Valero Crude by Rail
Project Description

Benicia Refinery
Benicia, California

March 2013

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Valero Refining Company

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Project No. 0186851

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LIST OF ACRONYMS AND ABBREVIATIONS

API	American Petroleum Institute
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
bbl	barrels
CBR	Crude by Rail
CEQA	California Environmental Quality Act
EFR	external floating roof
LPG	liquefied petroleum gas
UPRR	Union Pacific Railroad Company

1.0 INTRODUCTION

The Valero Refining Company – California ("Valero") is proposing the Crude by Rail ("CBR") Project ("Project") at its Benicia Refinery ("Refinery") located in Benicia, California. The Project would require a land-use permit from the City of Benicia, Public Works & Community Development Department. Approval of the land-use permit requires 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 (ERM, 2012), and the City would act as lead agency for the preparation of the Initial Study. The Project also requires approval of an Authority to Construct permit from the Bay Area Air Quality Management District ("BAAQMD"). The purpose of this document is to provide information to the City of Benicia in support of the CBR Project and issuance of the land-use permit.

1.1 Overview

The Refinery currently processes crude oil received by pipeline and marine vessels. The Project would install a rail car unloading rack, repurpose 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 by train 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 is limited to an annual average of 165,000 bbl per day (daily maximum of 180,000 bbl per day) by BAAQMD permit. This limit will remain unchanged. No modifications would be made to Refinery process equipment.

Valero plans to begin construction in 2013 and to commence operating the CBR unloading facility in late 2013 or early 2014. Construction is expected to take approximately 6 months. Once operational, this Project would employ approximately 15 full-time-equivalent personnel.

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 Interstate 680. The Refinery is located along the northern edge of the Suisun Bay in a low range of coastal hills. To the west of East Second Street is open space, and the residential areas are approximately 3,000 feet to the south, west, and north-west of the 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, and the Refinery dock provides access to transport by ship. The Refinery dock is located on the Carquinez Strait between the Benicia-Martinez Bridge and the Port of Benicia wharf. The lands and facilities of the existing Refinery are shown in Figure 2.

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 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 Project would be within the Valero property boundaries.

Figure 1-1 Site Location

Figure 1-2 Site Detail Map

1.3 Objectives and Benefits

The primary purpose of the Project is to allow Valero access to more North American sourced crudes that have recently become available. The only viable option for transporting the crude oil from the North American sources to the Refinery is by railroad. Therefore, the objective of this Project is to enable Valero to replace up to

70,000 bbl per day of the crude oil currently supplied to the Benicia Refinery by marine vessel with an equivalent amount of crude oil transported by rail cars.

Air quality analysis of marine vessels and locomotives, as modes of crude oil transportation, indicates that locomotives generate fewer emissions within the local air basin than marine vessels for the same quantity of crude oil transported; thus, this Project should result in a net air quality benefit.

As noted above, the Project would not increase the Refinery's total crude oil processing capacity or result in an increase in the production of existing products or byproducts. 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. Therefore, no modifications to the downstream Refinery process equipment and operations are required and no changes in associated emissions are expected.

1.4 Current Operations Overview

The Refinery converts crude oil into many finished products, including California Air Resources Board 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 materials such as asphalt, caustic, petroleum coke, and liquefied petroleum gas ("LPG"). All rail traffic enters and exits along the southeastern boundary of the Refinery near the intersection of Park Road and Bayshore Road.

Crude oil is currently delivered to the Refinery by pipeline and marine vessels. The crude oil delivