. Total	4.5	0	95.5		0	88.2	11.8		0	0	0		7.9	92.1	0		
PHF	.250	.000	.583	.550	.000	.764	.529	.829	.000	.000	.000	.000	.330	.842	.000	.914	.877

All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-005 Valero Refinery-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2



All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-005 Valero Refinery-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 1

Groups Printed- Bank 1

	Valero Refinery Entrance Southbound				Park Road Westbound				Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00	0	0	0	0	0	14	0	14	0	0	0	0	0	9	0	9	23
06:15	0	0	0	0	0	15	1	16	0	0	0	0	0	10	0	10	26
06:30	0	0	0	0	0	12	0	12	0	0	0	0	0	9	0	9	21
06:45	0	0	0	0	0	13	0	13	0	0	0	0	0	3	0	3	16
Total	0	0	0	0	0	54	1	55	0	0	0	0	0	31	0	31	86
07:00	0	0	0	0	0	14	0	14	0	0	0	0	0	16	0	16	30
07:15	0	0	0	0	0	6	0	6	0	0	0	0	0	5	0	5	11
07:30	0	0	0	0	0	9	0	9	0	0	0	0	0	4	0	4	13
07:45	0	0	0	0	0	18	0	18	0	0	0	0	0	8	0	8	26
Total	0	0	0	0	0	47	0	47	0	0	0	0	0	33	0	33	80
08:00	0	0	0	0	0	11	0	11	0	0	0	0	0	8	0	8	19
08:15	0	0	0	0	0	12	0	12	0	0	0	0	0	4	0	4	16
08:30	0	0	0	0	0	17	1	18	0	0	0	0	0	14	0	14	32
08:45	0	0	0	0	0	23	0	23	0	0	0	0	0	8	0	8	31
Total	0	0	0	0	0	63	1	64	0	0	0	0	0	34	0	34	98
Grand Total	0	0	0	0	0	164	2	166	0	0	0	0	0	98	0	98	264
Apprch %	0	0	0		0	98.8	1.2		0	0	0		0	100	0		
Total %	0	0	0	0	0	62.1	0.8	62.9	0	0	0	0	0	37.1	0	37.1	

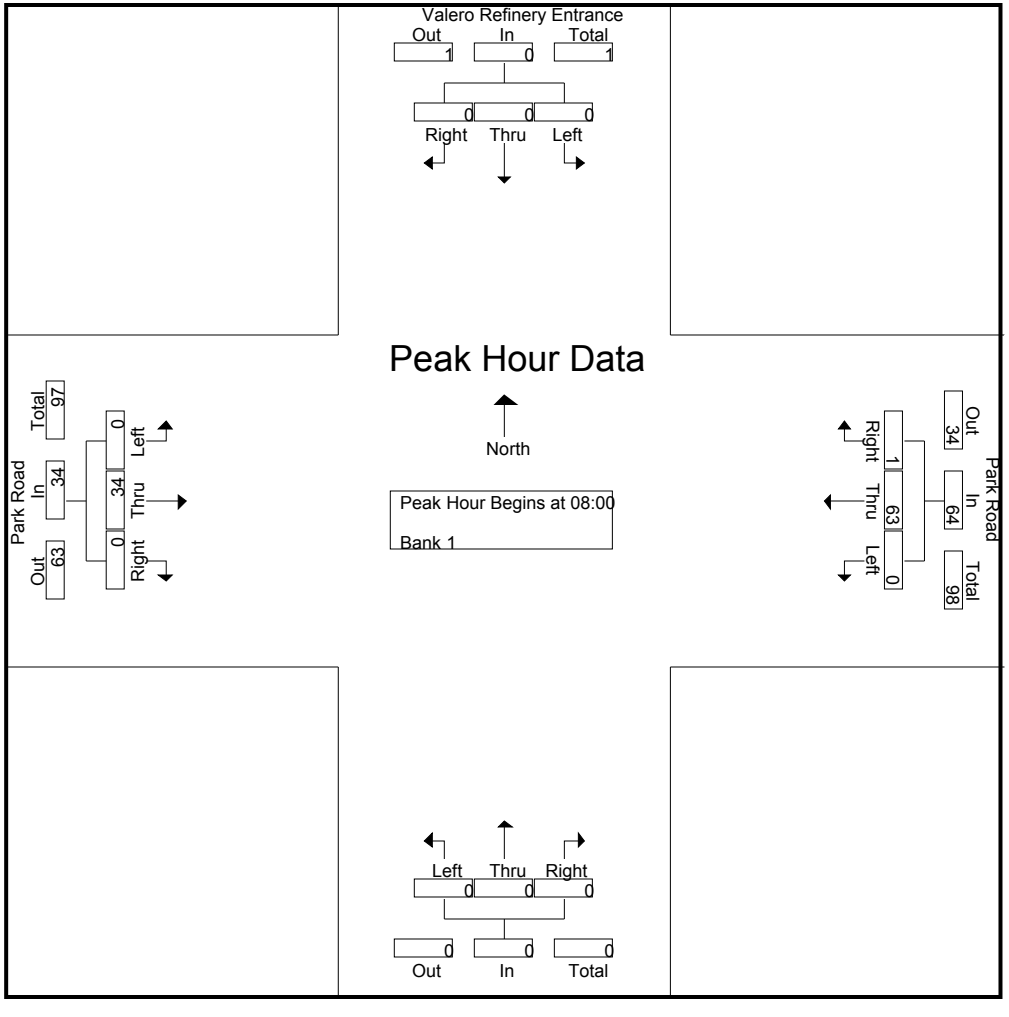
	Valero Refinery Entrance Southbound				Park Road Westbound				Northbound				Park Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	0	0	0	0	11	0	11	0	0	0	0	0	8	0	8	19
08:15	0	0	0	0	0	12	0	12	0	0	0	0	0	4	0	4	16
08:30	0	0	0	0	0	17	**1**	18	0	0	0	0	0	**14**	0	**14**	**32**
08:45	0	0	0	0	0	**23**	0	**23**	0	0	0	0	0	8	0	8	31
Total Volume	0	0	0	0	0	63	1	64	0	0	0	0	0	34	0	34	98
% App. Total	0	0	0		0	98.4	1.6		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.685	.250	.696	.000	.000	.000	.000	.000	.607	.000	.607	.766

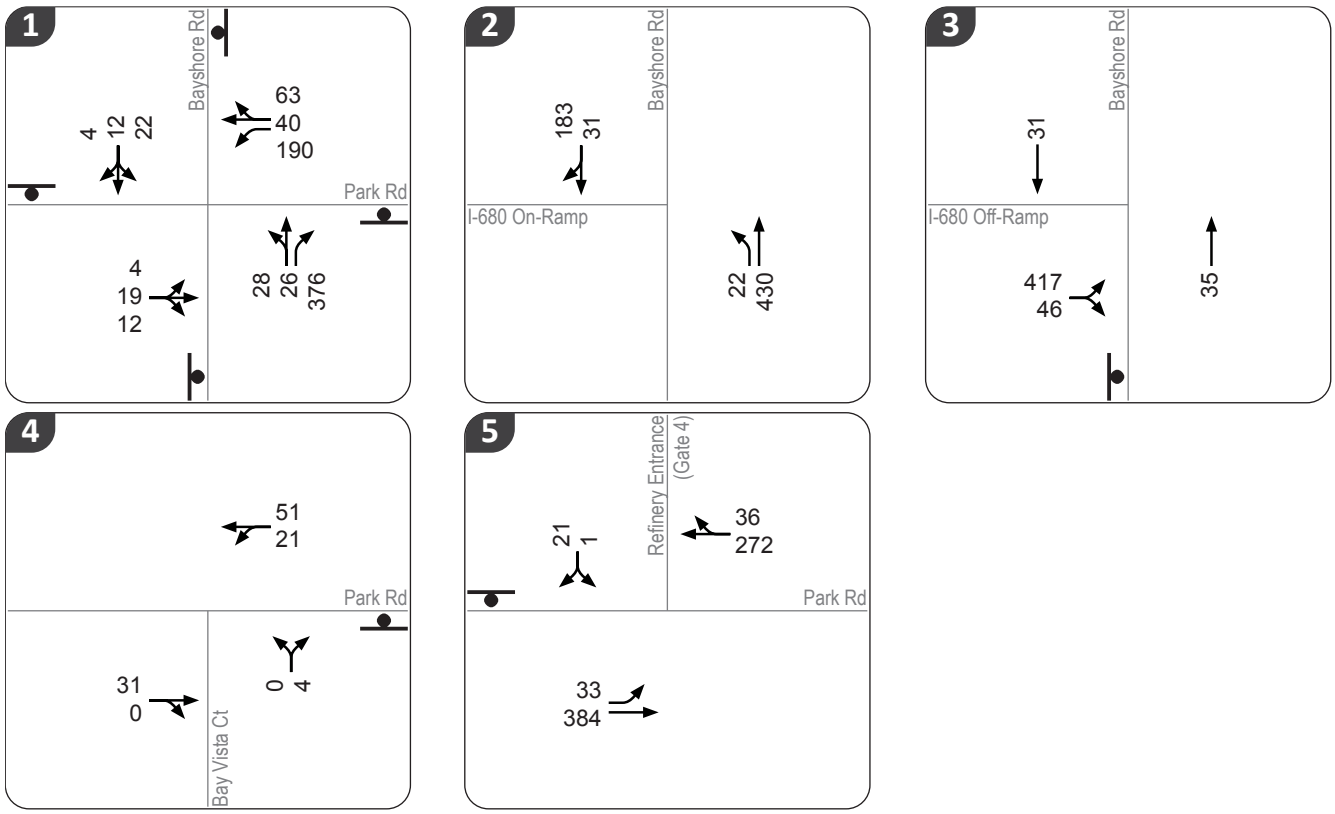
All Traffic Data

(916) 771-8700

City of Benicia
All Vehicles on Unshifted tab
Heavy Vehicles on Bank 1 tab

File Name : 13-7020-005 Valero Refinery-Park
Site Code : 00000000
Start Date : 1/23/2013
Page No : 2





VOLUMES KEY

XX AM Peak Hour Traffic Volumes

Stop Sign

MAP KEY

Study Intersection

UPRR At-Grade Crossing

Roadway Count Location

UPRR Overland Route (Spur)

UPRR Overland Route (Mainline)

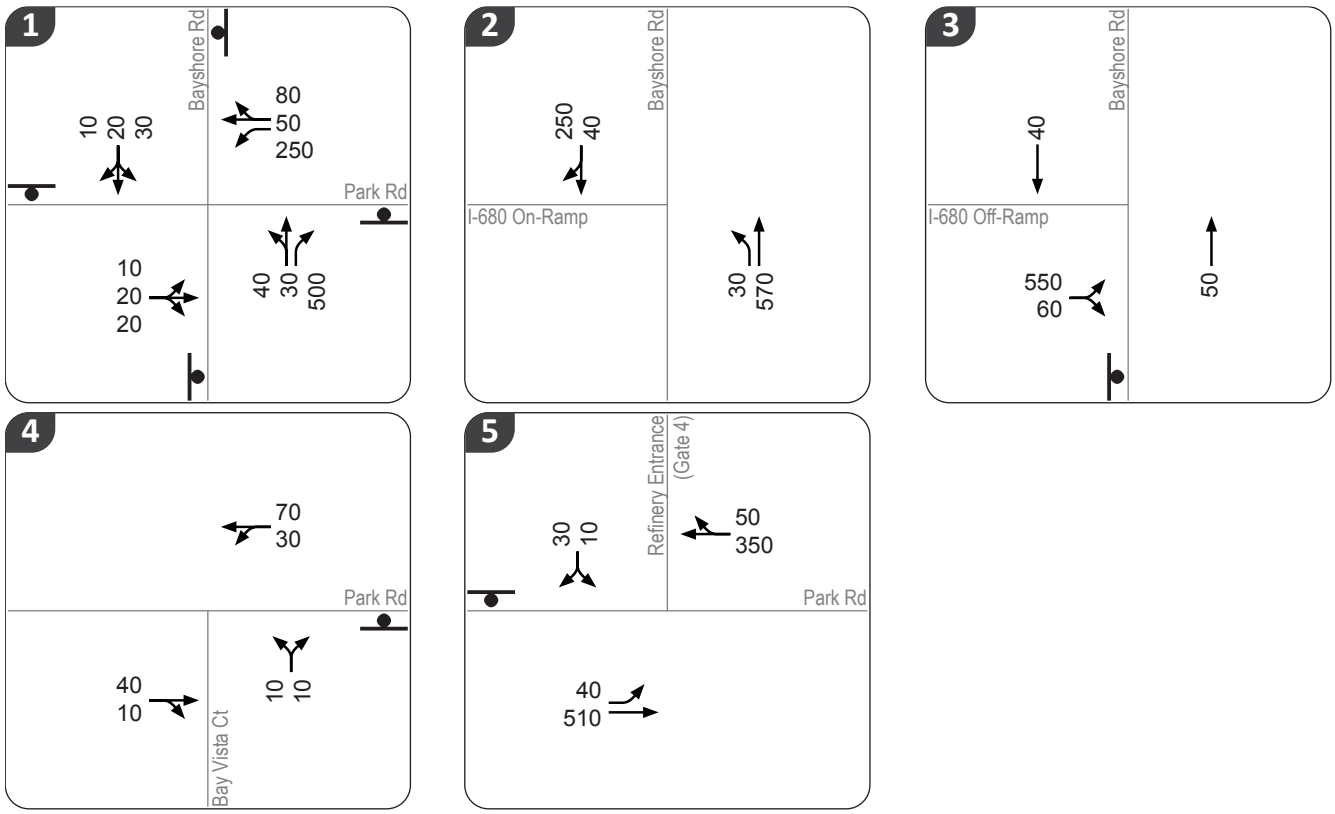
Figure **A1**.

Existing Conditions

Intersection Peak Hour Traffic Volumes and Lane Configurations

WC13-3005_2-2_ExVol

FEHR PEERS



VOLUMES KEY

XX AM Peak Hour Traffic Volumes

Stop Sign

MAP KEY

Study Intersection

UPRR At-Grade Crossing

Roadway Count Location

UPRR Overland Route (Spur)

UPRR Overland Route (Mainline)

Figure A2.

Cumulative Conditions

Intersection Peak Hour Traffic Volumes and Lane Configurations

WC13-3005_4-1_CumuVols

FEHR PEERS

Primary Rd O ST | Distance (ft) 276 | Direction W | Secondary Rd E 5TH ST | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist P28 | Beat 001 | Type 0 | CalTrans | Badge 3475 | Collision Date 20090425 | Time 0857 | Day SAT
Primary Collision Factor DRVR ALC|DRG | Violation 23152A | Collision Type REAR END | Severity PD | Date 20091217
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CN
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	Safety	EQUIP	Ejected
1F	DRVR	36	F	H	HBD-UI		PROC ST	E	A	0700	GMC	2001	- 3	A	23152			
2	DRVR	998	-		IMP UNK	IMP UNK	U-TURN	E	A	0800	NISSA	2004	- 3	N				

Primary Rd OFARRELL DR | Distance (ft) 209 | Direction W | Secondary Rd PLYMOUTH CT | NCIC 4801 | State H | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 003 | Type 0 | CalTran | 219 | Day SUN
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type REAR END | Severity PD | Date 20100910
Weather1 CLOUDY | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CN
Hit and Run | Motor Vehicle Involved With PKD MV | Lighting DAYLIGHT | Ped Action | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	Safety	EQUIP	Ejected
1F	DRVR	67	F	W	HNBD		UNS TURN	W	A	0100	HONDA	2007	- 3	N				
2	PRKD	998	-				PARKED	W	A	0700	GMC	1995	- 3	N				

Primary Rd OXFORD DR | Distance (ft) 366 | Direction W | Secondary Rd ROSE DR | NCIC 4801 | State H | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist 4801 | Beat 003 | Type 0 | CalTran | 251 | Day WED
Primary Collision Factor UNSAFE SPEED | Violation 22350 | Collision Type HIT OBJECT | Severity PD | Date 20100910
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 CONS ZONE
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety Equip	ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
1F	DRVR	29	F	W	HNBD		PROC ST	E	A	0100	VOLKS	2003	- 3	M		-	M G								

All

Primary Rd PARK RD | Distance (ft) 50 | Direction N | Secondary Rd BAYSHORE RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist P-66 | Beat 004 | Type 0 | CalTrans | Badge 1395 | Collision Date 20090221 | Time 1229 | Day SAT
Primary Collision Factor STOP SGN|SIG | Violation 22451A | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20090929
Weather1 RAINING | Weather2 | Rdwy Surface WET | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run MSDMNR | Motor Vehicle Involved With OTHER OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev FNCTNG | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety Equip	ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
1F	DRVR	998	-		IMP UNK	IMP UNK	PROC ST	N	-	- 00	-		- 3	N		-	- -								

Primary Rd PARK RD | Distance (ft) 50 | Direction N | Secondary Rd BAYSHORE RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 004 | Type 0 | CalTrans | Badge 1466 | Collision Date 20090415 | Time 1335 | Day WED
Primary Collision Factor STOP SGN|SIG | Violation 22451A | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20091123
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run MSDMNR | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev FNCTNG | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety Equip	ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
1F	DRVR	998	-		IMP UNK	IMP UNK	PROC ST	N	-	- 00	-		- 3	N		-	- -								

This report is accepted subject to the Terms of Use. Due to collision records processing backlogs, SWITRS data is typically seven months behind. Data requested for dates seven months prior to the current date will be incomplete.

Primary Rd PARK RD | Distance (ft) 0 | Direction | Secondary Rd BAYSHORE RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 004 | Type 0 | CalTrans | Badge 1060 | Collision Date 20090609 | Time 0610 | Day TUE
Primary Collision Factor STRTNG|BCKNG | Violation 22106 | Collision Type OTHER | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20100203
Weather1 CLOUDY | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev FNCTNG | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	37	M	H	HNBD		OTHER	S	-	- 00	OTHER	1999	- 3	F		-	M	G
2	DRVR	62	M	W	HNBD		STOPPED	S	-	- 00	VOLVO	2006	- 3	N		-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd PARK RD | Distance (ft) 50 | Direction N | Secondary Rd BAYSHORE RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat | Type 0 | CalTrans | Badge 3379 | Collision Date 20091214 | Time 1234 | Day MON
Primary Collision Factor STOP SGN|SIG | Violation 22451A | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20100916
Weather1 CLOUDY | Weather2 | Rdwy Surface WET | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run MSDMNR | Motor Vehicle Involved With OTHER OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev FNCTNG | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	998	-		IMP UNK	IMP UNK	PROC ST	-	-	- 00	-	-	3	A	20002	-	-	-

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd RAYMOND DR | Distance (ft) 136 | Direction W | Secondary Rd SHIRLEY DR | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 001 | Type 0 | CalTrans | Badge 3343 | Collision Date 20090626 | Time 2218 | Day FRI
Primary Collision Factor UNSAFE SPEED | Violation 22350 | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? Y | Process Date 20100206
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With PKD MV | Lighting DARK - ST | Ped Action | Cntrl Dev FNCTNG | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	21	M	W	HNBD		PROC ST	W	A	0100	FORD	1990	- 3	A	2800	N	M	G
2	PRKD	998	-				PARKED	-	A	0800	TOYOT	2005	- -	N		-	-	-

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd RIVERHILL DR | Distance (ft) 84 | Direction W | Secondary Rd 2ND ST | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist 4801 | Beat 002 | Type 0 | CalTrans | Badge 1060 | Collision Date 20090528 | Time 1132 | Day THU
Primary Collision Factor UNSAFE SPEED | Violation 22350 | Collision Type BROADSIDE | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? N | Process Date 20100105
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	28	M	W	HNBD		PROC ST	W	-	- 00	FORD	2000	- 3	N		-	M	G
2	DRVR	61	F	B	HNBD		ENT TRAF	S	-	- 00	FORD	1994	- 3	N		-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
PASS		24	-	6	0	M	G
DRVR	COMP PN	61	F	1	0	M	G

Primary Rd RIVERHILL DR | Distance (ft) 38 | Direction E | Secondary Rd BAYVIEW CIR | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist 4801 | Beat 002 | Type 0 | CalTrans | Badge 3458 | Collision Date 20090910 | Time 2041 | Day THU
Primary Collision Factor DRVR ALC|DRG | Violation 23152A | Collision Type REAR END | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? Y | Process Date 20100604
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With PKD MV | Lighting DARK - ST | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	50	F	W	HBD-UI		PROC ST	W	A	0100	FORD	1990	- 3	M		-	M	G
2	PRKD	998	-				PARKED	W	I	1100	FORD	1998	- 3	N		-	-	-

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
DRVR	COMP PN	50	F	1	0	M	G

This report is accepted subject to the Terms of Use. Due to collision records processing backlogs, SWITRS data is typically seven months behind. Data requested for dates seven months prior to the current date will be incomplete.

Primary Rd ROSE DR | Distance (ft) 72 | Direction S | Secondary Rd TYNE CT | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist P56 | Beat 003 | Type 0 | CalTrans | Badge 2914 | Collision Date 20090629 | Time 1940 | Day MON
Primary Collision Factor DRVR ALC|DRG | Violation 23152A | Collision Type SIDESWIPE | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? N | Process Date 20100206
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run MSDMNR | Motor Vehicle Involved With PKD MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info / Victim Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip	ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
1F	DRVR	55	M	W	HBD-UI		PROC ST	S	A	0100	NISSA	2004	-	3	N		-	L	G	DRVR	COMP PN	55	M	1	0	L	G
2	PRKD	998	-				PARKED	S	A	0100	TOYOT	2004	-	3	N		-	-	-								

Primary Rd RT 680 | Distance (ft) 655 | Direction S | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .88 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 15866 | Collision Date 20090202 | Time 1957 | Day MON
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type HIT OBJECT | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? Y | Process Date 20091015
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DARK - ST | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

3

Party Info / Victim Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip	ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
1F	DRVR	16	M	W	HNBD		RAN OFF RD	S	A	0100	TOYOT	1997	-	3	N		-	M	G	DRVR	OTH VIS	16	M	1	0	M	G

Primary Rd RT 680 | Distance (ft) 300 | Direction N | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .77 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 15594 | Collision Date 20090925 | Time 0355 | Day FRI
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? Y | Process Date 20100709
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DARK - NO | Ped Action | Cntrl Dev NT FNCT | Loc Type H | Ramp/Int -

3

Party Info / Victim Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip	ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
1F	DRVR	25	M	O	HNBD	FATG	PROC ST	S	A	0100	TOYOT	1997	-	3	N		-	L	G							

Primary Rd RT 680 | Distance (ft) 100 | Direction N | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile 1.35 | Side of Hwy N
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 17846 | Collision Date 20091016 | Time 1530 | Day FRI
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20101223
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

2

Party Info / Victim Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip	ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
1F	DRVR	19	F	W	HNBD		OTHER	N	A	0100	TOYOT	2004	-	3	N		-	M	G	PASS		19	M	3	0	M	G

Primary Rd RT 680 | Distance (ft) 500 | Direction N | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .797 | Side of Hwy N
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 014687 | Collision Date 20091221 | Time 0740 | Day MON
Primary Collision Factor UNSAFE SPEED | Violation 22350 | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? Y | Process Date 20101223
Weather1 CLOUDY | Weather2 | Rdwy Surface WET | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type R | Ramp/Int 2

2

Party Info / Victim Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip	ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
1F	DRVR	41	F	A	HNBD		PROC ST	N	A	0100	CHRYS	2006	-	3	N		-	M	G							

This report is accepted subject to the Terms of Use. Due to collision records processing backlogs, SWITRS data is typically seven months behind. Data requested for dates seven months prior to the current date will be incomplete.

Primary Rd BAYSHORE AV | Distance (ft) 0 | Direction | Secondary Rd RT 680 | NCIC 4801 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .797 | Side of Hwy N
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 004 | Type 0 | CalTrans 4 | Badge 3573 | Collision Date 20101231 | Time 1853 | Day FRI
Primary Collision Factor STOP SGN|SIG | Violation 22450A | Collision Type BROADSIDE | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? Y | Process Date 20120411
Weather1 CLOUDY | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DARK - ST | Ped Action | Cntrl Dev FNCTNG | Loc Type R | Ramp/Int 4

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	67	F	W	HNBD		PROC ST	N	A	0700	FORD	2006	- 3	N		-	M	G
2	DRVR	59	M	H	HNBD		PROC ST	E	H	1500	FORD	1998	- 3	N		-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
PASS		50	M	2	0	M	G
PASS		41	M	2	0	M	G
PASS		32	M	2	0	M	G
PASS		37	M	2	0	M	G
PASS		27	M	2	0	M	G
PASS		27	M	2	0	M	G
PASS		32	M	4	0	M	G
PASS		24	M	4	0	M	G
PASS		37	M	4	0	M	G
PASS		27	M	4	0	M	G
PASS		32	M	4	0	M	G

Primary Rd BAYSHORE RD | Distance (ft) 0 | Direction | Secondary Rd ADAMS ST | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist 4801 | Beat 004 | Type 0 | CalTrans | Badge 2092 | Collision Date 20100824 | Time 1634 | Day TUE
Primary Collision Factor R-O-W AUTO | Violation 21801A | Collision Type HEAD-ON | Severity INJURY | #Killed 0 | #Injured 3 | Tow Away? N | Process Date 20110829
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	56	M	B	HNBD		LFT TURN	W	D	2200	FORD	1995	- 3	N		-	M	G
2	DRVR	36	F	B	HNBD		PROC ST	E	D	2200	FORD	1998	- 3	N		-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
DRVR	COMP PN	56	M	1	0	M	G
DRVR	COMP PN	36	F	1	0	M	G
PASS	COMP PN	51	F	2	0	P	G

Primary Rd BAYSHORE RD | Distance (ft) 81 | Direction W | Secondary Rd BAYSHORE RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist 4801 | Beat 004 | Type 0 | CalTrans | Badge 2785 | Collision Date 20100318 | Time 0157 | Day THU
Primary Collision Factor DRVR ALC|DRG | Violation 23152A | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? Y | Process Date 20110131
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DARK - ST | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	24	M	H	HBD-UI		PROC ST	E	A	0100	JAGUA	1998	- 3	A	22107	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd BAYSHORE RD | Distance (ft) 88 | Direction N | Secondary Rd E CHANNEL RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist 4801 | Beat 004 | Type 0 | CalTrans | Badge 2092 | Collision Date 20100827 | Time 1323 | Day FRI
Primary Collision Factor UNKNOWN | Violation | Collision Type REAR END | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20110818
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1	DRVR	42	M	O	HNBD		OTHER	S	G	2731	FREIG	2006	- 3	N		-	P	G
2	DRVR	57	M	A	HNBD		OTHER	S	A	0100	TOYOT	1997	- 3	N		-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

This report is accepted subject to the Terms of Use. Due to collision records processing backlogs, SWITRS data is typically seven months behind. Data requested for dates seven months prior to the current date will be incomplete.

Primary Rd PANORAMA DR | Distance (ft) 417 | Direction S | Secondary Rd TUSTIN CT | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 0B3 | Type 0 | CalTrans | Badge 2092 | Collision Date 20101116 | Time 1343 | Day TUE
Primary Collision Factor R-O-W PED | Violation 21954B | Collision Type AUTO/PED | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20120120
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With PED | Lighting DAYLIGHT | Ped Action NOT IN X- | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	63	F	W	HNBD		PROC ST	N	A	0100	NISSA	2005	-	3	N	-	M	G
2	PED	60	M	W	HNBD			E	N	6000	-		-	-	N	-	-	-

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd PARK RD | Distance (ft) 25 | Direction N | Secondary Rd BAYSHORE RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist BENIC | Beat 004 | Type 0 | CalTrans | Badge 3572 | Collision Date 20101124 | Time 1305 | Day WED
Primary Collision Factor STRTNG|BCKNG | Violation 22106 | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20120214
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev FNCTNG | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	62	M	W	HNBD		PROC ST	N	-	- 00	HINO	2005	-	-	N	-	-	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd PARK RD | Distance (ft) 54 | Direction S | Secondary Rd INDUSTRIAL WY | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 004 | Type 0 | CalTrans | Badge 1466 | Collision Date 20100713 | Time 0749 | Day TUE
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type SIDESWIPE | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20110801
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	55	M	W	IMP UNK	IMP UNK	PASSING	N	-	- 31	-	1985	-	3	N	-	M	G
2	DRVR	50	M	O	HNBD		STOPPED	N	I	2000	-	2003	-	3	N	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
PASS		41	F	9	0	M	P
PASS		34	M	9	0	M	P
PASS		32	M	9	0	M	P

Primary Rd PARK RD | Distance (ft) 33 | Direction S | Secondary Rd INDUSTRIAL WY | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 004 | Type 0 | CalTrans | Badge 1466 | Collision Date 20100719 | Time 0859 | Day MON
Primary Collision Factor UNSAFE SPEED | Violation 22350 | Collision Type BROADSIDE | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20110727
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	61	M	H	HNBD		SLOWING	N	F	2600	KENW	2009	-	3	N	-	M	G
2	DRVR	25	F	A	HNBD		SLOWING	N	A	0100	HONDA	2006	-	3	N	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
PASS		35	M	8	0	M	P

Primary Rd RESERVOIR RD | Distance (ft) 2112 | Direction E | Secondary Rd LAKE HERMAN RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist 4801 | Beat 004 | Type 0 | CalTrans | Badge 2092 | Collision Date 20100125 | Time 0835 | Day MON
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20101025
Weather1 CLOUDY | Weather2 | Rdwy Surface WET | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	26	F	A	HNBD		PROC ST	E	A	0700	TOYOT	2007	-	3	N	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

This report is accepted subject to the Terms of Use. Due to collision records processing backlogs, SWITRS data is typically seven months behind. Data requested for dates seven months prior to the current date will be incomplete.

Primary Rd RT 680 | Distance (ft) 1056 | Direction S | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .8 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 17647 | Collision Date 20100115 | Time 1228 | Day FRI
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type HIT OBJECT | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? Y | Process Date 20110407
Weather1 CLOUDY | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

3

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	73	M	W	HNBD		OTHER	S	A	0100	FORD	1932	-	3	N	-	P	D
2	DRVR	42	M	H	HNBD		PROC ST	S	G	2530	FREIG	2000	-	2	N	-	P	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
DRVR	COMP PN	73	M	1	0	P	D

Primary Rd RT 680 | Distance (ft) 1584 | Direction S | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .7 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 12308 | Collision Date 20100510 | Time 1215 | Day MON
Primary Collision Factor UNSAFE SPEED | Violation 22350 | Collision Type HIT OBJECT | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? Y | Process Date 20110812
Weather1 CLOUDY | Weather2 RAINING | Rdwy Surface WET | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

3

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	48	M	W	HNBD		PROC ST	S	A	0100	BMW	2008	-	3	N	-	L	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
DRVR	COMP PN	48	M	1	0	L	G

Primary Rd RT 680 | Distance (ft) 89 | Direction S | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .98 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 15536 | Collision Date 20101021 | Time 0511 | Day THU
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? Y | Process Date 20120309
Weather1 CLOUDY | Weather2 | Rdwy Surface DRY | Rdwy Cond1 LOOSE MATRL | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DARK - NO | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

3

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	44	F	O	HNBD		OTHER	S	A	0100	BUICK	1982	-	3	N	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd RT 680 | Distance (ft) 1320 | Direction S | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .75 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 18092 | Collision Date 20101225 | Time 1850 | Day SAT
Primary Collision Factor LANE CHANGE | Violation 21658A | Collision Type SIDESWIPE | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20120409
Weather1 RAINING | Weather2 | Rdwy Surface WET | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DARK - NO | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

3

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	20	M	W	HNBD		CHANG LN	S	A	0100	HONDA	2000	-	3	N	-	M	G
2	DRVR	38	M	W	HNBD		PROC ST	S	A	0700	MERCE	2007	-	3	N	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
PASS		18	F	3	0	M	G
PASS		35	F	3	0	M	G
PASS		0	F	6	0	N	Q

Primary Rd RT 680 | Distance (ft) 528 | Direction S | Secondary Rd BENICIA BRIDGE | NCIC 9320 | State Hwy? Y | Route 680 | Postmile Prefix - | Postmile .41 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 685 | Type 1 | CalTrans 4 | Badge 19767 | Collision Date 20100209 | Time 0610 | Day TUE
Primary Collision Factor LANE CHANGE | Violation 21658A | Collision Type SIDESWIPE | Severity INJURY | #Killed 0 | #Injured 2 | Tow Away? Y | Process Date 20110128
Weather1 CLOUDY | Weather2 | Rdwy Surface WET | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DARK - ST | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	49	M	W	HNBD		CHANG LN	S	F	2400	PETER	1984	-	3	N	-	M	C
2	DRVR	56	M	H	HNBD		PROC ST	S	A	0100	MERCE	2003	-	3	N	-	L	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
DRVR	COMP PN	56	M	1	0	L	G
PASS	COMP PN	55	F	3	0	L	G

This report is accepted subject to the Terms of Use. Due to collision records processing backlogs, SWITRS data is typically seven months behind. Data requested for dates seven months prior to the current date will be incomplete.

Primary Rd ALTA LOMA | Distance (ft) 0 | Direction | Secondary Rd ALTA LOMA 48 | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist 4801 | Beat 001 | Type 0 | CalTrans | Badge 3471 | Collision Date 20110814 | Time 2257 | Day SUN
Primary Collision Factor STRTNG|BCKNG | Violation 22106 | Collision Type OTHER | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20130312
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 REDUCED RD | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With PKD MV | Lighting DARK - ST | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	54	M	H	HNBD		BACKING	E	E	2235	FORD	1994	-	3	N	-	M	G
2	PRKD	998	-				PARKED	W	A	0100	MAZDA	2002	-	-	N	-	-	-

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd ARGUELLO DR | Distance (ft) 528 | Direction E | Secondary Rd KEARNEY ST | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist P60 | Beat 003 | Type 0 | CalTrans | Badge 2092 | Collision Date 20110115 | Time 1211 | Day SAT
Primary Collision Factor R-O-W AUTO | Violation 21804A | Collision Type BROADSIDE | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? N | Process Date 20120324
Weather1 FOG | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	17	M	B	HNBD		BACKING	S	A	0100	TOYOT	2004	-	3	N	-	M	G
2	DRVR	31	M	O	HNBD		PROC ST	W	A	0100	NISSA	2006	-	3	N	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
PASS	COMP PN	14	F	6	0	P	G
PASS		32	F	3	0	P	G

Primary Rd BARTON WY | Distance (ft) 39 | Direction E | Secondary Rd VIOLET CT | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 003 | Type 0 | CalTrans | Badge 3210 | Collision Date 20110630 | Time 0144 | Day THU
Primary Collision Factor DRVR ALC|DRG | Violation 23152A | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20121116
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run MSDMNR | Motor Vehicle Involved With OTHER OBJ | Lighting DARK - ST | Ped Action | Cntrl Dev FNCTNG | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	18	M	W	HBD-UI		RAN OFF RD	W	A	0100	HONDA	2006	-	3	A	22107	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd BAYSHORE RD | Distance (ft) 320 | Direction E | Secondary Rd PARK RD | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist SOLAN | Beat 004 | Type 0 | CalTrans | Badge 1745 | Collision Date 20111006 | Time 1139 | Day THU
Primary Collision Factor NOT DRIVER | Violation | Collision Type SIDESWIPE | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? Y | Process Date 20130405
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1	DRVR	54	M	B	HNBD		PROC ST	W	F	2500	PETER	2009	-	3	K	-	M	G
2	PRKD	998	-				PARKED	-	A	0700	CHEVR	1999	-	-	-	-	-	-

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd BAYSHORE RD | Distance (ft) 0 | Direction | Secondary Rd RT 680 | NCIC 4801 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .797 | Side of Hwy N
City Benicia | County Solano | Population 4 | Rpt Dist P64 | Beat 004 | Type 0 | CalTrans 4 | Badge 2092 | Collision Date 20110504 | Time 0821 | Day WED
Primary Collision Factor R-O-W AUTO | Violation 21802A | Collision Type BROADSIDE | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? N | Process Date 20130128
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev FNCTNG | Loc Type R | Ramp/Int 4

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	38	F	H	HNBD		ENT TRAF	N	A	0100	BMW	1995	-	3	-	-	M	G
2	DRVR	29	F		HNBD		PROC ST	E	A	0100	HONDA	1990	-	3	-	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

This report is accepted subject to the Terms of Use. Due to collision records processing backlogs, SWITRS data is typically seven months behind. Data requested for dates seven months prior to the current date will be incomplete.

Primary Rd ROSE DR | Distance (ft) 0 | Direction | Secondary Rd WINDSOR | NCIC 4801 | State Hwy? N | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist BENIC | Beat 003 | Type 0 | CalTrans | Badge 3572 | Collision Date 20110502 | Time 1840 | Day MON
Primary Collision Factor STOP SGN|SIG | Violation 22450 | Collision Type BROADSIDE | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? N | Process Date 20120717
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With BICYCLE | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	BICY	10	M	W	HNBD		ENT TRAF	N	L	0400	-		-	3	E	-	-	-
2	DRVR	73	F	W	HNBD		PROC ST	E	A	0100	MERCU	2002	-	3	E	-	M	G
3	OTHR	998	-			null		N	-	9900	-		-	-	-	-	-	-

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
BICY	COMP PN	10	-	9	3	-	-

Primary Rd RT 680 | Distance (ft) 100 | Direction N | Secondary Rd BAY SHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile 1.34 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 017233 | Collision Date 20110217 | Time 1150 | Day THU
Primary Collision Factor UNSAFE SPEED | Violation 22350 | Collision Type HIT OBJECT | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? Y | Process Date 20120613
Weather1 CLOUDY | Weather2 RAINING | Rdwy Surface WET | Rdwy Cond1 FLOODED | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	22	F	B	HNBD		PROC ST	S	A	0100	SATUR	2007	-	3	N	-	M	G
2	DRVR	60	M	W	HNBD		PROC ST	S	D	2200	TOYOT	2006	-	3	N	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
DRVR	COMP PN	22	F	1	0	M	G

Primary Rd RT 680 | Distance (ft) 50 | Direction S | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile .99 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 19094 | Collision Date 20110116 | Time 0300 | Day SUN
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type HIT OBJECT | Severity PDO | #Killed 0 | #Injured 0 | Tow Away? Y | Process Date 20120627
Weather1 FOG | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run MSDMNR | Motor Vehicle Involved With FIXED OBJ | Lighting DARK - ST | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	998	-		IMP UNK	IMP UNK	OTHER	S	B	0736	FORD	1990	-	3	N	-	P	B

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected

Primary Rd RT 680 | Distance (ft) 120 | Direction N | Secondary Rd BAYSHORE RD | NCIC 9365 | State Hwy? Y | Route 680 | Postmile Prefix R | Postmile 1.02 | Side of Hwy S
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 680 | Type 1 | CalTrans 4 | Badge 015536 | Collision Date 20110604 | Time 0540 | Day SAT
Primary Collision Factor UNSAFE SPEED | Violation 22350 | Collision Type HIT OBJECT | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? Y | Process Date 20121109
Weather1 RAINING | Weather2 | Rdwy Surface WET | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With FIXED OBJ | Lighting DUSK/DAWN | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type H | Ramp/Int -

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	35	F	W	HNBD		PROC ST	S	D	2200	DODGE	2006	-	3	N	-	M	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
DRVR	COMP PN	35	F	1	0	M	G

Primary Rd RT 680 | Distance (ft) 200 | Direction W | Secondary Rd BAYSHORE RD | NCIC 9320 | State Hwy? Y | Route | Postmile Prefix | Postmile | Side of Hwy
City Benicia | County Solano | Population 4 | Rpt Dist | Beat 684 | Type 1 | CalTrans | Badge 017705 | Collision Date 20111202 | Time 1430 | Day FRI
Primary Collision Factor IMPROP TURN | Violation 22107 | Collision Type OVERTURNED | Severity INJURY | #Killed 0 | #Injured 1 | Tow Away? N | Process Date 20130128
Weather1 CLEAR | Weather2 | Rdwy Surface DRY | Rdwy Cond1 NO UNUSL CND | Rdwy Cond2 | Spec Cond 0
Hit and Run | Motor Vehicle Involved With OTHER MV | Lighting DAYLIGHT | Ped Action | Cntrl Dev NT PRS/FCTR | Loc Type | Ramp/Int

Party Info

Party	Type	Age	Sex	Race	Sobriety1	Sobriety2	Move Pre	Dir	SW Veh	CHP Veh	Make	Year	SP Info	OAF1	Viol	OAF2	Safety	Equip
1F	DRVR	69	F	W	HNBD		OTHER	W	A	0100	FORD	2010	-	3	N	-	L	G

Victim Info

ROLE	Ext Of Inj	AGE	Sex	Seat Pos	Safety	EQUIP	Ejected
DRVR	OTH VIS	69	F	1	0	L	G

This report is accepted subject to the Terms of Use. Due to collision records processing backlogs, SWITRS data is typically seven months behind. Data requested for dates seven months prior to the current date will be incomplete.

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

OMB Approval No. 2130-0500

Name Of	Alphabetic Code	RR Accident/Incident No.
1. Reporting Railroad: Southern Pacific Transportation Co. [SP]	1a. SP	1b. A0755
2. Other Railroad Involved in Train Accident/Incident	2a.	2b.
3. Railroad Responsible for Track Maintenance: Southern Pacific Transportation Co. [SP]	3a. SP	3b. A0755

4. U.S. DOT-AAR Grade Crossing ID No.: 751527E
5. Date of Accident/Incident: 04/24/95
6. Time of Accident/Incident: 03:56 PM

7. Nearest Railroad Station: BENICIA
8. Division:
9. County: SOLANO
10. State Abbr.: 06 Code: CA

11. City (if in a city): BENICIA
12. Highway Name or No.: PARK STREET ☑ Public ☐ Private

Highway User Involved

13. Type — A. Auto, B. Truck, C. Truck-trailer, D. Pick-up truck, E. Van, F. Bus, G. School Bus, H. Motorcycle, J. Other Motor Vehicle, K. Pedestrian, M. Other (specify) — Code: B

14. Vehicle Speed (est. mph at impact): 30

15. Direction (geographical): 1. North 2. South 3. East 4. West — Code: 2

16. Position: 1. Stalled on crossing 2. Stopped on Crossing 3. Moving over crossing 4. Trapped — Code: 3

20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code: 4

Rail Equipment Involved

17. Equipment — 1. Train (units pulling) 2. Train (units pushing) 3. Train (standing) 4. Car(s) (moving) 5. Car(s) (standing) 6. Light loco(s) (moving) 7. Light loco(s) (standing) 8. Other (specify) A. Train pulling- RCL B. Train pushing- RCL C. Train standing- RCL — Code: 6

18. Position of Car Unit in Train: 1

19. Circumstance: 1. Rail equipment struck highway user 2. Rail equipment struck by highway user — Code: 1

20b. Was there a hazardous materials release by: 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code:

20c. State the name and quantity of the hazardous material released, if any

21. Temperature (specify if minus): 78 °F

22. Visibility (single entry): 1. Dawn 2. Day 3. Dusk 4. Dark — Code: 2

23. Weather (single entry): 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow — Code: 1

24. Type of Equipment Consist (single entry): 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/Switching 8. Light loco(s) 9. Main./inspect. car A. Spec. MoW Equip. — Code: 8

25. Track Type Used by Rail Equipment Involved: 1. Main 2. Yard 3. Siding 4. Industry — Code: 2

26. Track Number or Name: 0700

27. FRA Track Class: 1

28. Number of Locomotive Units: 1

29. Number of Cars: 0

30. Consist Speed (Recorded if available): R. Recorded E. Estimated — 5 mph — Code: E

31. Time Table Direction: 1. North 2. South 3. East 4. West — Code: 4

32. Type of Crossing Warning: 1. Gates 2. Cantilever FLS 3. Standard FLS 4. Wig wags 5. Hwy. traffic signals 6. Audible 7. Crossbucks 8. Stop signs 9. Watchman 10. Flagged by crew 11. Other (specify) 12. None

Code(s): 07

33. Signaled Crossing Warning:

34. Whistle Ban: 1. Yes 2. No 3. Unknown — Code:

35. Location of Warning: 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach — Code: 1

36. Crossing Warning Interconnected with Highway Signals: 1. Yes 2. No 3. Unknown — Code: 2

37. Crossing Illuminated by Street Lights or Special Lights: 1. Yes 2. No 3. Unknown — Code: 2

38. Driver's Age:

39. Driver's Gender: 1. Male 2. Female — Code:

40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train: 1. Yes 2. No 3. Unknown — Code: 2

41. Driver: 1. Drove around or thru the gate 2. Stopped and then proceeded 3. Did not stop 4. Stopped on crossing 5. Other (specify) — Code: 3

42. Driver Passed Standing Highway Vehicle: 1. Yes 2. No 3. Unknown — Code: 2

43. View of Track Obscured by (primary obstruction): 1. Permanent Structure 2. Standing railroad equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicles 7. Other (specify) 8. Not Obstructed — Code: 1

Casualties to:	Killed	Injured
46. Highway-Rail Crossing Users	0	0
49. Railroad Employees	0	0
52. Passengers on Train	0	0

44. Driver was: 1. Killed 2. Injured 3. Uninjured — Code: 3

45. Was Driver in the Vehicle? 1. Yes 2. No — Code: 1

47. Highway Vehicle Property Damage (est. dollar damage): $1,000

48. Total Number of Highway-Rail Crossing Users (include driver): 1

50. Total Number of People on Train (include passengers and crew):

51. Is a Rail Equipment Accident / Incident Report Being Filed: 1. Yes 2. No — Code: 2

53a. Special Study Block

53b. Special Study Block

54. Narrative Description

55. Typed Name and Title

56. Signature

57. Date

FORM FRA F 6180.57

* NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

OMB Approval No. 2130-0500

Name Of	Alphabetic Code	RR Accident/Incident No.
1. Reporting Railroad: Southern Pacific Transportation Co. [SP]	1a. SP	1b. A0055
2. Other Railroad Involved in Train Accident/Incident	2a.	2b.
3. Railroad Responsible for Track Maintenance: Southern Pacific Transportation Co. [SP]	3a. SP	3b. A0055

4. U.S. DOT-AAR Grade Crossing ID No. 751527E | 5. Date of Accident/Incident 01/07/95 | 6. Time of Accident/Incident 06:30 PM

7. Nearest Railroad Station: BAHIA | 8. Division | 9. County: SOLANO | 10. State Abbr. 06 Code CA

11. City (if in a city) BENICIA | 12. Highway Name or No. PARK RD. | ☑ Public ☐ Private

Highway User Involved

13. Type — A. Auto, B. Truck, C. Truck-trailer, D. Pick-up truck, E. Van, F. Bus, G. School Bus, H. Motorcycle, J. Other Motor Vehicle, K. Pedestrian, M. Other (specify) — Code: B

14. Vehicle Speed (est. mph at impact): 5

15. Direction (geographical) — 1. North 2. South 3. East 4. West — Code: 4

16. Position — 1. Stalled on crossing 2. Stopped on Crossing 3. Moving over crossing 4. Trapped — Code: 3

20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? — 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code: 4

Rail Equipment Involved

17. Equipment — 1. Train (units pulling) 2. Train (units pushing) 3. Train (standing) 4. Car(s) (moving) 5. Car(s) (standing) 6. Light loco(s) (moving) 7. Light loco(s) (standing) 8. Other (specify) A. Train pulling- RCL B. Train pushing- RCL C. Train standing- RCL — Code: 1

18. Position of Car Unit in Train: 1

19. Circumstance — 1. Rail equipment struck highway user 2. Rail equipment struck by highway user — Code: 1

20b. Was there a hazardous materials release by — 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code:

20c. State the name and quantity of the hazardous material released, if any

21. Temperature (specify if minus): 50 °F

22. Visibility (single entry) — 1. Dawn 2. Day 3. Dusk 4. Dark — Code: 4

23. Weather (single entry) — 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow — Code: 3

24. Type of Equipment Consist (single entry) — 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/Switching 8. Light loco(s) 9. Main./inspect. car A. Spec. MoW Equip. — Code: 7

25. Track Type Used by Rail Equipment Involved — 1. Main 2. Yard 3. Siding 4. Industry — Code: 4

26. Track Number or Name: 0700

27. FRA Track Class: 1

28. Number of Locomotive Units: 1

29. Number of Cars: 5

30. Consist Speed (Recorded if available) — R. Recorded E. Estimated — 5 mph — Code: E

31. Time Table Direction — 1. North 2. South 3. East 4. West — Code: 4

32. Type of Crossing Warning — 1. Gates 2. Cantilever FLS 3. Standard FLS 4. Wig wags 5. Hwy. traffic signals 6. Audible 7. Crossbucks 8. Stop signs 9. Watchman 10. Flagged by crew 11. Other (specify) 12. None

Code(s): 07

33. Signaled Crossing Warning

34. Whistle Ban — 1. Yes 2. No 3. Unknown — Code:

35. Location of Warning — 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach — Code: 1

36. Crossing Warning Interconnected with Highway Signals — 1. Yes 2. No 3. Unknown — Code: 2

37. Crossing Illuminated by Street Lights or Special Lights — 1. Yes 2. No 3. Unknown — Code: 2

38. Driver's Age

39. Driver's Gender — 1. Male 2. Female — Code:

40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train — 1. Yes 2. No 3. Unknown — Code: 2

41. Driver — 1. Drove around or thru the gate 2. Stopped and then proceeded 3. Did not stop 4. Stopped on crossing 5. Other (specify) — Code: 3

42. Driver Passed Standing Highway Vehicle — 1. Yes 2. No 3. Unknown — Code: 2

43. View of Track Obscured by (primary obstruction) — 1. Permanent Structure 2. Standing railroad equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicles 7. Other (specify) 8. Not Obstructed — Code: 8

Casualties to:	Killed	Injured
46. Highway-Rail Crossing Users	0	0
49. Railroad Employees	0	0
52. Passengers on Train	0	0

44. Driver was — 1. Killed 2. Injured 3. Uninjured — Code: 3

45. Was Driver in the Vehicle? — 1. Yes 2. No — Code: 1

47. Highway Vehicle Property Damage (est. dollar damage): $1,000

48. Total Number of Highway-Rail Crossing Users (include driver): 1

50. Total Number of People on Train (include passengers and crew)

51. Is a Rail Equipment Accident / Incident Report Being Filed — 1. Yes 2. No — Code: 2

53a. Special Study Block | 53b. Special Study Block

54. Narrative Description

55. Typed Name and Title | 56. Signature | 57. Date

FORM FRA F 6180.57

* NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

OMB Approval No. 2130-0500

Name Of	Alphabetic Code	RR Accident/Incident No.
1. Reporting Railroad: Southern Pacific Transportation Co. [SP]	1a. SP	1b. A2523
2. Other Railroad Involved in Train Accident/Incident	2a.	2b.
3. Railroad Responsible for Track Maintenance: Southern Pacific Transportation Co. [SP]	3a. SP	3b. A2523

4. U.S. DOT-AAR Grade Crossing ID No.: 751527E
5. Date of Accident/Incident: 11/29/93
6. Time of Accident/Incident: 06:10 PM

7. Nearest Railroad Station: BENICIA
8. Division:
9. County: SOLANO
10. State Abbr.: 06 Code: CA

11. City (if in a city): BENICIA
12. Highway Name or No.: PARK STREET ☑ Public ☐ Private

Highway User Involved

13. Type — A. Auto, B. Truck, C. Truck-trailer, D. Pick-up truck, E. Van, F. Bus, G. School Bus, H. Motorcycle, J. Other Motor Vehicle, K. Pedestrian, M. Other (specify) — Code: A

14. Vehicle Speed (est. mph at impact): 10

15. Direction (geographical) — 1. North 2. South 3. East 4. West — Code: 3

16. Position — 1. Stalled on crossing 2. Stopped on Crossing 3. Moving over crossing 4. Trapped — Code: 3

20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? — 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code: 2

Rail Equipment Involved

17. Equipment — 1. Train (units pulling) 2. Train (units pushing) 3. Train (standing) 4. Car(s) (moving) 5. Car(s) (standing) 6. Light loco(s) (moving) 7. Light loco(s) (standing) 8. Other (specify) A. Train pulling- RCL B. Train pushing- RCL C. Train standing- RCL — Code: 2

18. Position of Car Unit in Train: 15

19. Circumstance — 1. Rail equipment struck highway user 2. Rail equipment struck by highway user — Code: 2

20b. Was there a hazardous materials release by — 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code:

20c. State the name and quantity of the hazardous material released, if any

21. Temperature (specify if minus): 65 °F

22. Visibility (single entry) — 1. Dawn 2. Day 3. Dusk 4. Dark — Code: 4

23. Weather (single entry) — 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow — Code: 2

24. Type of Equipment Consist (single entry) — 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/Switching 8. Light loco(s) 9. Main./inspect. car A. Spec. MoW Equip. — Code: 7

25. Track Type Used by Rail Equipment Involved — 1. Main 2. Yard 3. Siding 4. Industry — Code: 2

26. Track Number or Name: 0700 LEWAD

27. FRA Track Class: 1

28. Number of Locomotive Units: 1

29. Number of Cars: 15

30. Consist Speed (Recorded if available) — R. Recorded E. Estimated: 2 mph — Code: E

31. Time Table Direction — 1. North 2. South 3. East 4. West — Code: 3

32. Type of Crossing Warning — 1. Gates 2. Cantilever FLS 3. Standard FLS 4. Wig wags 5. Hwy. traffic signals 6. Audible 7. Crossbucks 8. Stop signs 9. Watchman 10. Flagged by crew 11. Other (specify) 12. None

Code(s): 07 10

33. Signaled Crossing Warning

34. Whistle Ban — 1. Yes 2. No 3. Unknown — Code:

35. Location of Warning — 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach — Code: 1

36. Crossing Warning Interconnected with Highway Signals — 1. Yes 2. No 3. Unknown — Code: 2

37. Crossing Illuminated by Street Lights or Special Lights — 1. Yes 2. No 3. Unknown — Code: 2

38. Driver's Age

39. Driver's Gender — 1. Male 2. Female — Code:

40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train — 1. Yes 2. No 3. Unknown — Code: 2

41. Driver — 1. Drove around or thru the gate 2. Stopped and then proceeded 3. Did not stop 4. Stopped on crossing 5. Other (specify) — Code: 3

42. Driver Passed Standing Highway Vehicle — 1. Yes 2. No 3. Unknown — Code: 2

43. View of Track Obscured by (primary obstruction) — 1. Permanent Structure 2. Standing railroad equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicles 7. Other (specify) 8. Not Obstructed — Code: 8

Casualties to:	Killed	Injured
46. Highway-Rail Crossing Users	0	0
49. Railroad Employees	0	0
52. Passengers on Train	0	0

44. Driver was — 1. Killed 2. Injured 3. Uninjured — Code: 3

45. Was Driver in the Vehicle? — 1. Yes 2. No — Code: 1

47. Highway Vehicle Property Damage (est. dollar damage): $3,000

48. Total Number of Highway-Rail Crossing Users (include driver): 3

50. Total Number of People on Train (include passengers and crew):

51. Is a Rail Equipment Accident / Incident Report Being Filed — 1. Yes 2. No — Code: 2

53a. Special Study Block

53b. Special Study Block

54. Narrative Description

55. Typed Name and Title

56. Signature

57. Date

FORM FRA F 6180.57

* NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

OMB Approval No. 2130-0500

Name Of	Alphabetic Code	RR Accident/Incident No.
1. Reporting Railroad: Southern Pacific Transportation Co. [SP]	1a. SP	1b. A3672
2. Other Railroad Involved in Train Accident/Incident	2a.	2b.
3. Railroad Responsible for Track Maintenance: Southern Pacific Transportation Co. [SP]	3a. SP	3b. A3672

4. U.S. DOT-AAR Grade Crossing ID No.: 751527E
5. Date of Accident/Incident: 10/23/92
6. Time of Accident/Incident: 06:10 PM

7. Nearest Railroad Station: BENICIA
8. Division:
9. County: SOLANO
10. State Abbr.: 06 Code: CA

11. City (if in a city): BENICIA
12. Highway Name or No.: PARK ST
☑ Public ☐ Private

Highway User Involved

13. Type — A. Auto, B. Truck, C. Truck-trailer, D. Pick-up truck, E. Van, F. Bus, G. School Bus, H. Motorcycle, J. Other Motor Vehicle, K. Pedestrian, M. Other (specify) — Code: C

14. Vehicle Speed (est. mph at impact): 3

15. Direction (geographical): 1. North 2. South 3. East 4. West — Code: 1

16. Position: 1. Stalled on crossing 2. Stopped on Crossing 3. Moving over crossing 4. Trapped — Code: 3

20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code: 4

Rail Equipment Involved

17. Equipment: 1. Train (units pulling) 2. Train (units pushing) 3. Train (standing) 4. Car(s) (moving) 5. Car(s) (standing) 6. Light loco(s) (moving) 7. Light loco(s) (standing) 8. Other (specify) A. Train pulling- RCL B. Train pushing- RCL C. Train standing- RCL — Code: 6

18. Position of Car Unit in Train: 1

19. Circumstance: 1. Rail equipment struck highway user 2. Rail equipment struck by highway user — Code: 1

20b. Was there a hazardous materials release by: 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code:

20c. State the name and quantity of the hazardous material released, if any

21. Temperature (specify if minus): 70 °F

22. Visibility (single entry): 1. Dawn 2. Day 3. Dusk 4. Dark — Code: 4

23. Weather (single entry): 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow — Code: 1

24. Type of Equipment Consist (single entry): 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/Switching 8. Light loco(s) 9. Main./inspect. car A. Spec. MoW Equip. — Code: 8

25. Track Type Used by Rail Equipment Involved: 1. Main 2. Yard 3. Siding 4. Industry — Code: 2

26. Track Number or Name: 728 LD

27. FRA Track Class: 1

28. Number of Locomotive Units: 1

29. Number of Cars: 0

30. Consist Speed (Recorded if available): R. Recorded E. Estimated — 5 mph — Code: E

31. Time Table Direction: 1. North 2. South 3. East 4. West — Code: 1

32. Type of Crossing Warning: 1. Gates 2. Cantilever FLS 3. Standard FLS 4. Wig wags 5. Hwy. traffic signals 6. Audible 7. Crossbucks 8. Stop signs 9. Watchman 10. Flagged by crew 11. Other (specify) 12. None
Code(s): 07

33. Signaled Crossing Warning:

34. Whistle Ban: 1. Yes 2. No 3. Unknown — Code:

35. Location of Warning: 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach — Code: 1

36. Crossing Warning Interconnected with Highway Signals: 1. Yes 2. No 3. Unknown — Code: 2

37. Crossing Illuminated by Street Lights or Special Lights: 1. Yes 2. No 3. Unknown — Code: 2

38. Driver's Age:

39. Driver's Gender: 1. Male 2. Female — Code:

40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train: 1. Yes 2. No 3. Unknown — Code: 2

41. Driver: 1. Drove around or thru the gate 2. Stopped and then proceeded 3. Did not stop 4. Stopped on crossing 5. Other (specify) — Code: 3

42. Driver Passed Standing Highway Vehicle: 1. Yes 2. No 3. Unknown — Code: 2

43. View of Track Obscured by (primary obstruction): 1. Permanent Structure 2. Standing railroad equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicles 7. Other (specify) 8. Not Obstructed — Code: 8

Casualties to:	Killed	Injured
46. Highway-Rail Crossing Users	0	0
49. Railroad Employees	0	1
52. Passengers on Train	0	0

44. Driver was: 1. Killed 2. Injured 3. Uninjured — Code: 3

45. Was Driver in the Vehicle? 1. Yes 2. No — Code: 1

47. Highway Vehicle Property Damage (est. dollar damage): $500

48. Total Number of Highway-Rail Crossing Users (include driver): 1

50. Total Number of People on Train (include passengers and crew):

51. Is a Rail Equipment Accident / Incident Report Being Filed: 1. Yes 2. No — Code: 2

53a. Special Study Block

53b. Special Study Block

54. Narrative Description

55. Typed Name and Title

56. Signature

57. Date

FORM FRA F 6180.57

* NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

OMB Approval No. 2130-0500

Name Of	Alphabetic Code	RR Accident/Incident No.
1. Reporting Railroad: Southern Pacific Transportation Co. [SP]	1a. SP	1b. A1111
2. Other Railroad Involved in Train Accident/Incident	2a.	2b.
3. Railroad Responsible for Track Maintenance: Southern Pacific Transportation Co. [SP]	3a. SP	3b. A1111

4. U.S. DOT-AAR Grade Crossing ID No.: 751527E
5. Date of Accident/Incident: 04/16/91
6. Time of Accident/Incident: 09:15 AM

7. Nearest Railroad Station: ARMY POINT
8. Division:
9. County: SOLANO
10. State Abbr.: 06 Code: CA

11. City (if in a city): BENICA
12. Highway Name or No.: PARK ST
☑ Public ☐ Private

Highway User Involved

13. Type — Code: C
A. Auto B. Truck C. Truck-trailer D. Pick-up truck E. Van F. Bus G. School Bus H. Motorcycle J. Other Motor Vehicle K. Pedestrian M. Other (specify)

Rail Equipment Involved

17. Equipment — Code: 1
1. Train (units pulling) 2. Train (units pushing) 3. Train (standing) 4. Car(s) (moving) 5. Car(s) (standing) 6. Light loco(s) (moving) 7. Light loco(s) (standing) 8. Other (specify) A. Train pulling- RCL B. Train pushing- RCL C. Train standing- RCL

14. Vehicle Speed (est. mph at impact): 7
15. Direction (geographical) — Code: 4
1. North 2. South 3. East 4. West
18. Position of Car Unit in Train: 1

16. Position — Code: 3
1. Stalled on crossing 2. Stopped on Crossing 3. Moving over crossing 4. Trapped

19. Circumstance — Code: 1
1. Rail equipment struck highway user 2. Rail equipment struck by highway user

20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? — Code: 4
1. Highway User 2. Rail Equipment 3. Both 4. Neither

20b. Was there a hazardous materials release by — Code:
1. Highway User 2. Rail Equipment 3. Both 4. Neither

20c. State the name and quantity of the hazardous material released, if any

21. Temperature (specify if minus): 75 °F
22. Visibility (single entry) — Code: 2
1. Dawn 2. Day 3. Dusk 4. Dark
23. Weather (single entry) — Code: 1
1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow

24. Type of Equipment Consist (single entry) — Code: 7
1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/Switching 8. Light loco(s) 9. Main./inspect. car A. Spec. MoW Equip.
25. Track Type Used by Rail Equipment Involved — Code: 2
1. Main 2. Yard 3. Siding 4. Industry
26. Track Number or Name: 0712

27. FRA Track Class: 1
28. Number of Locomotive Units: 1
29. Number of Cars: 5
30. Consist Speed (Recorded if available) — Code: E
R. Recorded E. Estimated 10 mph
31. Time Table Direction — Code: 4
1. North 2. South 3. East 4. West

32. Type of Crossing Warning
1. Gates 2. Cantilever FLS 3. Standard FLS 4. Wig wags 5. Hwy. traffic signals 6. Audible 7. Crossbucks 8. Stop signs 9. Watchman 10. Flagged by crew 11. Other (specify) 12. None
Code(s): 07
33. Signaled Crossing Warning
34. Whistle Ban — Code:
1. Yes 2. No 3. Unknown

35. Location of Warning — Code: 1
1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach
36. Crossing Warning Interconnected with Highway Signals — Code: 2
1. Yes 2. No 3. Unknown
37. Crossing Illuminated by Street Lights or Special Lights — Code: 2
1. Yes 2. No 3. Unknown

38. Driver's Age
39. Driver's Gender — Code:
1. Male 2. Female
40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train — Code: 2
1. Yes 2. No 3. Unknown
41. Driver — Code: 3
1. Drove around or thru the gate 2. Stopped and then proceeded 3. Did not stop 4. Stopped on crossing 5. Other (specify)

42. Driver Passed Standing Highway Vehicle — Code: 2
1. Yes 2. No 3. Unknown
43. View of Track Obscured by (primary obstruction) — Code: 8
1. Permanent Structure 2. Standing railroad equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicles 7. Other (specify) 8. Not Obstructed

Casualties to:	Killed	Injured
46. Highway-Rail Crossing Users	0	0
49. Railroad Employees	0	0
52. Passengers on Train	0	0

44. Driver was — Code: 3
1. Killed 2. Injured 3. Uninjured
45. Was Driver in the Vehicle? — Code: 1
1. Yes 2. No
47. Highway Vehicle Property Damage (est. dollar damage): $1,000
48. Total Number of Highway-Rail Crossing Users (include driver): 1
50. Total Number of People on Train (include passengers and crew):
51. Is a Rail Equipment Accident / Incident Report Being Filed — Code: 2
1. Yes 2. No

53a. Special Study Block
53b. Special Study Block

54. Narrative Description

55. Typed Name and Title
56. Signature
57. Date

FORM FRA F 6180.57

* NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

OMB Approval No. 2130-0500

Name Of	Alphabetic Code	RR Accident/Incident No.
1. Reporting Railroad: Southern Pacific Transportation Co. [SP]	1a. SP	1b. E1300
2. Other Railroad Involved in Train Accident/Incident	2a.	2b.
3. Railroad Responsible for Track Maintenance: Southern Pacific Transportation Co. [SP]	3a. SP	3b. E1300

4. U.S. DOT-AAR Grade Crossing ID No.: 751527E
5. Date of Accident/Incident: 03/06/90
6. Time of Accident/Incident: 12:05 PM

7. Nearest Railroad Station: ARMY POINT
8. Division:
9. County: SOLANO
10. State Abbr.: 06 Code: CA

11. City (if in a city): BENICIA
12. Highway Name or No.: PARK STREET
☑ Public ☐ Private

Highway User Involved

13. Type — Code: A
A. Auto B. Truck C. Truck-trailer D. Pick-up truck E. Van F. Bus G. School Bus H. Motorcycle J. Other Motor Vehicle K. Pedestrian M. Other (specify)

14. Vehicle Speed (est. mph at impact): 7

15. Direction (geographical) — Code: 4
1. North 2. South 3. East 4. West

16. Position — Code: 3
1. Stalled on crossing 2. Stopped on Crossing 3. Moving over crossing 4. Trapped

20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? — Code: 4
1. Highway User 2. Rail Equipment 3. Both 4. Neither

Rail Equipment Involved

17. Equipment — Code: 6
1. Train (units pulling) 2. Train (units pushing) 3. Train (standing) 4. Car(s) (moving) 5. Car(s) (standing) 6. Light loco(s) (moving) 7. Light loco(s) (standing) 8. Other (specify) A. Train pulling- RCL B. Train pushing- RCL C. Train standing- RCL

18. Position of Car Unit in Train: 1

19. Circumstance — Code: 1
1. Rail equipment struck highway user 2. Rail equipment struck by highway user

20b. Was there a hazardous materials release by — Code:
1. Highway User 2. Rail Equipment 3. Both 4. Neither

20c. State the name and quantity of the hazardous material released, if any

21. Temperature (specify if minus): 70 °F

22. Visibility (single entry) — Code: 2
1. Dawn 2. Day 3. Dusk 4. Dark

23. Weather (single entry) — Code: 1
1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow

24. Type of Equipment Consist (single entry) — Code: 8
1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/Switching 8. Light loco(s) 9. Main./inspect. car A. Spec. MoW Equip.

25. Track Type Used by Rail Equipment Involved — Code: 2
1. Main 2. Yard 3. Siding 4. Industry

26. Track Number or Name: 0710

27. FRA Track Class: 1

28. Number of Locomotive Units: 1

29. Number of Cars: 0

30. Consist Speed (Recorded if available) — Code: E
R. Recorded
E. Estimated 7 mph

31. Time Table Direction — Code: 4
1. North 2. South 3. East 4. West

32. Type of Crossing Warning
1. Gates 2. Cantilever FLS 3. Standard FLS 4. Wig wags 5. Hwy. traffic signals 6. Audible 7. Crossbucks 8. Stop signs 9. Watchman 10. Flagged by crew 11. Other (specify) 12. None
Code(s): 07

33. Signaled Crossing Warning

34. Whistle Ban — Code:
1. Yes 2. No 3. Unknown

35. Location of Warning — Code: 1
1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach

36. Crossing Warning Interconnected with Highway Signals — Code: 2
1. Yes 2. No 3. Unknown

37. Crossing Illuminated by Street Lights or Special Lights — Code: 2
1. Yes 2. No 3. Unknown

38. Driver's Age

39. Driver's Gender — Code:
1. Male 2. Female

40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train — Code: 2
1. Yes 2. No 3. Unknown

41. Driver — Code: 4
1. Drove around or thru the gate 2. Stopped and then proceeded 3. Did not stop 4. Stopped on crossing 5. Other (specify)

42. Driver Passed Standing Highway Vehicle — Code: 2
1. Yes 2. No 3. Unknown

43. View of Track Obscured by (primary obstruction) — Code: 8
1. Permanent Structure 2. Standing railroad equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicles 7. Other (specify) 8. Not Obstructed

Casualties to:	Killed	Injured
46. Highway-Rail Crossing Users	0	0
49. Railroad Employees	0	0
52. Passengers on Train	0	0

44. Driver was — Code: 3
1. Killed 2. Injured 3. Uninjured

45. Was Driver in the Vehicle? — Code: 1
1. Yes 2. No

47. Highway Vehicle Property Damage (est. dollar damage): $500

48. Total Number of Highway-Rail Crossing Users (include driver): 1

50. Total Number of People on Train (include passengers and crew):

51. Is a Rail Equipment Accident / Incident Report Being Filed — Code: 2
1. Yes 2. No

53a. Special Study Block

53b. Special Study Block

54. Narrative Description

55. Typed Name and Title

56. Signature

57. Date

FORM FRA F 6180.57

* NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

OMB Approval No. 2130-0500

Name Of	Alphabetic Code	RR Accident/Incident No.
1. Reporting Railroad: Southern Pacific Transportation Co. [SP]	1a. SP	1b. 50329
2. Other Railroad Involved in Train Accident/Incident	2a.	2b.
3. Railroad Responsible for Track Maintenance: Southern Pacific Transportation Co. [SP]	3a. SP	3b. 50329

4. U.S. DOT-AAR Grade Crossing ID No. 751527E | 5. Date of Accident/Incident 01/25/89 | 6. Time of Accident/Incident 12:12 PM

7. Nearest Railroad Station: ARMY POINT | 8. Division: | 9. County: SOLANO | 10. State Abbr. 06 Code CA

11. City (if in a city) BENICIA | 12. Highway Name or No. PARK | ☑ Public ☐ Private

Highway User Involved

13. Type — A. Auto, B. Truck, C. Truck-trailer, D. Pick-up truck, E. Van, F. Bus, G. School Bus, H. Motorcycle, J. Other Motor Vehicle, K. Pedestrian, M. Other (specify) — Code: A

14. Vehicle Speed (est. mph at impact): 5

15. Direction (geographical) — 1. North 2. South 3. East 4. West — Code: 3

16. Position — 1. Stalled on crossing 2. Stopped on Crossing 3. Moving over crossing 4. Trapped — Code: 3

20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? — 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code: 4

Rail Equipment Involved

17. Equipment — 1. Train (units pulling) 2. Train (units pushing) 3. Train (standing) 4. Car(s) (moving) 5. Car(s) (standing) 6. Light loco(s) (moving) 7. Light loco(s) (standing) 8. Other (specify) A. Train pulling- RCL B. Train pushing- RCL C. Train standing- RCL — Code: 6

18. Position of Car Unit in Train: 1

19. Circumstance — 1. Rail equipment struck highway user 2. Rail equipment struck by highway user — Code: 1

20b. Was there a hazardous materials release by — 1. Highway User 2. Rail Equipment 3. Both 4. Neither — Code:

20c. State the name and quantity of the hazardous material released, if any

21. Temperature (specify if minus) 55 °F

22. Visibility (single entry) — 1. Dawn 2. Day 3. Dusk 4. Dark — Code: 2

23. Weather (single entry) — 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow — Code: 1

24. Type of Equipment Consist (single entry) — 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/Switching 8. Light loco(s) 9. Main./inspect. car A. Spec. MoW Equip. — Code: 8

25. Track Type Used by Rail Equipment Involved — 1. Main 2. Yard 3. Siding 4. Industry — Code: 2

26. Track Number or Name: 700 LEAD

27. FRA Track Class: 1

28. Number of Locomotive Units: 1

29. Number of Cars: 0

30. Consist Speed (Recorded if available) — R. Recorded E. Estimated — 5 mph — Code: E

31. Time Table Direction — 1. North 2. South 3. East 4. West — Code: 3

32. Type of Crossing Warning — 1. Gates 2. Cantilever FLS 3. Standard FLS 4. Wig wags 5. Hwy. traffic signals 6. Audible 7. Crossbucks 8. Stop signs 9. Watchman 10. Flagged by crew 11. Other (specify) 12. None

Code(s): 07

33. Signaled Crossing Warning

34. Whistle Ban — 1. Yes 2. No 3. Unknown — Code:

35. Location of Warning — 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach — Code: 1

36. Crossing Warning Interconnected with Highway Signals — 1. Yes 2. No 3. Unknown — Code: 2

37. Crossing Illuminated by Street Lights or Special Lights — 1. Yes 2. No 3. Unknown — Code: 2

38. Driver's Age

39. Driver's Gender — 1. Male 2. Female — Code:

40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train — 1. Yes 2. No 3. Unknown — Code: 2

41. Driver — 1. Drove around or thru the gate 2. Stopped and then proceeded 3. Did not stop 4. Stopped on crossing 5. Other (specify) — Code: 3

42. Driver Passed Standing Highway Vehicle — 1. Yes 2. No 3. Unknown — Code: 2

43. View of Track Obscured by (primary obstruction) — 1. Permanent Structure 2. Standing railroad equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicles 7. Other (specify) 8. Not Obstructed — Code: 8

Casualties to:	Killed	Injured
46. Highway-Rail Crossing Users	0	0
49. Railroad Employees	0	0
52. Passengers on Train	0	0

44. Driver was — 1. Killed 2. Injured 3. Uninjured — Code: 3

45. Was Driver in the Vehicle? — 1. Yes 2. No — Code: 1

47. Highway Vehicle Property Damage (est. dollar damage): $1,500

48. Total Number of Highway-Rail Crossing Users (include driver): 1

50. Total Number of People on Train (include passengers and crew):

51. Is a Rail Equipment Accident / Incident Report Being Filed — 1. Yes 2. No — Code: 2

53a. Special Study Block | 53b. Special Study Block

54. Narrative Description

55. Typed Name and Title | 56. Signature | 57. Date

FORM FRA F 6180.57

* NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

APPENDIX B: INTERSECTION ANALYSIS WORKSHEETS

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Existing (No Train) PM**
Volume and Delay by Movement | **PM**

Intersection 1 **Bayshore Road/Park Road** **All-way Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	19	18	95.3%	0.2	5.7	1.1	A
	Through	26	26	99.2%	0.0	4.5	1.7	A
	Right Turn	159	153	96.5%	0.4	5.7	0.8	A
	Subtotal	**204**	**197**	**96.7%**	0.5	**5.6**	**0.7**	**A**
SB	Left Turn	21	19	89.5%	0.5	6.0	0.6	A
	Through	32	31	97.2%	0.2	6.9	0.8	A
	Right Turn	8	8	98.8%	0.0	5.1	2.4	A
	Subtotal	**61**	**58**	**94.8%**	0.4	**6.4**	**0.8**	**A**
EB	Left Turn	8	8	105.0%	0.1	4.0	1.7	A
	Through	40	40	99.0%	0.1	6.8	0.6	A
	Right Turn	22	21	96.8%	0.2	6.6	2.1	A
	Subtotal	**70**	**69**	**99.0%**	0.1	**6.4**	**0.7**	**A**
WB	Left Turn	241	239	99.2%	0.1	7.3	1.3	A
	Through	32	31	96.3%	0.2	5.0	0.8	A
	Right Turn	18	19	103.3%	0.1	4.4	1.0	A
	Subtotal	**291**	**288**	**99.1%**	0.2	**6.9**	**1.1**	**A**
Total		**626**	**613**	**97.9%**	0.5	**6.4**	**0.6**	**A**

Intersection 2 **Bayshore Road/I-680 SB On-Ramp** **Uncontrolled**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	73	73	100.1%	0.0	2.4	0.7	A
	Through	204	197	96.6%	0.5	0.8	0.2	A
	Right Turn							
	Subtotal	**277**	**270**	**97.5%**	0.4	**1.2**	**0.2**	**A**
SB	Left Turn							
	Through	24	24	99.6%	0.0	0.9	0.3	A
	Right Turn	270	268	99.1%	0.1	1.2	0.1	A
	Subtotal	**294**	**292**	**99.1%**	0.1	**1.2**	**0.1**	**A**
EB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**571**	**562**	**98.4%**	0.4	**1.2**	**0.1**	**A**

Intersection 3 **Bayshore Road/I-680 NB Off-Ramp** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through	119	116	97.6%	0.3	0.3	0.1	A
	Right Turn							
	Subtotal	**119**	**116**	**97.6%**	0.3	**0.3**	**0.1**	**A**
SB	Left Turn							
	Through	24	24	99.6%	0.0	0.0	0.1	A
	Right Turn							
	Subtotal	**24**	**24**	**99.6%**	0.0	**0.0**	**0.1**	**A**
EB	Left Turn	158	154	97.7%	0.3	10.2	1.1	B
	Through							
	Right Turn	41	43	103.7%	0.2	7.0	0.8	A
	Subtotal	**199**	**197**	**98.9%**	0.2	**9.6**	**0.9**	**A**
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**342**	**337**	**98.5%**	0.3	**5.7**	**0.5**	**A**

Intersection 4 **Bay Vista Court/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn	10	12	119.0%	0.6	4.1	0.7	A
	Subtotal	**10**	**12**	**119.0%**	0.6	**4.1**	**0.7**	**A**
SB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
EB	Left Turn							
	Through	60	58	96.2%	0.3	0.4	0.1	A
	Right Turn							
	Subtotal	**60**	**58**	**96.2%**	0.3	**0.4**	**0.1**	**A**
WB	Left Turn	10	10	95.0%	0.2	0.3	0.2	A
	Through	49	47	96.1%	0.3	0.1	0.0	A
	Right Turn							
	Subtotal	**59**	**57**	**95.9%**	0.3	**0.1**	**0.1**	**A**
Total		**129**	**126**	**97.8%**	0.2	**0.6**	**0.1**	**A**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Existing (No Train) PM**
Volume and Delay by Movement | **PM**

Intersection 5 **Valero Refinery Entrance/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
SB	Left Turn	35	34	96.9%	0.2	8.7	1.2	A
	Through							
	Right Turn	35	36	103.7%	0.2	6.9	1.9	A
	Subtotal	**70**	**70**	**100.3%**	0.0	**8.0**	**1.1**	**A**
EB	Left Turn	10	9	85.0%	0.5	1.3	2.1	A
	Through	210	203	96.8%	0.5	0.1	0.0	A
	Right Turn							
	Subtotal	**220**	**212**	**96.3%**	0.6	**0.2**	**0.1**	**A**
WB	Left Turn							
	Through	256	252	98.5%	0.2	0.3	0.1	A
	Right Turn	10	10	101.0%	0.0	0.5	0.2	A
	Subtotal	**266**	**262**	**98.6%**	0.2	**0.3**	**0.1**	**A**
Total		**556**	**544**	**97.9%**	0.5	**1.2**	**0.2**	**A**

Intersection 0 / **-**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
SB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
EB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
WB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
Total						**0.0**	**#N/A**	**A**

VISSIM Post-Processor
Average Values from 10 Runs
Queue Counter

Valero Refinery TIA
Existing PM
PM Peak Hour

Queue Counter	Int	Mov	Description	Average Queue (feet)			
				Average	Std. Dev.	Maximum	Std. Dev.
12			Bayshore/Park SB	1	0	69	9
15			Bayshore/Park WB TR	1	0	73	20
16			Bayshore/Park WB L	5	1	102	16
17			Bayshore/Park NB R	4	1	85	11
18			Bayshore/Park NB TL	1	0	68	4
29			Bayshore/I-680 On L	0	0	6	13
38			Bayshore/I-680 Off NB	0	0	0	0
48			Bay Vista/Park NB	0	0	0	0
52			Valero/Park SB	2	0	51	5
55			Valero/Park WB	0	0	0	0
111			Bayshore/Park EB	1	0	69	8
311			Bayshore/I-680 Off EB	7	1	136	30
511			Bayshore/Park EB	0	0	0	0
901			RR Track T	0	0	5	11
902			RR Track L	2	1	101	59

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Existing (With Train) PM**
Volume and Delay by Movement | **PM**

Intersection 1 **Bayshore Road/Park Road** **All-way Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	19	18	92.1%	0.4	35.5	61.9	E
	Through	26	26	98.8%	0.1	34.4	43.0	D
	Right Turn	159	154	96.7%	0.4	199.2	37.0	F
	Subtotal	**204**	**197**	**96.5%**	0.5	**160.5**	**19.5**	**F**
SB	Left Turn	21	20	96.2%	0.2	310.0	138.9	F
	Through	32	29	90.6%	0.5	135.1	130.5	F
	Right Turn	8	9	107.5%	0.2	144.0	207.3	F
	Subtotal	**61**	**58**	**94.8%**	0.4	**185.7**	**135.2**	**F**
EB	Left Turn	8	8	98.8%	0.0	311.7	198.5	F
	Through	40	36	91.0%	0.6	275.9	53.0	F
	Right Turn	22	22	97.7%	0.1	214.4	88.7	F
	Subtotal	**70**	**66**	**94.0%**	0.5	**262.7**	**29.4**	**F**
WB	Left Turn	241	238	98.8%	0.2	331.3	39.3	F
	Through	32	32	98.4%	0.1	276.7	123.4	F
	Right Turn	18	19	105.0%	0.2	266.6	217.1	F
	Subtotal	**291**	**289**	**99.2%**	0.1	**313.9**	**35.0**	**F**
Total		**626**	**609**	**97.3%**	0.7	**235.8**	**26.4**	**F**

Intersection 2 **Bayshore Road/I-680 SB On-Ramp** **Uncontrolled**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	73	73	99.5%	0.0	13.0	15.0	B
	Through	204	197	96.6%	0.5	128.5	29.4	F
	Right Turn							
	Subtotal	**277**	**270**	**97.4%**	0.4	**95.4**	**21.6**	**F**
SB	Left Turn							
	Through	24	24	99.6%	0.0	2.0	0.9	A
	Right Turn	270	265	98.3%	0.3	2.1	0.3	A
	Subtotal	**294**	**289**	**98.4%**	0.3	**2.1**	**0.3**	**A**
EB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**571**	**559**	**97.9%**	0.5	**54.4**	**11.4**	**F**

Intersection 3 **Bayshore Road/I-680 NB Off-Ramp** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through	119	116	97.4%	0.3	113.8	34.9	F
	Right Turn							
	Subtotal	**119**	**116**	**97.4%**	0.3	**113.8**	**34.9**	**F**
SB	Left Turn							
	Through	24	24	99.6%	0.0	0.6	1.2	A
	Right Turn							
	Subtotal	**24**	**24**	**99.6%**	0.0	**0.6**	**1.2**	**A**
EB	Left Turn	158	154	97.3%	0.3	227.7	58.5	F
	Through							
	Right Turn	41	43	103.7%	0.2	142.8	66.8	F
	Subtotal	**199**	**196**	**98.6%**	0.2	**212.1**	**57.8**	**F**
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**342**	**336**	**98.2%**	0.3	**152.1**	**32.9**	**F**

Intersection 4 **Bay Vista Court/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn	10	8	79.0%	0.7	50.5	56.5	F
	Subtotal	**10**	**8**	**79.0%**	0.7	**50.5**	**56.5**	**F**
SB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
EB	Left Turn							
	Through	60	58	96.7%	0.3	38.5	25.1	E
	Right Turn							
	Subtotal	**60**	**58**	**96.7%**	0.3	**38.5**	**25.1**	**E**
WB	Left Turn	10	11	106.0%	0.2	0.8	1.3	A
	Through	49	47	95.7%	0.3	0.2	0.1	A
	Right Turn							
	Subtotal	**59**	**58**	**97.5%**	0.2	**0.3**	**0.4**	**A**
Total		**129**	**123**	**95.7%**	0.5	**26.5**	**14.9**	**D**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Existing (With Train) PM**
Volume and Delay by Movement | **PM**

Intersection 5 **Valero Refinery Entrance/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
SB	Left Turn	35	34	96.6%	0.2	104.0	71.7	F
	Through							
	Right Turn	35	36	103.4%	0.2	184.2	61.2	F
	Subtotal	**70**	**70**	**100.0%**	0.0	**148.3**	**49.0**	**F**
EB	Left Turn	10	9	94.0%	0.2	3.7	4.1	A
	Through	210	201	95.7%	0.6	18.4	0.9	C
	Right Turn							
	Subtotal	**220**	**210**	**95.6%**	0.7	**17.7**	**0.7**	**C**
WB	Left Turn							
	Through	256	252	98.4%	0.3	294.1	40.8	F
	Right Turn	10	9	92.0%	0.3	137.0	174.9	F
	Subtotal	**266**	**261**	**98.1%**	0.3	**284.7**	**39.0**	**F**
Total		**556**	**541**	**97.4%**	0.6	**147.5**	**16.7**	**F**

Intersection 0 / **-**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
SB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
EB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
WB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
Total						**0.0**	**#N/A**	**A**

VISSIM Post-Processor
Average Values from 10 Runs
Queue Counter

Valero Refinery TIA
Existing (With Train) PM
PM Peak Hour

Queue Counter	Int	Mov	Description	Average Queue (feet)			
				Average	Std. Dev.	Maximum	Std. Dev.
12			Bayshore/Park SB	60	55	179	90
15			Bayshore/Park WB TR	1	1	81	24
16			Bayshore/Park WB L	11	1	126	21
17			Bayshore/Park NB R	399	41	613	13
18			Bayshore/Park NB TL	1	0	65	10
29			Bayshore/I-680 On L	0	1	23	38
38			Bayshore/I-680 Off NB	52	24	240	36
48			Bay Vista/Park NB	0	0	0	0
52			Valero/Park SB	54	19	190	45
55			Valero/Park WB	29	21	268	128
111			Bayshore/Park EB	134	26	369	70
311			Bayshore/I-680 Off EB	340	115	973	211
511			Bayshore/Park EB	0	0	0	0
901			RR Track T	99	269	187	492
902			RR Track L	919	56	1574	16

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Existing Plus Project PM**
Volume and Delay by Movement | **PM**

Intersection 1 **Bayshore Road/Park Road** **All-way Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	19	17	91.6%	0.4	23.1	37.1	C
	Through	26	26	100.0%	0.0	22.8	26.1	C
	Right Turn	159	154	97.0%	0.4	104.1	16.9	F
	Subtotal	**204**	**198**	**96.9%**	0.5	**86.0**	**10.3**	**F**
SB	Left Turn	21	21	98.6%	0.1	154.3	106.5	F
	Through	32	29	89.1%	0.6	64.6	75.0	F
	Right Turn	8	9	107.5%	0.2	67.9	128.0	F
	Subtotal	**61**	**58**	**94.8%**	0.4	**88.2**	**75.9**	**F**
EB	Left Turn	8	8	97.5%	0.1	144.5	140.6	F
	Through	40	37	91.8%	0.5	171.5	38.0	F
	Right Turn	22	21	96.8%	0.2	115.8	54.4	F
	Subtotal	**70**	**66**	**94.0%**	0.5	**149.5**	**27.0**	**F**
WB	Left Turn	241	238	98.7%	0.2	135.8	10.8	F
	Through	32	31	97.8%	0.1	138.6	57.7	F
	Right Turn	18	18	101.7%	0.1	95.6	62.5	F
	Subtotal	**291**	**288**	**98.8%**	0.2	**134.4**	**9.2**	**F**
Total		**626**	**609**	**97.2%**	0.7	**116.3**	**10.7**	**F**

Intersection 2 **Bayshore Road/I-680 SB On-Ramp** **Uncontrolled**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	73	72	99.2%	0.1	7.1	5.5	A
	Through	204	198	96.9%	0.5	57.3	15.4	F
	Right Turn							
	Subtotal	**277**	**270**	**97.5%**	0.4	**43.1**	**11.4**	**E**
SB	Left Turn							
	Through	24	23	95.4%	0.2	1.9	0.6	A
	Right Turn	270	265	98.3%	0.3	2.1	0.2	A
	Subtotal	**294**	**288**	**98.0%**	0.3	**2.1**	**0.2**	**A**
EB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**571**	**558**	**97.8%**	0.5	**22.0**	**5.7**	**C**

Intersection 3 **Bayshore Road/I-680 NB Off-Ramp** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through	119	116	97.3%	0.3	32.0	17.9	D
	Right Turn							
	Subtotal	**119**	**116**	**97.3%**	0.3	**32.0**	**17.9**	**D**
SB	Left Turn							
	Through	24	23	95.4%	0.2	0.4	0.6	A
	Right Turn							
	Subtotal	**24**	**23**	**95.4%**	0.2	**0.4**	**0.6**	**A**
EB	Left Turn	158	154	97.5%	0.3	83.3	46.8	F
	Through							
	Right Turn	41	42	102.7%	0.2	62.4	54.4	F
	Subtotal	**199**	**196**	**98.6%**	0.2	**79.9**	**46.5**	**F**
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**342**	**335**	**97.9%**	0.4	**57.4**	**31.8**	**F**

Intersection 4 **Bay Vista Court/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn	10	8	79.0%	0.7	8.2	7.0	A
	Subtotal	**10**	**8**	**79.0%**	0.7	**8.2**	**7.0**	**A**
SB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
EB	Left Turn							
	Through	60	58	96.7%	0.3	3.9	3.2	A
	Right Turn							
	Subtotal	**60**	**58**	**96.7%**	0.3	**3.9**	**3.2**	**A**
WB	Left Turn	10	11	111.0%	0.3	0.4	0.2	A
	Through	49	46	94.1%	0.4	0.1	0.1	A
	Right Turn							
	Subtotal	**59**	**57**	**96.9%**	0.2	**0.1**	**0.1**	**A**
Total		**129**	**123**	**95.4%**	0.5	**2.6**	**1.7**	**A**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Existing Plus Project PM**
Volume and Delay by Movement | **PM**

Intersection 5 **Valero Refinery Entrance/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
SB	Left Turn	35	35	98.6%	0.1	32.8	30.9	D
	Through							
	Right Turn	35	36	101.4%	0.1	65.1	35.7	F
	Subtotal	**70**	**70**	**100.0%**	0.0	**49.7**	**25.8**	**E**
EB	Left Turn	10	9	90.0%	0.3	3.2	3.2	A
	Through	210	203	96.6%	0.5	10.1	1.0	B
	Right Turn							
	Subtotal	**220**	**212**	**96.3%**	0.6	**9.7**	**0.9**	**A**
WB	Left Turn							
	Through	256	251	98.2%	0.3	99.6	16.0	F
	Right Turn	10	9	94.0%	0.2	47.1	44.5	E
	Subtotal	**266**	**261**	**98.0%**	0.3	**97.4**	**15.6**	**F**
Total		**556**	**543**	**97.6%**	0.6	**57.0**	**9.1**	**F**

Intersection 0 / **-**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
SB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
EB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
WB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
Total						**0.0**	**#N/A**	**A**

VISSIM Post-Processor
Average Values from 10 Runs
Queue Counter

Valero Refinery TIA
EPP PM
PM Peak Hour

Queue Counter	Int	Mov	Description	Average Queue (feet)			
				Average	Std. Dev.	Maximum	Std. Dev.
12			Bayshore/Park SB	28	30	129	80
15			Bayshore/Park WB TR	1	1	76	26
16			Bayshore/Park WB L	9	1	114	17
17			Bayshore/Park NB R	250	48	604	10
18			Bayshore/Park NB TL	1	0	59	4
29			Bayshore/I-680 On L	0	0	17	28
38			Bayshore/I-680 Off NB	7	9	84	66
48			Bay Vista/Park NB	0	0	0	0
52			Valero/Park SB	14	8	94	34
55			Valero/Park WB	0	0	0	0
111			Bayshore/Park EB	64	14	234	59
311			Bayshore/I-680 Off EB	128	90	521	213
511			Bayshore/Park EB	0	0	0	0
901			RR Track T	60	150	158	362
902			RR Track L	505	65	1218	117

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **EXISTING PLUS PROJECT PM**
Volume and Delay by Movement | **PM**

Intersection 1 **Bayshore Road/Park Road** **All-way Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	3	3	113.3%	0.2	2.4	2.0	A
	Through	2	1	65.0%	0.5	1.8	2.9	A
	Right Turn	34	32	94.7%	0.3	131.2	59.3	F
	Subtotal	**39**	**37**	**94.6%**	0.3	**103.7**	**49.3**	**F**
SB	Left Turn	2	4	205.0%	1.2	140.0	162.1	F
	Through	1	0	0.0%	1.4			
	Right Turn							
	Subtotal	**3**	**4**	**136.7%**	0.6	**115.8**	**137.4**	**F**
EB	Left Turn							
	Through	2	2	115.0%	0.2	118.6	175.0	F
	Right Turn	1	2	170.0%	0.6	0.9	1.2	A
	Subtotal	**3**	**4**	**133.3%**	0.5	**81.6**	**114.0**	**F**
WB	Left Turn	18	19	106.1%	0.3	130.7	63.7	F
	Through	4	4	100.0%	0.0	88.4	145.5	F
	Right Turn	6	6	98.3%	0.0	84.3	119.0	F
	Subtotal	**28**	**29**	**103.6%**	0.2	**117.2**	**41.2**	**F**
Total		**73**	**74**	**101.4%**	0.1	**113.4**	**21.1**	**F**

Intersection 2 **Bayshore Road/I-680 SB On-Ramp** **Uncontrolled**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	2	2	120.0%	0.3	0.1	0.2	A
	Through	39	37	94.6%	0.3	0.3	0.1	A
	Right Turn							
	Subtotal	**41**	**39**	**95.9%**	0.3	**0.3**	**0.1**	**A**
SB	Left Turn							
	Through	3	2	80.0%	0.4	0.6	0.9	A
	Right Turn	17	18	107.1%	0.3	0.5	0.3	A
	Subtotal	**20**	**21**	**103.0%**	0.1	**0.5**	**0.3**	**A**
EB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**61**	**60**	**98.2%**	0.1	**0.4**	**0.1**	**A**

Intersection 3 **Bayshore Road/I-680 NB Off-Ramp** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through	3	4	133.3%	0.5	0.1	0.3	A
	Right Turn							
	Subtotal	**3**	**4**	**133.3%**	0.5	**0.1**	**0.3**	**A**
SB	Left Turn							
	Through	3	2	80.0%	0.4	0.0	0.0	A
	Right Turn							
	Subtotal	**3**	**2**	**80.0%**	0.4	**0.0**	**0.0**	**A**
EB	Left Turn	38	35	92.9%	0.4	5.6	0.6	A
	Through							
	Right Turn	4	5	132.5%	0.6	4.1	2.1	A
	Subtotal	**42**	**41**	**96.7%**	0.2	**5.4**	**0.7**	**A**
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**48**	**47**	**97.9%**	0.1	**4.6**	**0.6**	**A**

Intersection 4 **Bay Vista Court/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
SB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
EB	Left Turn							
	Through	3	4	133.3%	0.5	0.1	0.0	A
	Right Turn							
	Subtotal	**3**	**4**	**133.3%**	0.5	**0.1**	**0.0**	**A**
WB	Left Turn	2	3	125.0%	0.3	0.2	0.2	A
	Through	5	5	98.0%	0.0	0.1	0.1	A
	Right Turn							
	Subtotal	**7**	**7**	**105.7%**	0.1	**0.1**	**0.1**	**A**
Total		**10**	**11**	**114.0%**	0.4	**0.1**	**0.0**	**A**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **EXISTING PLUS PROJECT PM**
Volume and Delay by Movement | **PM**

Intersection 5 **Valero Refinery Entrance/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
SB	Left Turn							
	Through							
	Right Turn	2	4	205.0%	1.2	4.6	1.0	A
	Subtotal	**2**	**4**	**205.0%**	1.2	**4.6**	**1.0**	**A**
EB	Left Turn	3	3	96.7%	0.1	0.1	0.1	A
	Through	35	36	102.0%	0.1	0.0	0.0	A
	Right Turn							
	Subtotal	**38**	**39**	**101.6%**	0.1	**0.0**	**0.1**	**A**
WB	Left Turn							
	Through	26	25	95.4%	0.2	0.0	0.0	A
	Right Turn	3	3	93.3%	0.1	0.2	0.2	A
	Subtotal	**29**	**28**	**95.2%**	0.3	**0.1**	**0.1**	**A**
Total		**69**	**70**	**101.9%**	0.2	**0.4**	**0.1**	**A**

VISSIM Post-Processor **Valero Refinery TIA**
Average Results from 10 Runs **CB (With Train) PM**
Volume and Delay by Movement **PM**

Intersection 1 **Bayshore Road/Park Road** **All-way Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	30	27	88.7%	0.6	44.1	79.4	E
	Through	30	33	108.3%	0.4	39.9	68.1	E
	Right Turn	210	203	96.8%	0.5	244.0	32.3	F
	Subtotal	**270**	**262**	**97.2%**	0.5	**192.9**	**26.7**	**F**
SB	Left Turn	30	27	90.3%	0.5	330.8	112.7	F
	Through	40	39	97.3%	0.2	215.3	116.5	F
	Right Turn	10	9	87.0%	0.4	166.6	133.7	F
	Subtotal	**80**	**75**	**93.4%**	0.6	**248.3**	**108.4**	**F**
EB	Left Turn	10	9	87.0%	0.4	222.3	218.9	F
	Through	60	60	99.5%	0.0	234.9	42.3	F
	Right Turn	30	30	99.7%	0.0	145.4	71.4	F
	Subtotal	**100**	**98**	**98.3%**	0.2	**211.9**	**17.5**	**F**
WB	Left Turn	320	323	100.9%	0.2	356.7	40.0	F
	Through	50	48	95.4%	0.3	420.9	204.6	F
	Right Turn	20	19	92.5%	0.3	298.5	233.4	F
	Subtotal	**390**	**389**	**99.8%**	0.0	**347.9**	**21.1**	**F**
Total		**840**	**825**	**98.2%**	0.5	**253.2**	**18.5**	**F**

Intersection 2 **Bayshore Road/I-680 SB On-Ramp** **Uncontrolled**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	100	98	98.0%	0.2	15.6	12.0	C
	Through	270	262	97.0%	0.5	159.2	29.2	F
	Right Turn							
	Subtotal	**370**	**360**	**97.2%**	0.5	**120.0**	**19.8**	**F**
SB	Left Turn							
	Through	30	31	104.0%	0.2	2.1	1.2	A
	Right Turn	360	360	100.1%	0.0	2.6	0.4	A
	Subtotal	**390**	**392**	**100.4%**	0.1	**2.6**	**0.3**	**A**
EB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**760**	**751**	**98.9%**	0.3	**68.7**	**10.3**	**F**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **CB (With Train) PM**
Volume and Delay by Movement | **PM**

Intersection 3 **Bayshore Road/I-680 NB Off-Ramp** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through	160	157	98.3%	0.2	0.7	0.3	A
	Right Turn							
	Subtotal	**160**	**157**	**98.3%**	0.2	**0.7**	**0.3**	**A**
SB	Left Turn							
	Through	30	31	104.0%	0.2	0.3	0.2	A
	Right Turn							
	Subtotal	**30**	**31**	**104.0%**	0.2	**0.3**	**0.2**	**A**
EB	Left Turn	210	203	96.7%	0.5	218.3	46.5	F
	Through							
	Right Turn	60	64	106.0%	0.5	223.3	50.8	F
	Subtotal	**270**	**267**	**98.8%**	0.2	**219.7**	**45.4**	**F**
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**460**	**455**	**98.9%**	0.2	**147.9**	**33.0**	**F**

Intersection 4 **Bay Vista Court/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	10	10	96.0%	0.1	10.5	18.0	B
	Through							
	Right Turn	20	20	97.5%	0.1	92.3	45.5	F
	Subtotal	**30**	**29**	**97.0%**	0.2	**69.6**	**36.1**	**F**
SB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
EB	Left Turn							
	Through	80	79	98.6%	0.1	107.2	54.0	F
	Right Turn	10	11	109.0%	0.3	77.7	87.4	F
	Subtotal	**90**	**90**	**99.8%**	0.0	**103.6**	**50.5**	**F**
WB	Left Turn	20	20	101.5%	0.1	1.8	3.4	A
	Through	70	63	89.9%	0.9	0.1	0.1	A
	Right Turn							
	Subtotal	**90**	**83**	**92.4%**	0.7	**0.3**	**0.4**	**A**
Total		**210**	**202**	**96.2%**	0.6	**71.8**	**30.7**	**F**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **CB (With Train) PM**
Volume and Delay by Movement | **PM**

Intersection 5 **Valero Refinery Entrance/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
SB	Left Turn	50	48	95.4%	0.3	163.0	71.3	F
	Through							
	Right Turn	50	52	103.2%	0.2	246.4	93.1	F
	Subtotal	**100**	**99**	**99.3%**	0.1	**202.7**	**73.0**	**F**
EB	Left Turn	20	19	96.0%	0.2	15.8	35.0	C
	Through	280	271	96.9%	0.5	14.6	5.2	B
	Right Turn							
	Subtotal	**300**	**291**	**96.9%**	0.5	**15.2**	**1.3**	**C**
WB	Left Turn							
	Through	340	337	99.0%	0.2	381.4	40.5	F
	Right Turn	20	20	97.5%	0.1	365.1	222.1	F
	Subtotal	**360**	**356**	**98.9%**	0.2	**375.1**	**43.7**	**F**
Total		**760**	**746**	**98.2%**	0.5	**170.1**	**25.0**	**F**

Intersection 0 / **-**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
SB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
EB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
WB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
Total						**0.0**	**#N/A**	**A**

VISSIM Post-Processor
Average Values from 10 Runs
Queue Counter

Valero Refinery TIA
CB (With Train) PM
PM Peak Hour

Queue Counter	Int	Mov	Description	Average Queue (feet)			
				Average	Std. Dev.	Maximum	Std. Dev.
12			Bayshore/Park SB	118	60	304	77
15			Bayshore/Park WB TR	1	0	71	15
16			Bayshore/Park WB L	18	1	125	12
17			Bayshore/Park NB R	440	24	616	14
18			Bayshore/Park NB TL	1	0	62	5
29			Bayshore/I-680 On L	1	1	37	37
38			Bayshore/I-680 Off NB	91	18	258	7
48			Bay Vista/Park NB	2	4	37	22
52			Valero/Park SB	103	34	225	3
55			Valero/Park WB	941	62	2202	141
111			Bayshore/Park EB	221	59	510	121
311			Bayshore/I-680 Off EB	565	114	1641	210
511			Bayshore/Park EB	0	0	7	15
901			RR Track T	44	100	87	145
902			RR Track L	397	11	498	13

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Cumulative Plus Project**
Volume and Delay by Movement | **PM**

Intersection 1 **Bayshore Road/Park Road** **All-way Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	30	28	91.7%	0.5	16.2	20.9	C
	Through	30	32	105.3%	0.3	16.9	23.7	C
	Right Turn	210	202	96.1%	0.6	95.3	7.5	F
	Subtotal	**270**	**261**	**96.7%**	0.6	**79.3**	**7.7**	**F**
SB	Left Turn	30	27	89.7%	0.6	147.3	71.6	F
	Through	40	39	98.0%	0.1	91.8	69.6	F
	Right Turn	10	9	88.0%	0.4	54.8	61.9	F
	Subtotal	**80**	**75**	**93.6%**	0.6	**105.6**	**61.0**	**F**
EB	Left Turn	10	9	89.0%	0.4	121.8	134.3	F
	Through	60	60	100.0%	0.0	144.1	30.2	F
	Right Turn	30	30	98.3%	0.1	77.2	47.0	F
	Subtotal	**100**	**98**	**98.4%**	0.2	**123.2**	**21.5**	**F**
WB	Left Turn	320	320	100.0%	0.0	149.7	5.5	F
	Through	50	50	100.0%	0.0	133.7	59.7	F
	Right Turn	20	20	98.5%	0.1	119.4	78.3	F
	Subtotal	**390**	**390**	**99.9%**	0.0	**146.2**	**7.2**	**F**
Total		**840**	**824**	**98.1%**	0.6	**115.8**	**6.7**	**F**

Intersection 2 **Bayshore Road/I-680 SB On-Ramp** **Uncontrolled**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	100	99	98.5%	0.2	9.9	7.3	A
	Through	270	261	96.5%	0.6	63.0	12.1	F
	Right Turn							
	Subtotal	**370**	**359**	**97.0%**	0.6	**48.8**	**8.5**	**E**
SB	Left Turn							
	Through	30	31	103.7%	0.2	1.9	0.6	A
	Right Turn	360	358	99.3%	0.1	2.2	0.3	A
	Subtotal	**390**	**389**	**99.7%**	0.1	**2.2**	**0.3**	**A**
EB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**760**	**748**	**98.4%**	0.4	**26.9**	**4.4**	**D**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Cumulative Plus Project**
Volume and Delay by Movement | **PM**

Intersection 3 **Bayshore Road/I-680 NB Off-Ramp** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through	160	157	97.9%	0.3	51.3	16.1	F
	Right Turn							
	Subtotal	**160**	**157**	**97.9%**	0.3	**51.3**	**16.1**	**F**
SB	Left Turn							
	Through	30	31	103.7%	0.2	0.1	0.1	A
	Right Turn							
	Subtotal	**30**	**31**	**103.7%**	0.2	**0.1**	**0.1**	**A**
EB	Left Turn	210	203	96.6%	0.5	165.8	45.5	F
	Through							
	Right Turn	60	63	104.8%	0.4	126.4	46.0	F
	Subtotal	**270**	**266**	**98.4%**	0.3	**157.5**	**43.1**	**F**
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**460**	**454**	**98.6%**	0.3	**109.2**	**24.7**	**F**

Intersection 4 **Bay Vista Court/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	10	9	93.0%	0.2	5.3	0.8	A
	Through							
	Right Turn	20	20	99.0%	0.0	21.6	15.9	C
	Subtotal	**30**	**29**	**97.0%**	0.2	**17.6**	**11.5**	**C**
SB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
EB	Left Turn							
	Through	80	79	98.5%	0.1	22.5	19.5	C
	Right Turn	10	11	111.0%	0.3	14.3	31.9	B
	Subtotal	**90**	**90**	**99.9%**	0.0	**21.5**	**17.4**	**C**
WB	Left Turn	20	20	98.0%	0.1	0.6	0.8	A
	Through	70	67	95.1%	0.4	0.2	0.1	A
	Right Turn							
	Subtotal	**90**	**86**	**95.8%**	0.4	**0.3**	**0.2**	**A**
Total		**210**	**205**	**97.7%**	0.3	**13.0**	**8.9**	**B**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **Cumulative Plus Project**
Volume and Delay by Movement | **PM**

Intersection 5 **Valero Refinery Entrance/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
SB	Left Turn	50	48	95.6%	0.3	67.1	36.6	F
	Through							
	Right Turn	50	51	102.8%	0.2	110.3	63.1	F
	Subtotal	**100**	**99**	**99.2%**	0.1	**88.5**	**48.6**	**F**
EB	Left Turn	20	20	98.5%	0.1	10.8	24.6	B
	Through	280	269	96.2%	0.6	6.9	2.4	A
	Right Turn							
	Subtotal	**300**	**289**	**96.3%**	0.6	**7.3**	**0.4**	**A**
WB	Left Turn							
	Through	340	338	99.4%	0.1	224.7	30.8	F
	Right Turn	20	19	97.0%	0.1	202.2	88.2	F
	Subtotal	**360**	**357**	**99.3%**	0.1	**223.0**	**32.3**	**F**
Total		**760**	**746**	**98.1%**	0.5	**114.3**	**19.6**	**F**

Intersection 0 / **-**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
SB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
EB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
WB	Left Turn					#N/A	#N/A	#N/A
	Through					#N/A	#N/A	#N/A
	Right Turn					#N/A	#N/A	#N/A
	Subtotal					**#N/A**	**#N/A**	**#N/A**
Total						**0.0**	**#N/A**	**A**

VISSIM Post-Processor
Average Values from 10 Runs
Queue Counter

Valero Refinery TIA
CPP PM
PM Peak Hour

Queue Counter	Int	Mov	Description	Average Queue (feet)			
				Average	Std. Dev.	Maximum	Std. Dev.
12			Bayshore/Park SB	48	32	197	80
15			Bayshore/Park WB TR	2	1	70	11
16			Bayshore/Park WB L	11	1	129	12
17			Bayshore/Park NB R	293	22	614	11
18			Bayshore/Park NB TL	1	0	63	6
29			Bayshore/I-680 On L	1	2	24	45
38			Bayshore/I-680 Off NB	32	15	217	50
48			Bay Vista/Park NB	0	0	27	6
52			Valero/Park SB	49	34	172	65
55			Valero/Park WB	51	41	356	177
111			Bayshore/Park EB	99	33	352	88
311			Bayshore/I-680 Off EB	327	96	984	136
511			Bayshore/Park EB	0	0	4	11
901			RR Track T	94	262	195	480
902			RR Track L	961	72	1572	18

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **CB PLUS PROJECT PM**
Volume and Delay by Movement | **PM**

Intersection 1 **Bayshore Road/Park Road** **All-way Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	4	3	82.5%	0.4	2.2	1.8	A
	Through	3	3	86.7%	0.2	2.1	2.6	A
	Right Turn	45	39	87.6%	0.9	111.6	38.7	F
	Subtotal	**52**	**45**	**87.1%**	1.0	**88.4**	**33.8**	**F**
SB	Left Turn	3	2	70.0%	0.6	42.3	73.5	E
	Through	2	1	35.0%	1.1	1.0	2.2	A
	Right Turn	1	1	130.0%	0.3	1.3	2.3	A
	Subtotal	**6**	**4**	**68.3%**	0.8	**25.3**	**41.3**	**D**
EB	Left Turn	1	1	50.0%	0.6			
	Through	2	1	50.0%	0.8	21.4	43.8	C
	Right Turn	2	2	85.0%	0.2	1.1	1.4	A
	Subtotal	**5**	**3**	**64.0%**	0.9	**12.8**	**24.7**	**B**
WB	Left Turn	23	23	101.3%	0.1	141.1	52.5	F
	Through	5	5	98.0%	0.0	125.9	146.3	F
	Right Turn	7	7	102.9%	0.1	116.1	138.9	F
	Subtotal	**35**	**35**	**101.1%**	0.1	**138.0**	**38.2**	**F**
Total		**98**	**88**	**89.8%**	1.0	**102.1**	**17.2**	**F**

Intersection 2 **Bayshore Road/I-680 SB On-Ramp** **Uncontrolled**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	3	3	113.3%	0.2	0.1	0.2	A
	Through	52	45	86.5%	1.0	0.3	0.1	A
	Right Turn							
	Subtotal	**55**	**48**	**88.0%**	0.9	**0.3**	**0.1**	**A**
SB	Left Turn							
	Through	4	3	70.0%	0.7	0.0	0.0	A
	Right Turn	23	23	100.0%	0.0	0.8	0.4	A
	Subtotal	**27**	**26**	**95.6%**	0.2	**0.7**	**0.3**	**A**
EB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**82**	**74**	**90.5%**	0.9	**0.4**	**0.1**	**A**

Intersection 3 **Bayshore Road/I-680 NB Off-Ramp** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through	5	4	80.0%	0.5	0.0	0.0	A
	Right Turn							
	Subtotal	**5**	**4**	**80.0%**	0.5	**0.0**	**0.0**	**A**
SB	Left Turn							
	Through	4	3	70.0%	0.7	0.0	0.0	A
	Right Turn							
	Subtotal	**4**	**3**	**70.0%**	0.7	**0.0**	**0.0**	**A**
EB	Left Turn	50	44	88.4%	0.8	5.9	0.7	A
	Through							
	Right Turn	5	5	108.0%	0.2	5.4	0.8	A
	Subtotal	**55**	**50**	**90.2%**	0.7	**5.8**	**0.6**	**A**
WB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
Total		**64**	**56**	**88.1%**	1.0	**5.0**	**0.6**	**A**

Intersection 4 **Bay Vista Court/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn	1	0	0.0%	1.4			
	Through							
	Right Turn	1	0	0.0%	1.4			
	Subtotal	**2**	**0**	**0.0%**	2.0	**0.0**	**0.0**	**A**
SB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
EB	Left Turn							
	Through	4	3	80.0%	0.4	0.1	0.0	A
	Right Turn	1	1	80.0%	0.2	0.2	0.3	A
	Subtotal	**5**	**4**	**80.0%**	0.5	**0.1**	**0.1**	**A**
WB	Left Turn	3	3	103.3%	0.1	0.1	0.2	A
	Through	7	7	92.9%	0.2	0.0	0.1	A
	Right Turn							
	Subtotal	**10**	**10**	**96.0%**	0.1	**0.1**	**0.1**	**A**
Total		**17**	**14**	**80.0%**	0.9	**0.1**	**0.0**	**A**

VISSIM Post-Processor | **Valero Refinery TIA**
Average Results from 10 Runs | **CB PLUS PROJECT PM**
Volume and Delay by Movement | **PM**

Intersection 5 **Valero Refinery Entrance/Park Road** **Side-street Stop**

		Volume (vph)		Percent		Total Delay (sec/veh)		
Direction	**Movement**	**Demand**	**Served**	**Served**	**GEH**	**Average**	**Std. Dev.**	**LOS**
NB	Left Turn							
	Through							
	Right Turn							
	Subtotal							
SB	Left Turn	1	1	80.0%	0.2	0.5	1.5	A
	Through							
	Right Turn	3	3	110.0%	0.2	4.2	2.0	A
	Subtotal	**4**	**4**	**102.5%**	0.0	**3.7**	**1.1**	**A**
EB	Left Turn	4	3	65.0%	0.8	1.2	2.1	A
	Through	46	40	86.3%	1.0	0.0	0.0	A
	Right Turn							
	Subtotal	**50**	**42**	**84.6%**	1.1	**0.1**	**0.2**	**A**
WB	Left Turn							
	Through	32	32	100.3%	0.0	0.0	0.0	A
	Right Turn	5	5	98.0%	0.0	0.2	0.2	A
	Subtotal	**37**	**37**	**100.0%**	0.0	**0.0**	**0.1**	**A**
Total		**91**	**83**	**91.6%**	0.8	**0.3**	**0.1**	**A**

Appendix J.

Mitigation Monitoring Reporting Program

ESA

APPENDIX J
Mitigation Monitoring Reporting Program

Introdction

This document describes the mitigation monitoring and reporting program (MMRP) for ensuring the effective implementation of the mitigation measures required for City of Benicia approval of a Use Permit for Valero Benicia Refinery's Crude by Rail Project (Project).

City of Benicia

When a lead agency approves findings pursuant to §21081.6 upon completion of a certified EIR it is required to adopt a reporting and monitoring program. The purpose of the reporting and monitoring program is to ensure that measures adopted to mitigate or avoid significant environmental impacts are implemented. A mitigation monitoring and reporting program does not need to be included with the EIR as at times the findings which trigger the program are made after considering the Final EIR. Note that mitigation measures are enforced through permit conditions, agreements, or other measures. The reporting and monitoring program will not only direct the implementation of mitigation measures by the applicant, but also facilitate the monitoring, compliance and reporting activities of the City and any monitors it may designate.

Project Background

The Project would allow the Refinery to receive crude oil by rail. Currently, these crudes are not readily accessible at the Refinery. The crudes would originate at sites in North America. Union Pacific Railroad would transport the crudes in railcars using existing rail lines to Roseville, California, where the cars would be assembled into a train for shipment to the Refinery.

The Project involves the installation of a new railcar unloading rack, rail track spurs, pumps, pipeline, and associated infrastructure at the Refinery. The Project would allow the Refinery to accept up to 100 railcars of crude oil a day in two 50 railcar trains. The trains would enter the Refinery on an existing rail spur crossing Park Road outside the southern boundary of the Refinery. The crude oil unloaded from the railcars would be pumped to the existing crude oil storage tanks in the Refinery via a new pipeline connected to existing piping infrastructure.

The Project would allow Valero to receive up to 70,000 barrels per day of the crude oil by rail. Based on Valero's current plans, Valero would reduce its shipments of crude by marine vessel by the same amount. The crude oil delivered to the Refinery by railcar would not displace the crude oil delivered by pipeline.

The Project would not include, nor would it require, any changes to existing Refinery operations or process equipment, other than installation and operation of the Project unloading rack and other Project components.

The Project has the following objectives:

1. Allow for the delivery of up to 70,000 barrels per day of North American-sourced crude oil by rail.

2. Replace marine vessel delivery with rail delivery of up to 70,000 barrels per day of crude oil.

3. Mitigate project-related impacts.

4. Implement the Project without changing existing Refinery process equipment or Refinery process operations, other than operation of the Project components.

5. Continue to meet requirements of existing rules and regulations pertaining to oil refining including the State of California Global Warming Solutions Act of 2006 (AB 32).

Construction activities are scheduled to begin in 2014 and are expected to take approximately 25 weeks. Implementation of the Project would result in the addition of approximately 20 new permanent refinery personnel.

The Environmental Impact Report for the Project found that the resulting actions would have potentially significant impacts in the areas of:

- Air Quality
- Biological Resources
- Energy Conservation
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Transportation and Traffic

In addition, no mitigation measures were identified for the following areas as all potential project impacts were determined to be either no impact or less than significant:

- Cultural Resources
- Land Use and Planning
- Noise

Based on the Initial Study prepared for the Project, the City determined that the Project will result in no impacts or less than significant impacts to:

- Aesthetics
- Agriculture and Forestry Resources
- Mineral Resources
- Population and Housing
- Public Services

- Recreation
- Utilities and Service Systems

Accordingly, those topics were not studied in the EIR.

Roles and Responsibilities

As the lead agency under CEQA, the City of Benicia will be responsible for ensuring full compliance with the provisions of this monitoring program and has primary responsibility for implementation of the monitoring program. The City of Benicia has the authority to halt any activity associated with the construction and operation of the Project if the activity is determined to be a deviation from the approved Project or the adopted mitigation measures. The City of Benicia will act as the mitigation monitor and will designate to Valero how to contact the monitor.

Mitigation Monitoring and Reporting Program

The table attached presents a compilation of the mitigation measures in the Environmental Impact Report together with the required monitoring and reporting actions, effectiveness criteria, and timing.

VALERO BENICIA CRUDE BY RAIL PROJECT
MITIGATION MONITORING AND REPORTING PROGRAM

Environmental Impact	Mitigation Measures	Monitoring/Reporting Action	Effectiveness Criteria	Timing	Non-Compliance Sanction
Air Quality					
Impact 4.1-1a: Construction of the Project could contribute to an existing or projected air quality violation.	**Mitigation Measure 4.1-1: Implement BAAQMD Basic Mitigation Measures.** Valero and/or its construction contractors shall comply with the following applicable BAAQMD basic control measures during Project construction: • All exposed dirt non-work surfaces (e.g., parking areas, staging areas, soil piles, and graded areas, and unpaved access roads) shall be watered two times a day. • All haul trucks transporting soil, sand, or other loose material off-site shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. • All vehicle speeds on unpaved roads shall be limited to 15 mph. • Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California Airborne Toxics Control Measure Tile 13, Section 2485 of California of Regulations). Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation. • A publicly visible sign with the telephone number and person to contact at the City of Benicia regarding dust complaints shall be posted throughout construction. Valero and/or contractor shall respond and take corrective action within 48 hours of notification by the City. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.	Reporting action: Valero will submit documentation to the mitigation monitor that the dust control procedures are specified in construction contracts. Monitoring action: Field inspections during construction by the mitigation monitor.	Receipt by the mitigation monitor of the described documentation. Verification by the mitigation monitor that the prescribed procedures are being followed.	During construction activities.	Stop work order.

VALERO BENICIA CRUDE BY RAIL PROJECT (Continued)
MITIGATION MONITORING AND REPORTING PROGRAM

Environmental Impact	Mitigation Measures	Monitoring/Reporting Action	Effectiveness Criteria	Timing	Non-Compliance Sanction
Biological Resources					
Impact 4.2-1: The Project could have a substantial adverse effect on nesting birds in the Sulphur Springs Creek riparian corridor.	**Mitigation Measure 4.2-1:** Project construction activities should avoid the nesting season of February 15 through August 31, if feasible. If seasonal avoidance is not possible then no sooner than 30 days prior to the start of any Project activity a biologist experienced in conducting nesting bird surveys shall survey the Project area and all accessible areas within 500 feet. If nesting birds are identified, the biologist shall implement a suitable protective buffer around the nest and no activities shall occur within this buffered area. Typical buffers are 250 feet for songbirds and 500 feet for raptors, but may be increased or decreased according to site-specific, Project-specific, activity-specific considerations such as visual barriers between the nest and the activity, decibel levels associated with the activity, and the species of nesting bird and its tolerance of the activity. Construction activities that are conducted within a reduced buffer shall be conducted in the presence of a qualified full-time biological monitor.	Reporting action: Valero will notify the City if it intends to limit construction to non-nesting season. Monitoring action: Biologist will survey Project area and implement suitable protective buffer(s), if necessary.	Receipt of notification by the City. Verification by the Biologist that the buffer(s) are in place and no construction activities are occurring within buffer(s).	30 days prior to construction activities. During construction activities.	Stop work order.
Impact 4.2-2: The Project could have a substantial adverse effect on the Sulphur Springs Creek riparian corridor.	Implement **Mitigation Measure 4.8-1**	See MM 4.8-1.			
Impact 4.2-3: The Project could have a substantial adverse effect on federally protected wetlands.	Implement **Mitigation Measure 4.8-1**	See MM 4.8-1.			
Energy Conservation					
Impact 4.4-1: Construction and operation and maintenance of the Project would result in consumption of energy and could cause adverse effect on local and regional energy supplies or requirements.	Implement **Mitigation Measure 4.1-1**	See MM 4.1-1.			

VALERO BENICIA CRUDE BY RAIL PROJECT (Continued)
MITIGATION MONITORING AND REPORTING PROGRAM

Environmental Impact	Mitigation Measures	Monitoring/Reporting Action	Effectiveness Criteria	Timing	Non-Compliance Sanction
Geology and Soils					
Impact 4.5-3: The Project would not expose people or structures to potential adverse effects involving seismic-related ground failure, including liquefaction	**Mitigation Measure 4.5-1:** Consistent with the geotechnical investigations and deformation analysis conducted to evaluate the potential for liquefaction hazards, the Valero Benicia Refinery shall incorporate into the final project design all recommendations to overcome lateral displacement, horizontal ground separation, and vertical settlement as provided by the licensed geotechnical engineer. Specifically, the Valero Benicia Refinery, in its design of the railroad project element located in areas identified as underlain by liquefiable or problematic soils, shall design for total seismic lateral displacements of 8 inches to 39 inches. Railroad ties and slabs shall be analyzed to evaluate the effect of up to a 6 inch wide horizontal ground separation and all recommendations to overcome such horizontal ground separation provided by the licensed geotechnical engineer incorporate into the final project design. A differential settlement of 2 inches across the gage width shall be analyzed to evaluate rail car tipping potential and all recommendations provided by the licensed geotechnical engineer incorporate into the final project design. All geotechnical design shall comply with seismic design requirements of CBC.	Reporting action: Valero will submit documentation, including bid plans and specifications to the City. Results of any site-specific geologic studies and associated recommendations should be included in the submittal. Any specific recommendations in geological reports will be included in the submittal and incorporated in the design.	Review and approval of plans, specifications and documentation by Community Development Department.	At the time of submittal of final project design.	Withhold building permit.
	Mitigation Measure 4.5-2: Valero Benicia Refinery shall include into its current track inspection program, regular and, in the event of a seismic incident with potential for track damage, post-earthquake inspections of the proposed track sections to ensure compliance with Federal Railroad Administration (FRA) track safety standards. Additionally, in the event of an incident with potential for track damage,	Reporting action: Valero will submit documentation of results of track inspection program to the City.	Review and approval of documentation by Community Development Department.	Concurrent with track inspection program.	Cease crude by rail operations.
Impact 4.5-3 (cont.)	such as an earthquake and associated secondary ground failure (such as liquefaction or lateral spreading) track inspection shall occur after the occurrence and before the operation of any train over that track.				

VALERO BENICIA CRUDE BY RAIL PROJECT (Continued)
MITIGATION MONITORING AND REPORTING PROGRAM

Environmental Impact	Mitigation Measures	Monitoring/Reporting Action	Effectiveness Criteria	Timing	Non-Compliance Sanction
Hazards and Hazardous Materials					
Impact 4.7-7: The Project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	Implement **Mitigation Measure 4.11-4**	See MM 4.11-4.			
Hydrology and Water Quality					
Impact 4.8-1: The Project would not violate any water quality standards or otherwise substantially degrade water quality.	**Mitigation Measure 4.8-1:** The Applicant and/or its contractor shall prepare and implement a storm water management plan (SWMP) for construction of the Project. The proposed project is covered under the Applicant's National Pollutant Discharge Elimination System (NPDES) permit and storm water pollution prevention plan (SWPPP). A notice of intent (NOI) application and notice of termination (NOT) application are not required. Implementation of the SWMP shall start with the commencement of construction and continue through the completion of the Project. The SWMP shall identify pollutant sources (such as sediment) that may affect the quality of storm water discharge and implement best management practices (BMPs) consistent with the California Stormwater Quality Association's BMP Handbook for Construction to reduce pollutants in storm water. The Applicant or the construction contractor shall install erosion and storm water control measures on the construction site such as installation of a silt fence and other BMPs, particularly at locations close to storm drains and water bodies. The BMPs shall also include practices for proper handling of chemicals such as avoiding fueling at the construction site and overtopping during fueling and installing spill containment pans.	Reporting action: Valero will submit SWMP to City. Monitoring action: Field inspections during construction by the mitigation monitor.	Review and approval of SWMP by Community Development Department.	Prior to construction activities. During construction activities.	Withhold building permit. Stop work order.

VALERO BENICIA CRUDE BY RAIL PROJECT (Continued)
MITIGATION MONITORING AND REPORTING PROGRAM

Environmental Impact	Mitigation Measures	Monitoring/Reporting Action	Effectiveness Criteria	Timing	Non-Compliance Sanction
Transportation/Traffic					
Impact 4.11-4: The Project would not result in inadequate emergency access.	**Mitigation Measure 4.11-4:** • Coordinate with the City of Benicia Fire Department to finalize the City of Benicia Fire Department/Valero Benicia Refinery Fire Department Operation Aid Agreement ("Agreement") to be implemented in the event an emergency occurs during a Project train crossing. The "Agreement" shall provide methods of adequately informing the Fire Department of the expected train crossing schedule and alternate routes to access the Park Road and Bayshore Road industrial areas during the event that a train crosses Park Road. In order to inform Benicia Dispatch of a train crossing during an emergency, Valero shall provide, install, and maintain camera(s) at specified location(s) determined by the City, with coordination from Valero. The camera shall meet the City's standards and have a real-time connection to Benicia Dispatch. The camera connection will signal to Benicia Dispatch that emergency responders shall use East 2nd Street as the identified alternative route to the Park Road and Bayshore Road industrial areas. East 2nd Street was identified for its direct access to area and the Opticom system in place at all signalized intersections. The camera must be installed and operational prior to commencement of the Project or certificate of occupancy. In order to minimize potential impacts associated with utilizing the alternative route, Valero shall provide the necessary devices for the City's emergency response vehicles that are not equipped for the Opticom system. The emergency response vehicles identified to receive a device shall be those without the necessary device as of the date the "Agreement" is executed. Valero shall be responsible for the maintenance of the camera during the life of the Project.	Reporting action: Valero will notify the City that it has finalized the Operational Aid Agreement, installed cameras and City designated locations, and provided the necessary Opticom systems for the City's emergency vehicles.	Receipt of notification by the mitigation monitor and agreement by the Benicia Fire Department that the camera and Opticom systems are operating.	Not later than 30 days prior to project operation.	Cease crude by rail operations.

VALERO BENICIA CRUDE BY RAIL PROJECT (Continued)
MITIGATION MONITORING AND REPORTING PROGRAM

Environmental Impact	Mitigation Measures	Monitoring/Reporting Action	Effectiveness Criteria	Timing	Non-Compliance Sanction
Transportation/Traffic (cont.)					
Impact 4.11-4 (cont.)	• Utilize the Refinery's existing onsite emergency response team to assist with responding to off-site emergencies within the Park Road and Bayshore Road industrial areas as requested by the City of Benicia Fire Department under the existing mutual aid agreement, if an emergency occurs during the event of a train crossing on Park Road. The procedures for the occurrence of this support by the Valero Refinery Fire personnel are outlined in the proposed Benicia Fire-Valero Fire Operational Aid Agreement.	Reporting action: Report annually for the first 2 years of project operation on the effectiveness of these procedures.	Receipt of notification by the mitigation monitor.	Annually. Timing to be determined by mitigation monitor.	Cease crude by rail operations.

Appendix K.

McGovern Report for City of Benicia Valero Crude by Rail Project

ESA

SJ McGovern Report for City of Benicia
Valero Crude by Rail Project

By: Dr. Stephen J McGovern, PE

Date: June 11, 2014

Contents

I. To What Extent Will the CBR Project Change the Quality of Crudes Delivered to the Refinery? 4

A. How Do Refiners Decide Which Crudes to Purchase? 4

B. What Crudes are Currently Delivered to the Benicia Refinery? 8

C. What Crudes Will be Delivered to the Benicia Refinery as a Result of the CBR Project? .. 10

II. Would Any Changes in Crude Sources Result in Increase Emissions? 14

III. What Information Must Valero Keep Confidential? 18

I have been retained by the City of Benicia in connection with the City's review of the Valero Crude by Rail (CBR) Project under the California Environmental Quality Act.

I have worked in and around the petroleum refining and/or renewable fuels industries for over 40 years. I have a Doctorate in Chemical Engineering from Princeton University and am a licensed Professional Engineer in New Jersey. I have recently served on two different National Research Council Committees regarding conventional and alternative fuels. I teach industry recognized courses on various aspects of refining technology. My Curriculum Vitae is attached as Appendix A.

Last summer, the City circulated a mitigated negative declaration for the CBR Project before deciding to prepare an EIR. During the public comment period on the negative declaration, the City received comments from, among other individuals and groups, the Natural Resources Defense Council, Communities for a Better Environment, the Goodman Group, and J. Phyllis Fox. The City has asked me to consider the following three issues raised in these comments:

1. Would the quality of the crudes delivered to the Valero refinery change significantly as a result of the CBR Project? Would the crudes delivered by rail, for example, be significantly heavier and/or contain more sulfur and be more acidic than the crudes that they would replace? Or would they be significantly lighter and/or contain more volatile organic hydrocarbons than the crudes they would replace?

2. If the quality of the crudes delivered to the Valero refinery will change significantly as a result of the CBR Project, would the changes cause an increase in air pollutants emitted from the refinery during the refining process?

3. What information about crude sources and refinery operations must Valero keep confidential?

In short, my conclusions are as follows:

1. The CBR Project will allow Valero to access a variety of North American crudes that are not readily available in Benicia. Like other crudes that Valero currently processes, the quality of these crudes varies widely, from very heavy sour crudes to very light sweet crudes. Valero will decide which crudes to purchase in the future at any given time based on a variety of factors, such as the quality and price of crudes on the market, the market demand for different products such as gasoline, jet fuel, or diesel fuel, the market prices for different products, and the refinery's unique processing configuration. There is no way to predict with any certainty what crudes Valero will purchase at any given time in the future because there are so many variables. The CBR project does not change the

refining capabilities of Valero's Benicia refinery. Therefore, the average quality of the crudes processed by the refinery will not change as a result of the CBR project.

2. Although the sources of the crudes delivered to the Valero refinery could change significantly as a result of the CBR Project, the changes would not cause an increase in air pollutants. The refinery's processing configuration limits the instantaneous quality of the crude mix that can be processed and the refinery processing configuration will not be changed. Valero will continue to blend crudes of varying quality to match the refinery's existing limitations in API gravity and sulfur content before processing them. Valero will continue to blend crudes to this small range in the future, regardless of any change in the sources or methods of delivery of crudes. Therefore, the air emissions from process equipment will remain substantially the same.

3. The detailed information concerning the quality and potential sources of crude oil both processed in the past and contemplated to be processed in the future at Valero's Benicia refinery are business confidential information and therefore are not included in the EIR. Furthermore information defining Valero Benicia's processing capabilities, other than information included in operating permits and other public documents is also confidential.

I. To What Extent Will the CBR Project Change the Quality of Crudes Delivered to the Refinery?

A. How Do Refiners Decide Which Crudes to Purchase?

Crude oil is a complex mixture of thousands of individual chemical compounds (molecules). An oil refinery separates and transforms these complex mixtures into the different, saleable specification products that consumers demand such as gasoline, jet fuel, diesel fuel, asphalt, and lubricating oils. Refineries also produce byproducts such as liquefied petroleum gas (LPG), pet coke, and sulfur.

The "oil industry" consists of producers of crude oil, refiners of crude oil and distributors, transporters and marketers of crude oil and finished products. Very few US oil companies perform all of these tasks. For example, Valero is the largest independent oil refiner in the world, but does not drill for crude oil. It purchases most of its crude oil through both short and long term contracts and on the spot market. Thus, Valero must rely on other entities (oil producing companies and countries) to ensure that the quality of the crude oil it purchases meets agreed specifications. Crude oils are produced and sold by various entities including governmental organizations such as member nations of the Organization of Petroleum Exporting Countries (OPEC), private companies under license to various governments and private companies producing oil from privately owned land.

Crudes are generally categorized based on weight or "gravity" and sulfur content. Gravity (API gravity) is an indirect measure of the amount of gasoline and distillate (diesel fuel, jet fuel and home heating oil are collectively referred to as distillates) that exist in the crude as it is delivered to the refinery. Lower gravity crudes contain less gasoline and distillate and larger amounts of heavy tar-like components that require more complex refineries to convert these heavy molecules into gasoline and distillate. Current governmental regulations require gasoline and diesel fuel to be essentially sulfur free, so processing higher sulfur crudes also requires more complex refineries and additional costs to remove the sulfur from the final product. Since it requires less refinery equipment and operating expenses to convert light sweet crudes into gasoline and distillates than it does to convert heavy sour crudes, light sweet crudes are more valuable (higher priced) than heavy sour crudes. Crude traders generally price crude oils based on their relative weight and sulfur content. The Energy Information Administration of the US Department of Energy publishes monthly average costs of imported crude oils as a function of API gravity. Lower gravity crudes generally cost less for refineries to purchase than higher gravity crudes.

Gasoline typically has an API gravity of about 50, while diesel has an API gravity of about 35. Vacuum gas oil (VGO) and residue (the other major components of crude oil) have gravities of about 22 and 10 respectively. The gasoline that is native to crude oil has a low octane and must be “reformed” in a naphtha reformer to increase its octane. The vacuum gas oil is “cracked” in a Fluid Catalytic Cracking (FCC) unit to convert most of it to gasoline and diesel fuel. The residue is either sold as asphalt or heavy fuel oil or is cracked in a coker to produce additional gasoline and diesel fuel and pet coke. Lower gravity crudes with more VGO and residue require more processing in more complex and expensive refineries.

There are many different crude oils available on the world market. In addition to gravity and sulfur, samples of each crude are analyzed in more detail by both producers and refiners. These detailed analyses are called crude assays. A crude assay on a single sample of crude oil can cost anywhere from $5,000 to more than $100,000. The cost of the crude assay increases with the level of detail desired. Refiners use these more detailed crude assays to determine the blends of various crudes that can be economically processed in their refinery.

When a refinery is first built, the types and sizes of the various process units are chosen to match the characteristics of the specific “design” crude oil based on a detailed crude assay of that oil. The Benicia refinery, for example, was originally designed to process Alaskan North Slope (ANS) crudes, because Valero's predecessor Humble (and then Exxon) had easy access to ANS crudes.

As new crude sources become available and sources of the design crude decline, refiners must purchase different crudes and blend them together to match refinery processing capabilities as closely as possible. Refiners do this with computer programs know as LPs. (Linear Programing

Optimization Routines). After it purchased the Benicia refinery in 2000, for example, Valero had to process crude oil blends that were similar to Alaskan North Slope crudes. The Valero Improvement Project, however, allowed Valero to process crude blends that were heavier and/or contained more sulfur than a typical ANS crude. The Valero Improvement Project was completed in 2011.

Linear Programing is a complex mathematical tool that can be purchased from several different companies. Many refiners use the PIMS model offered by AspenTech. These models have mathematical representations of each refinery process unit and track essentially every major input, intermediate stream, and product stream within the refinery. The basic model is licensed from AspenTech, but the refiner must then modify it to include all of the capabilities and constraints of the individual refinery being modeled. The constraints include operational, economic, logistical and environmental factors. The unit specific information only changes when hardware or environmental requirements change. Product demand and pricing, as well as crude oil price and availability change every day.

The refinery and the corporate planning groups run these LP models every day. The models are used to determine the optimal crude mix the refinery should purchase from the crudes that are available to it. Once the crudes arrive at the refinery (this could be several weeks or months after the purchase decision is made), the model is run again to determine the most profitable product mix that can be made from the crudes "on-hand", given "today's" prices and product demands. The models are also used as longer term planning tools to determine if an investment such as the CBR or VIP project will be beneficial to the refinery.

These models also use crude assay information to represent the crude oil input into the refinery. The refiners must either develop the crude assay information themselves or purchase the information from other sources. Some limited crude assay information is available from the internet, but the detailed information that is required to run a refinery LP is copyrighted and cannot be distributed to the public without compensating the copyright owner. Detailed crude assays developed by refiners for use in their own LP modeling have competitive value and are therefore considered trade secret information.

Although each crude oil has a specific name and generally accepted quality, every cargo is a blend of various oils produced from a number of individual wells, each well producing a slightly different quality oil. Therefore, a single crude assay is only an approximation of the actual quality of crude oil delivered to a refinery. For example, Crude Oil Quality, Inc. maintains a website (www.crudemonitor.ca) that published limited analytical data on shipments of a number of Canadian crude oils. Figures 1 and 2 show the variability in Gravity, Sulfur, Total Acid Number (TAN) and Benzene of Western Canadian Select and Christina Dilbit, two heavy, sour Canadian crudes that could be available to Valero Benicia by rail.

Figure 1: Selected Properties of Western Canadian Select

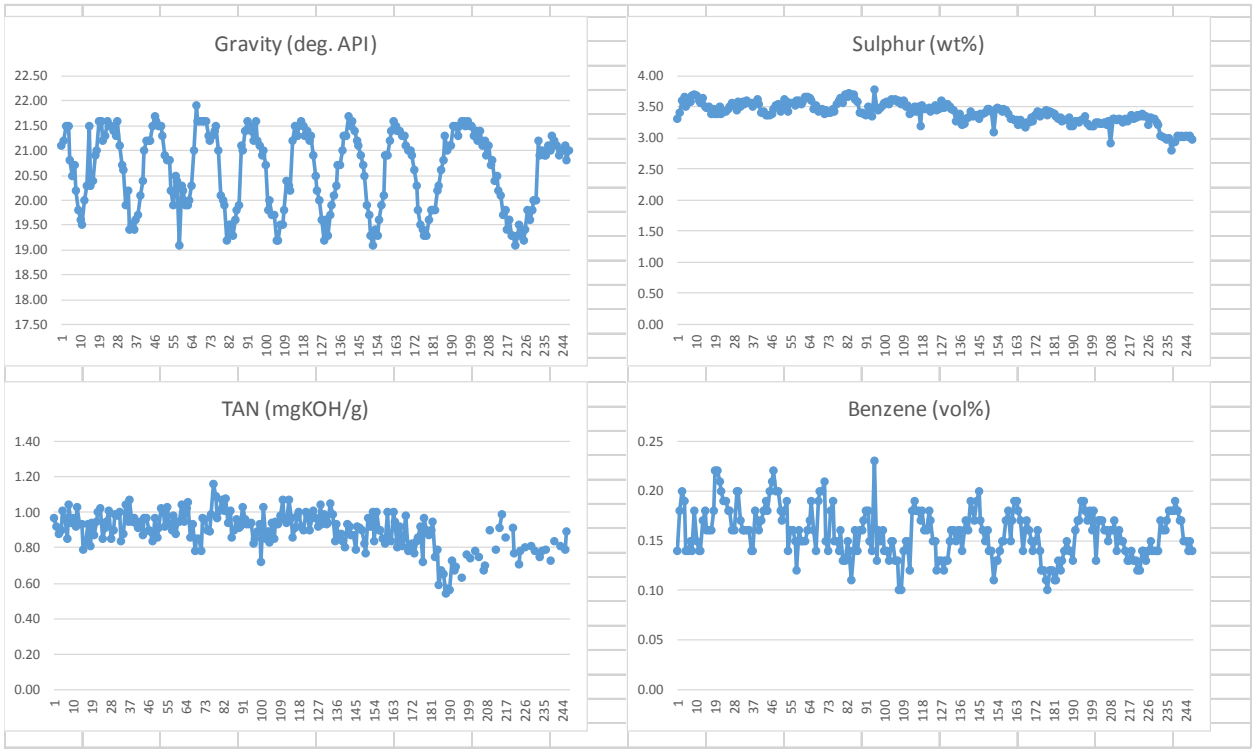
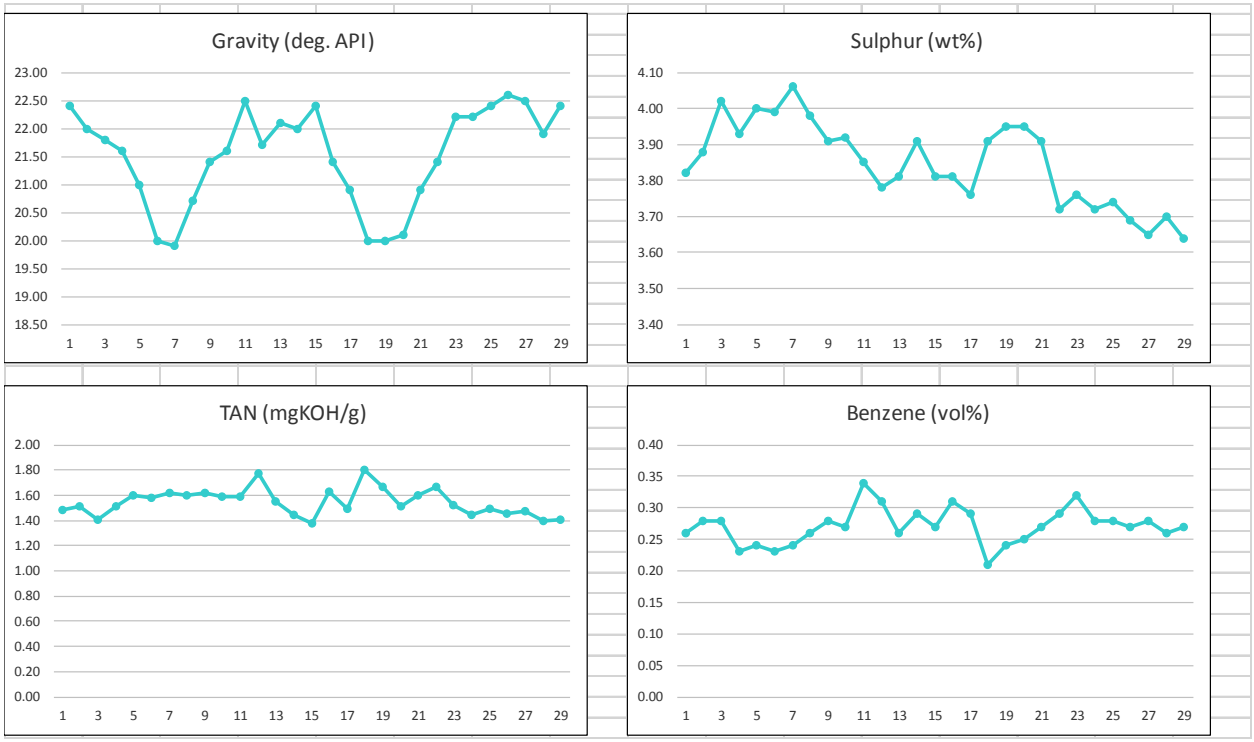


Figure 2: Selected Properties of Christina Dilbit



Refinery configuration, economic considerations (crude price, relative product prices and operating costs) determine the actual crude mix and crude rates that the refinery will run to maximize profits. Each refinery has a different configuration and therefore is limited in the types of crude that can be economically processed in that particular refinery.[1] The major processing units typically found in most refineries include: Crude unit, naphtha pretreater and reformer, jet fuel and distillate desulfurization units, fluid catalytic cracking unit, alkylation unit and a gas recovery/treating facility. Some refineries might also have a hydrocracker, a heavy gas oil hydrotreater, a coker, a catalytic polymerization unit, a hydrogen plant, lube oil and/or asphalt production facilities as well as other specialty units such as a benzene conversion unit.[2] Each of these units operates on a different fraction of the crude oil. The exact refinery configuration determines the crude oils that the refinery is capable of processing. For example, the size of the naphtha reformer limits the average naphtha content of the crude oil that the refinery can process. Most of the sulfur that enters a refinery with the crude oil is removed by the various processing units and converted to elemental sulfur by the sulfur plant. The size of the sulfur plant relative to the crude processing capacity of the refinery ultimately determines the maximum average crude sulfur content that the refinery can process. The size of the FCC unit and coker determine the amounts of VGO and residue that the refinery can process.

B. What Crudes are Currently Delivered to the Benicia Refinery?

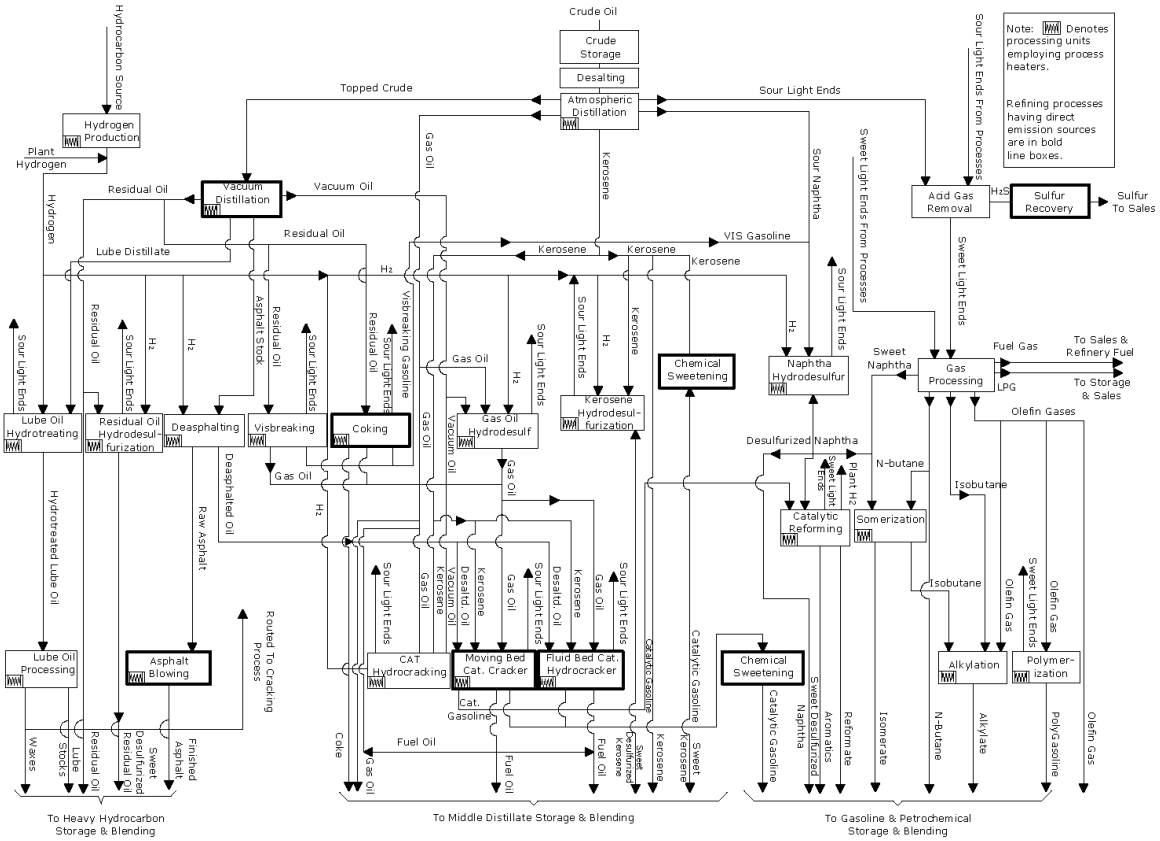
The Benicia refinery was originally designed and built by Humble Oil Company (later renamed Exxon) to refine ANS, the oil that Humble was going to produce from its oil fields on the North Slope of Alaska. Shortly after Exxon and Mobil merged in 1999, the Benicia refinery was sold to Valero. Because of the declining production from the Alaskan oil fields and the captive use of this production by the various producers, Valero buys crude on the open market as a substitute for ANS. Some of this purchased crude is domestic production and some is imported from as far away as the Middle-East.

---

[1] Both the US Department of Energy (DOE) and the Oil and Gas Journal publish annual listings of the processing capacities of every US refinery and the major processing units within each refinery. The DOE listing is available for download from the EIA website, free of charge. The Oil and Gas Journal survey is available for a nominal fee.

[2] Refineries also have support facilities to generate steam and electricity, to produce boiler feed water, to recovery and produce elemental sulfur. A refinery also includes units whose specific function is to minimize the release of potential contaminants into the environment. A schematic of a typical complex oil refinery can be found in AP-42 Figure 5.1.1 on the EPA website and is reproduced herein as Figure 3. A tutorial on refinery operations is attached as Appendix B.

Figure 3: Schematic of a Complex Oil Refinery

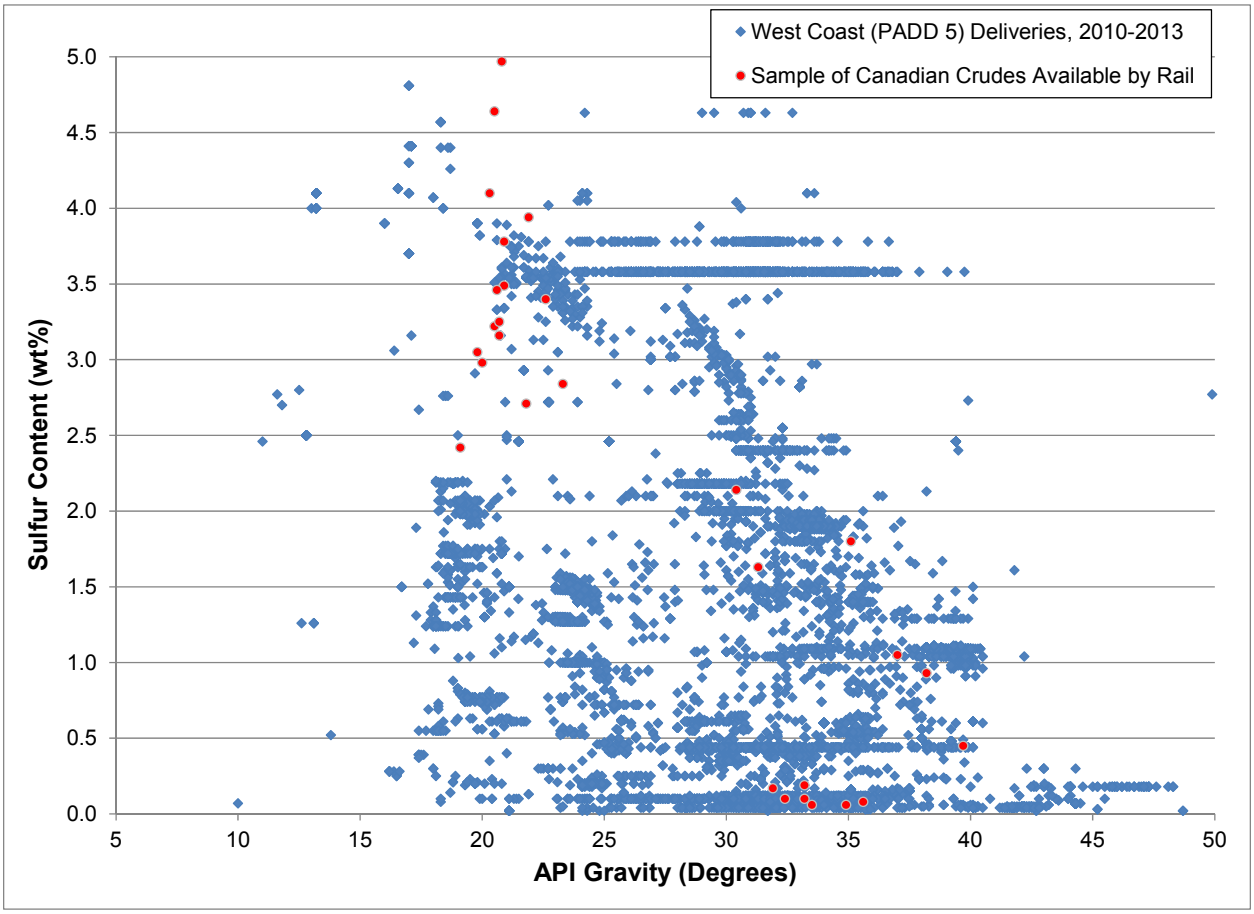


Source: EPA AP-42, Chapter 5 Petroleum Refining

The Energy Information Administration of the US Department of Energy publishes much information concerning the types of crudes that are imported into the US, produced within the US and processed within US refineries. The information, however, is aggregated to avoid revealing the input to individual refineries. DOE recognizes that the crudes purchased and processed by individual refineries is valuable company confidential information and does not release this information.

Figure 4 shows the gravity and sulfur contents of crudes that have been delivered to West coast (PADD 5) refineries in the recent past, along with the same properties of various Canadian crudes that could be available by rail as reported by Crude Quality, Inc. The figure also includes a box that defines Valero Benicia's normal operating window for blended crude sulfur and gravity. Although Valero might purchase individual crudes that are outside the box, it must blend them with other crudes to ensure that the blend fits the operating limitations of the refinery.

Figure 4: West Coast Refinery Crude Quality



Valero Benicia currently receives about 20% heavy sour crude via pipeline from the San Joaquin Valley of California. It also receives both light sweet and heavy sour crudes via ship. All of these various crudes are blended within the refinery to match the operating constraints of the refinery.

C. What Crudes Will be Delivered to the Benicia Refinery as a Result of the CBR Project?

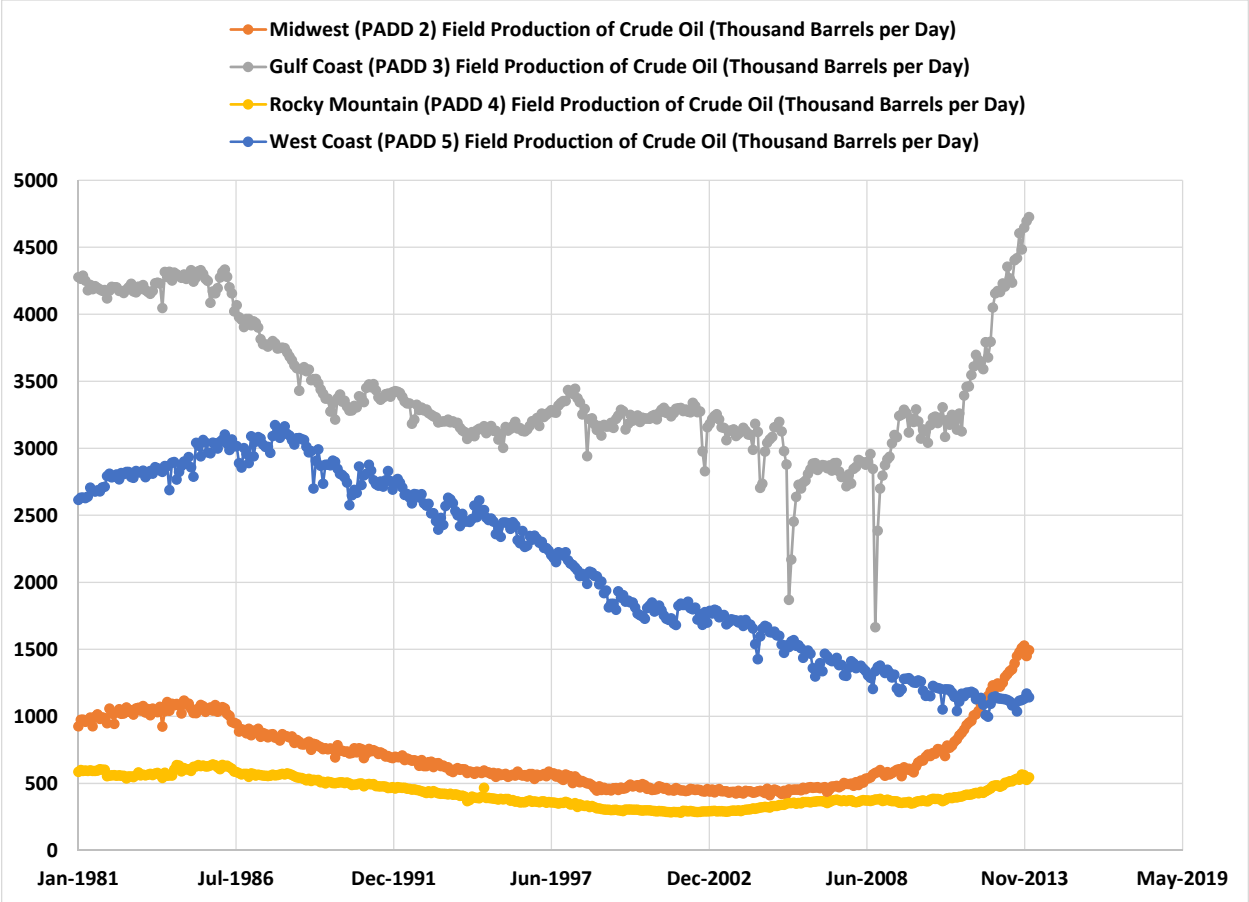
The Valero refinery is subject to a variety of operating constraints.

The operating constraints of the refinery are not being changed by the CBR project, so the average quality of the crude that can be processed within the refinery will not change. The sources of the crudes will most likely change, but the average quality will not.

Valero will use the CBR project to obtain North American crudes. In recent years, large volumes of crude oil have become available both domestically and from Canada. Figure 5 shows historic

crude oil production rates from various parts of the US. It is easy to see that West Coast crude production continues to decline while production from the mid-continent and gulf coast of the US is rapidly increasing. This increased production is mostly lighter crudes such as Bakken, WTI and WTS. This new production is often available at a discount because it is produced in regions of the country that are not connected to the major refining centers by crude oil pipeline. Shipment by rail is the current preferred shipping method for crude such as Bakken being produced in North Dakota.

Figure 5: US Crude Oil Production



Through the mid-1990's PADD 5 was a net exporter of oil products to other parts of the US, Figure 6. Since then, the west coast and especially California has been a net importer of petroleum. Much of this oil has come from other countries. The CBR project will give Valero Benicia access to the increasing domestic and Canadian crude oil production reducing the need to import crude from outside North America.

Figure 6: PADD 5 Petroleum Balance

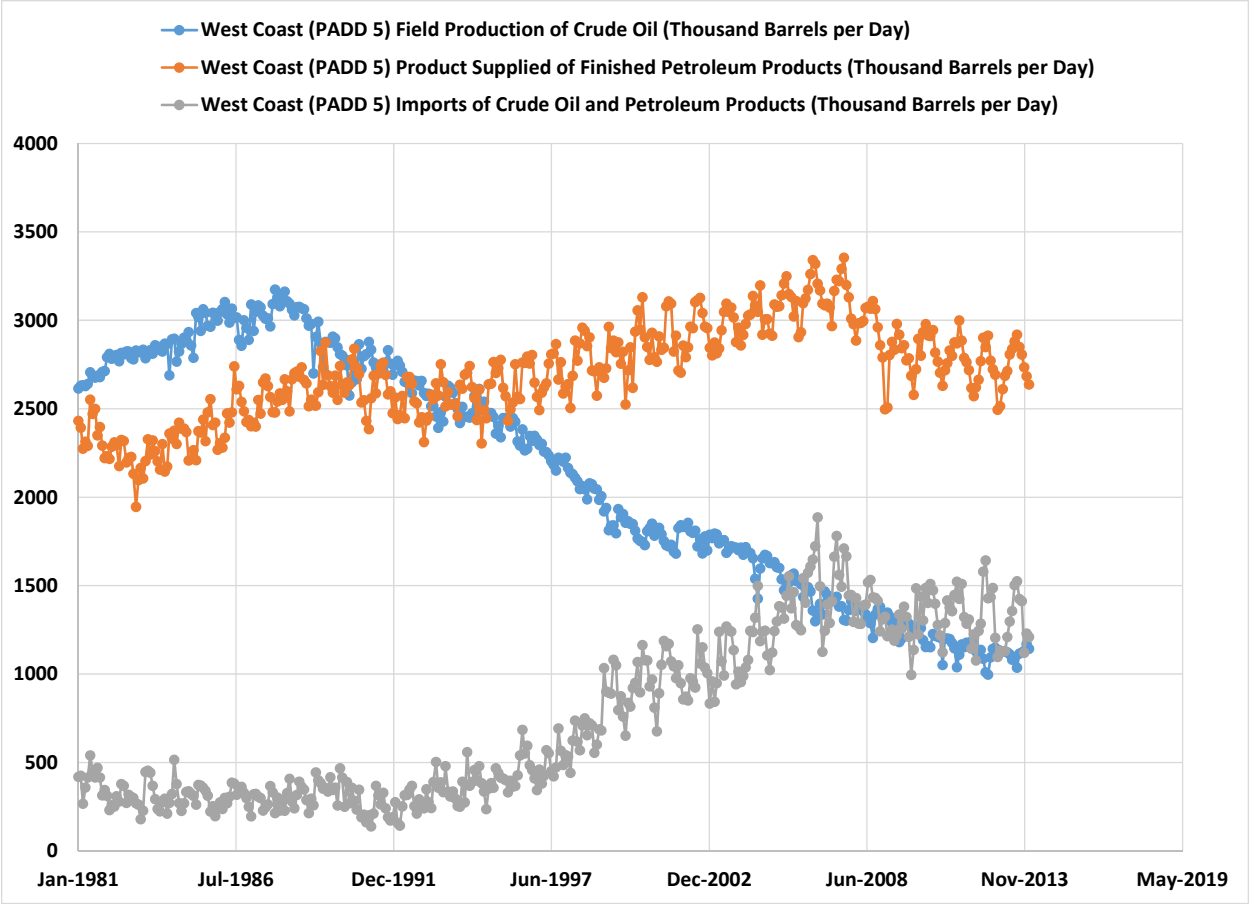


Table 1 below sets forth the North American crudes that are available on the market today.

Available North American crudes range widely in API gravities and sulfur content. Dilbits have been available on the world market for more than 40 years and have been processed in many US refineries including Valero Benicia. They are one of many types of heavy, high sulfur crudes that are available. The diluents range from natural gas condensates to light sweet crudes such as Bakken. Dilbits are nothing more than pre-blended crudes to facilitate transport.

At the light end, large volumes of Bakken type crude have recently become available from the north central United States and southern Canada. Unlike the heavy high sulfur Canadian crudes, the Bakken crudes are light, sweet (low sulfur) crudes. Bakken is a crude that could potentially be delivered to Valero Benicia.

Table 1 Available North American Crudes

Type	Crude	Origin
Light Sweet	New Mexico Sweet	New Mexico
Light Sweet	Utah Sweet	Utah
Light Sweet	Bakken	North Dakota
Light Sweet	Canadian Manitoba Sweet	Canada
Light Sweet	Light Sweet Synthetic	Canada
Light Sweet	Husky Synthetic Blend	Canada
Light Sweet	Mixed Sweet Blend	Canada
Light Sweet	Niobar	Colorado
Light Sweet	Suncor Synthetic A	Canada
Light Sweet	Premium Albian Synthetic	Canada
Light Sweet	Long Lake Light Synthetic	Canada
Light Sweet	Sour Light Edmonton	Canada
Light Sweet	Shell Synthetic Light	Canada
Light Sweet	Syncrude Synthetic	Canada
Light Sweet	West Texas Intermediate	Texas
Light Sweet	Wyoming Sweet	Wyoming
Light Sour	Light Sour Blend	Canada
Light Sour	Peace River Sour	Canada
Medium Sour	Bow River South	Canada
Medium Sour	Sour High Edmonton	Canada
Medium Sour	Kearl Lake	Canada
Medium Sour	Midale	Canada
Medium Sour	Mixed Sour Blend	Canada
Heavy Sour	Albian Heavy Synthetic	Canada
Heavy Sour	Access Western Blend	Canada
Heavy Sour	Bow River North	Canada
Heavy Sour	Cold Lake	Canada
Heavy Sour	Cold Lake	Canada
Heavy Sour	Fosterton	Canada
Heavy Sour	Lloyd Blend	Canada
Heavy Sour	Lloyd Kerrobert	Canada
Heavy Sour	Suncor Synthetic H	Canada
Heavy Sour	Peace River Heavy	Canada
Heavy Sour	Smiley-Coleville	Canada
Heavy Sour	SHE	Canada
Heavy Sour	Western Canadian Blend	Canada
Heavy Sour	Western Canadian Select	Canada
Heavy Sour	Wabasca Heavy	Canada

II. Would Any Changes in Crude Sources Result in Increased Emissions?

Phyllis Fox and other commenters assumed that, if heavy sour Canadian crude is the cheapest crude on the market in the future, Valero would purchase a lot of this material. The commenters further assumed that emissions would therefore increase because heavier crudes require more processing than light crudes and sour crudes require more processing than sweet crudes. At the same time, these commenters also expressed a concern that, if a light North American crude like Bakken is the cheapest crude on the market in the future, Valero would purchase a lot of that crude. The commenters further assumed that VOC emissions from storage tanks and equipment leaks would therefore increase if Valero's crude slate became significantly lighter.

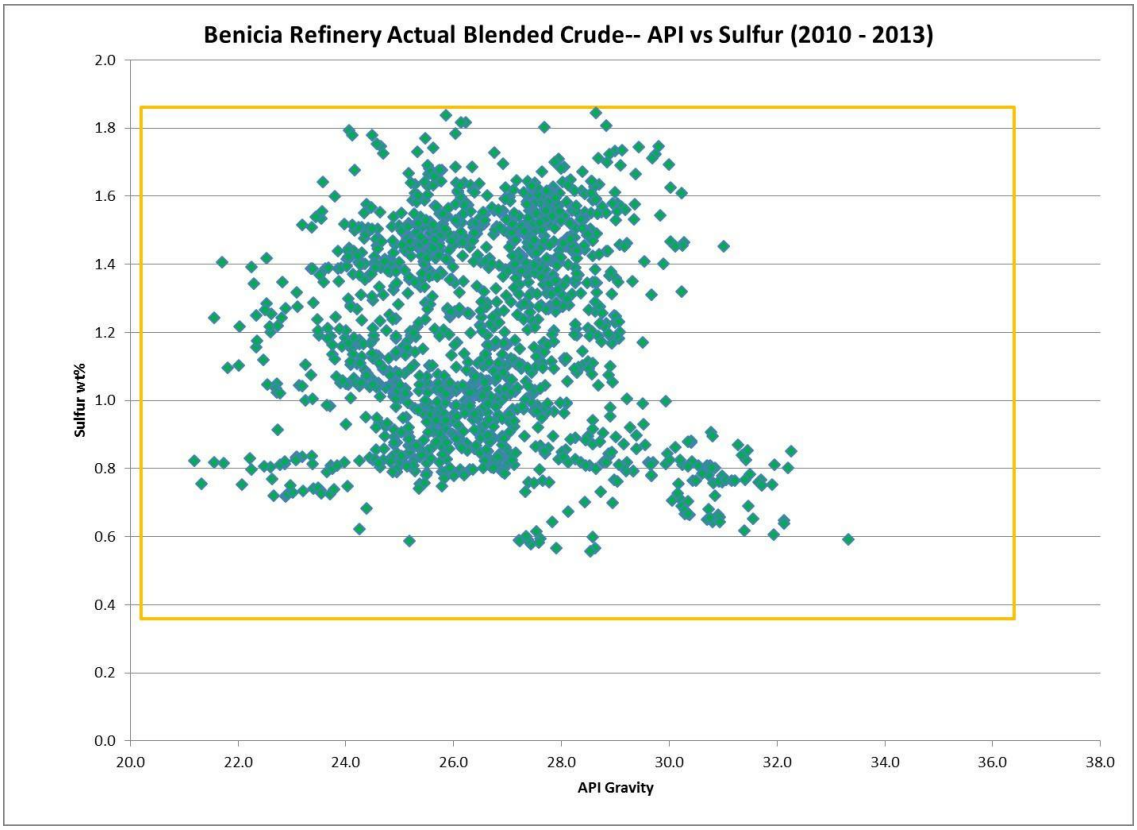
These concerns are baseless because, even though the sources of crude oil could change as a result of the CBR project, the crude blends processed at the Refinery must fall within a narrow range of gravity and sulfur content. This will not change as a result of the project. Therefore, the crude blends processed, as well as the average of all crude feedstocks delivered, will fall within the same narrow range.

The "yellow box" in Figure 7 reflects the physical constraints of the Refinery's configuration. Valero cannot efficiently operate the Refinery process units and other equipment if the crude blend were to fall outside the yellow box. Based on the size of the various processing units in the Benicia refinery as reported in the 2014 Oil and Gas Journal Annual Refining Survey, for example, the maximum average crude oil sulfur content that Valero could process in its Benicia refinery is about 1.9 wt%. The CBR project will not change this value. The capacities of the Coker and FCC units (the units that upgrade the “tars” in the crude) will not change as a result of the CBR project, so the amount of heavy low gravity crude that the refinery can process will also not change as a result of the CBR project. The capacity of the naphtha reformer will not change as a result of the CBR project, so the amount of light, high gravity crude that the refinery can process will not change as a result of the CBR project.

The second operating “window” is represented by the concentrated “cluster” of crude blends inFigure 7.

Figure 7 shows the actual blended crude API gravity and sulfur content processed in the Valero Benicia refinery in the three years from 2011 to 2013, after completion of most of the Valero Improvement Project. Although the yellow box defines the “feasible” operating window, the normal “profitable” operating window is actually smaller. This is exemplified by the pattern of data in Figure 7.

Figure 7: Quality of Crude Blends Processed at Valero Benicia



The operating window exists because of Valero Benicia's configuration of process units. Its ability to remove sulfur from the various refinery products and air emission streams limits the maximum sulfur content of the crude oil blend that can be processed to about 1.9wt%. Attempting to process a higher sulfur blend could result in violation of its BAAQMD operating permits. Processing blends with less than about 0.4 wt% sulfur causes inefficient operation of the refineries equipment and is very unlikely to occur.

Valero Benicia must also operate within a relatively narrow range of blended crude gravities as shown in Figure 7. The capacities of the coker and FCC, as defined by BAAQMD operating permits, limit the amounts of heavy crude with high quantities of low gravity tar-like substances that can be run without producing excessive amounts of very low value heavy fuel oil. The capacities of these units determine the ability of the refinery to convert these tar-like crude fractions into specification gasoline and distillates. Excess low gravity material must be blended with distillate and sold as high sulfur heavy fuel oil. Not only is the world market for high sulfur heavy fuel oil continuing to decline, producing high sulfur heavy fuel oil reduces distillate production making the production and sale of high sulfur heavy fuel oil very unprofitable.

The rated capacity of the naphtha reformer at Valero Benicia is 36, 000 BPD. Crude blends with gravities that exceed about 32 API can exceed the capacity of the naphtha reformer and light stream hydrodesulfurization units at full refinery utilization. The refinery must then either export the excess intermediate streams to other refineries at distressed prices or reduce crude run to bring the refinery back into balance. Both of these options reduce refinery profitability and are highly unlikely as demonstrated by the lower actual crude gravities processed during the previous 3 years.

Even though the "hard" operating limits are defined by the box in Figure 7, most of the actual crude blends that have been processed in the past three years are well inside the box. The refinery requires some amount of operating "cushion" to ensure that it does not violate any true operating permit limits or other constraints. Furthermore, operating at a "limit" does not always produce the most profitable operation. The optimal crude mix, as determined by the LP, is a function of the price and availability of various crudes as well as the price and demand for the various products. Thus, most of the crude blends that the refinery processed during the three year period fell between about 0.8 and 1.7 wt% sulfur, while the gravities ranged between 24 and 30 degrees API.

Neither Bakken, nor the heavy Canadian crudes could be profitably run by themselves at Valero Benicia. The refinery could not run at full capacity on either crude alone. When running pure Bakken, it would be limited by its ability to process the amount of naphtha contained in the crude and the units designed to process the heavy portion of the crude would be under-utilized. When running pure heavy Canadian crude, the refinery would be limited in its ability to handle the sulfur and residue in the crude and the units designed to process the lighter portions of the crude would be under-utilized.

All refinery units have minimum practical as well as maximum permitted operating limits. If a unit reaches its minimum operating limit it must be shut down. Thus, there are limits to how light or heavy a crude mix any refinery can run. Crudes like Bakken or heavy Canadian crudes must be blended together or with other crudes to optimize the refinery operation. By blending these crudes with other crudes, the refinery can run more efficiently and profitably at higher sustained rates than on either crude alone.

Table 1, extracted from a presentation given by John Auers of Turner, Mason & Co. at the Platts Crude Marketing Conference in Houston, TX on March 1, 2013 shows how a blend of Western Canadian Select and Bakken crudes can give the same yields as ANS. Thus, refineries that were designed for ANS, like Benicia, can substitute blends of WCS and Bakken for ANS. This table also shows that the light hydrocarbons (those contributing most to VOCs) in the blend are lower than those in ANS. Although the sulfur content of the blend is higher, the VIP was permitted under CEQA and additional desulfurization facilities were added to the refinery to allow the processing of higher sulfur crude oil blends while controlling emissions at or below previous levels.

Table 1: Crude oil comparison

Yield, vol%	Alaskan North Slope	WCS/Bakken Blend
API Gravity	32.1	32.1
Sulfur, wt%	0.9	1.4
TAN, mgKOH/g	0.6	0.1
Butanes and Lighter	4	3
Naphtha	26	26
Kero/Diesel	27	27
Gas Oil (FCC feed)	27	27
Residue (Coker feed or Asphalt)	16	16

Several commenters were concerned that the crude by rail project would increase the benzene content or the acidity of the crudes run in the refinery or potentially increase the VOC emissions from lighter crudes. The benzene content of Alaskan North Slope, the design crude for the refinery has been reported as 0.33% while two Canadian crudes suspected of being higher in benzene (Figures 1 and 2) are actually on average lower in benzene. Crude Quality, Inc. also reports the benzene content of Canadian light sweet crudes as less than 0.25%, again less than ANS, the design crude for the Benicia refinery.

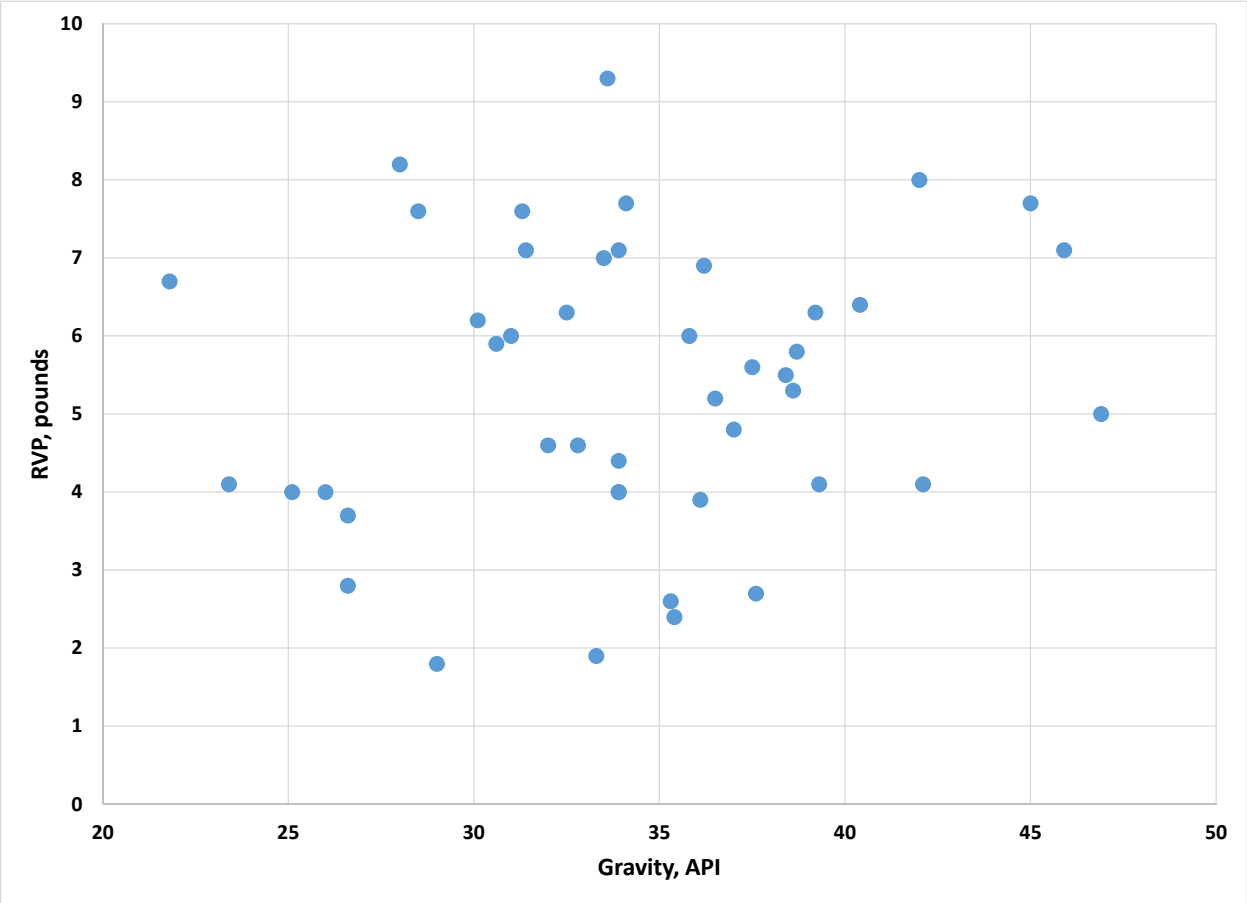
Crude oil volatility (vapor pressure or potential VOC emissions) has recently received increased scrutiny by various governmental agencies. Most of the focus has been on proper labeling/classification of crude oil shipped by rail from the Bakken formation. Crude oil is a flammable liquid as defined by the Code of Federal Regulations Title 46 (30.10) for Marine shipments and Title 49 (172.101) for land and air shipments. Both sections define three subclasses of flammable liquids although the definitions are slightly different. Title 46 defines Grades A, B and C based on Reid Vapor Pressures (RVP, ASTM D323) of > or = to 14 pounds, under14 and over 8.5 pounds and less than or equal to 8.5 pounds, respectively. Title 49 defines three Packing Groups based on initial boiling point by ASTM D86 distillation and flash point. These are: Packing Groups I, II and III based on IBP<95 F (PG I), IBP >95F and Flash Point <73F (PG II) and Flash Point >73F and <149F and IBP>95F (PG III).

In addition to these shipping requirements, refiners also limit the volatility of crude they purchase. Most of the volatility or vapor pressure of crude oil is due to the small amounts of propane and butanes that are dissolved in the crude oil. Refineries are very limited in their ability to convert these light materials into gasoline. CARB gasoline has an RVP limit of 7 pounds, so most of the propane and some of the butane contained in the crude oil must be sold at a loss as LPG. Recent LPG spot prices are only 1/3 of CARB gasoline prices.

There is no universal relationship between crude gravity and volatility or vapor pressure of the crude oil as shown in Figure 8 for 45 different crude oils. Based on the factors discussed above, there is no valid reason to believe that the crudes that arrive by rail will be higher volatility than

those currently processed. Valero has large financial incentives to minimize the volatility of crudes that it purchases.

Figure 8: Crude oil volatility



Would Any Changes in Crude Sources Lead to Increased Corrosion of Refinery Equipment Resulting in Accidental Releases?

Phyllis Fox and other commenters expressed concern that, as a result of the CBR project, future crude feedstocks could become more acidic. As a result, the commenters stated, the Refinery's equipment would suffer increased corrosion, leading to accidental releases.

The acidity of the Canadian crudes is also lower than that of typical California crudes and other heavy sour crudes. San Joaquin Valley crudes have acidities above 2 (as shown in the Califorinia Energy Commission report attached as Appendix C), while Figures 1 and 2 show values below 2 for heavy Canadian crudes. The acidity of the light sweet Canadian crudes is not reported because of its low value. The acidity of Bakken crude has a low value of <0.2 mgKOH/g. Valero actively monitors and controls the acidity of the crude blends it processes to stay within

equipment capabilities. Valero also conducts an equipment inspection program that exceeds state and federal requirements.

III. What Information Must Valero Keep Confidential?

The various commenters have asked for additional information to be included in the EIR. Some of the requested information is included in the EIR and this report, while other information is business confidential information or copyrighted information with restrictive rights that limit its public dissemination without proper compensation. Valero has designated as confidential the following information:

- The specific North American crudes that Valero plans to purchase and ship by rail;
- The properties (weight, sulfur content, vapor pressure, and acidity) of specific crudes delivered to Valero in the past;
- The properties (weight, sulfur content, vapor pressure, and acidity) of specific crude blends processed at the refinery;
- Data purchased by Valero showing the weight and sulfur content of specific crudes, including North American crudes;
- Data generated by Valero showing the weight and sulfur content of specific crudes, including North American crudes;
- Detailed information regarding the weight and sulfur content of crude blends suitable for processing at the Benicia refinery based on the refinery's unique configuration; and
- Detailed daily measurements of the weight and sulfur content of crude blends processed at the Benicia refinery in the past.

Basic properties of most Canadian crudes such as gravity, sulfur, benzene and acidity are available on www.crudemonitor.ca. Representative data have been included in this report. Similar properties on Bakken crude could not be found in public documents; although, the North Dakota Petroleum Council released results of a study of Bakken crude volatility on May 20, 2014. Crude assay compositional data can be purchased from companies such as AspenTech; however, this information is copyrighted and cannot be distributed to the general public. Several of the commenters also requested detailed information concerning the capabilities of the various refinery process units, the crudes that have been and will be run in the refinery and the planning tools that the refinery uses to make crude purchase decisions.

As discussed above, the USDOE has determined that refineries do not have to release specific crude purchase information to the public nor do they have to release detailed information on the capabilities of the various processing units within the refinery. It is sufficient to release only

unit capacities aggregated by unit type. This information is available on the DOE website and also by purchase through the Oil and Gas Journal. Although the refineries report more detailed information on crude purchases to the DOE, the agency aggregates the data prior to publication to avoid revealing company confidential information.

Crude oils are a commodity that is heavily traded by oil companies as well as trading companies. Publishing what specific crudes Valero purchases or intends to purchase allows competitor refiners to bid on similar crudes and allows traders to purchase futures of these crudes. Both of these actions would increase the price Valero would then pay for future cargoes of these specific crudes. Releasing information on the specific crudes that Valero intends to purchase would put it at a disadvantage against it competitors.

The planning tools that a refinery uses can be purchased by anyone; however, they are copyrighted and cannot be redistributed without compensating the copyright owner. Furthermore, much of the value of these programs comes from configuring them and customizing them to closely match the capacities, capabilities, limitations and performance of the individual units in a particular refinery. This latter type of information would be of particular value to a competitor and is business confidential.

Commenters also requested public dissemination of construction details for the unloading rack that were submitted to the permitting agency. These documents contain sufficient detail to allow a competitor to build a similar facility without contracting for the detailed engineering that Valero required to develop the project. Releasing this information would allow a competitor to build a similar facility at a lower cost and put Valero at a competitive disadvantage. This detailed design information is clearly business confidential information. Furthermore, only a skilled process engineer would find these drawings useful.

_____ _____

Date Stephen J. McGovern, P.E., PhD

Appendix L.

Union Pacific Railroad Statement re: Preemption

ESA

UNION PACIFIC RAILROAD STATEMENT RE PREEMPTION

Union Pacific will not agree to any limitation on the volume of product it ships or the frequency, route or configuration of such shipments. Such restrictions are clearly preempted under federal law. A general overview of the case law is set forth below.

THE ICC TERMINATION ACT PREEMPTS STATE LAWS THAT MANAGE OR GOVERN RAIL TRANSPORTATION

The ICC Termination Act ("ICCTA") also preempts state laws with respect to rail transportation. The ICCTA, which became effective on January 1, 1996, created the Surface Transportation Board ("STB"). As codified at 49 U.S.C. § 10501, one section of the ICCTA addresses both the jurisdiction of the STB and the preemptive effect of its decisions and the remedies provided under the Act:

> (1) *transportation by rail carriers,* and the remedies provided in this part with respect to rates, classifications, rules *(including car service, interchange, and other operating rules), practices, routes, services,* and facilities of such carriers; and
>
> (2) the construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks, or facilities, even if the tracks are located, or intended to be located, entirely in one State, *is exclusive.*
>
> Except as otherwise provided in this part, *the remedies provided under this part with respect to regulation of rail transportation are exclusive and preempt the remedies provided under Federal or State law.*

49 U.S.C. § 10501(b) (emphasis added). The STB's substantive powers concern economic regulations or core operational decisions about railroads and other aspects of transportation. The ICCTA's definition of "transportation" includes the physical apparatus of railroad operations (locomotives, cars, rails and terminals that are owned by rail carriers) and the services related to the movement of passengers or property by rail. *See* 49 U.S.C. *§* 10102(9).

The ICCTA preempts laws "with respect to regulation of rail transportation." *!d.* § 10501(b). Congress' use of this phrase meant that it intended to preempt all laws that "have the effect of 'manag[ing]' or 'govern[ing]' rail transportation ... " *Florida East Coast Ry. v. City of W. Palm Beach,* 266 F.3d 1324, 1331 (11th Cir. 2001). Because the STB's jurisdiction is exclusive, states may not legislate in the aforementioned areas, which embrace matters such as railroad construction and facility management.

The Ninth Circuit has interpreted the ICCT A as broadly preempting state laws that have the effect of impacting the operation of railroads- physically or economically. In *City of Auburn v. STB,* the Ninth Circuit held that if local authorities had the "ability to impose 'environmental' permitting regulations on the railroad, such power will in fact amount to 'economic regulation' if the carrier is prevented from constructing, acquiring, operating, abandoning, or discontinuing a line." 154 F.3d 1025, 1029-31 (9th Cir. 1998). The court held that congressional intent to

preempt this kind of state and local regulation of rail lines is "explicit in the plain language of the ICCT A and the statutory framework surrounding it." *Id.*

Likewise, the Court of Appeals for the Fifth Circuit has held that the ICCTA expressly preempted a Texas law that prohibited railroads from willfully allowing a standing train to obstruct a crossing for more than five minutes. *Friberg v. Kansas City S. Ry. Co.,* 267 F.3d 439,441-44 (5th Cir. 2001). The *Friberg* court stated that the ICCTA's preemption provision "could not be more precise, and it is beyond peradventure that regulation of ... *train operations,* as well as the construction and operation of ... side tracks, is under the exclusive jurisdiction of the STB unless some other provision in the ICCTA provides otherwise." *Id.* at 443 (emphasis added); *see also Burlington N Santa Fe Corp. v. Anderson,* 959 F.Supp. 1288, 1296 (D. Mont. 1997) (holding that a state law authorizing regulation of closure, consolidation, or centralization of railroad agencies was preempted by ICCT A because it has a direct and substantial effect on economic regulation of railroad transportation).

Therefore, the ICCT A preempts all state laws or orders that attempt to regulate railroad transportation- a field committed to exclusive STB jurisdiction under the ICCTA. 49 U.S.C. § 10501 (b).

THE COMMERCE CLAUSE LIMITS STATE REGULATION OF RAILROADS BECAUSE IT PROHIBITS STATES FROM UNDULY INTERFERING WITH INTERSTATE COMMERCE

In *Southern Pacific Co. v. Arizona,* 325 U.S. 761, 773 (1945); *Pike v. Bruce Church, Inc.,* 397 U.S. 137, 142 (1960) the Supreme Court held that an Arizona law governing the length of trains unduly burdened interstate commerce and was unenforceable. 325 U.S. at 773. The Court emphasized the need for national uniformity in the field of train equipment, stating, "the confusion and difficulty with which interstate operations would be burdened under the varied system of state regulation and the unsatisfied need for uniformity in such regulation, if any, are evident." *Id.* at 773-74.

Similarly, in *Union Pacific R.R. v. Cal. Pub. Util. Comm 'n,* the Ninth Circuit held that a California Public Utility Commission rule requiring railroads to develop performance standards for train configuration impermissibly burdened interstate commerce. 346 F.3d 851, 872 (9th Cir. 2003). The court held that the rule was "clearly excessive in relation to the putative local benefits." *Id.* Although the Commission's rule did not, on its face, regulate conduct outside California, "the extra-territorial effect of its regulation [was] undisputed" because any train entering or leaving the state would have to be configured "to meet the most stringent standards on its trip." *!d.* at 871; *see also Missouri Pacific R.R. Co. v. R.R. Comm 'n of Texas,* 850 F.2d 264, 268 (5th Cir. 1988) (stating, "[I]t is difficult to imagine a state regulation of the train itself ... which could escape being a burden upon commerce .... ").

Therefore, state-by-state regulation of train safety and operations may place an undue burden on interstate commerce by inhibiting interstate train movement. As the Ninth Circuit stated, "if [one state] can require the Railroads to develop and to implement [particular] standards, so can every other state, and there is no guarantee that the standards will be similar." *See Union Pacific,* 346

F.3d at 871. Moreover, the need for nationally uniform safety regulations makes this an area that "can only be regulated by the national government." *Id.* at 870. Congress and the FRA have consistently articulated the goal of national uniformity in the FRSA's preemption provision, 49 U.S.C. § 20106(a)(l), in the FRA's parity requirement for collision-avoidance equipment, 49 C.F.R. § 236.566, and in Congress' recent requirement for PTC interoperability, 49 U.S.C. § 20157(a)(2). Therefore, state-by-state regulation of train equipment or safety standards would likely violate the Commerce Clause.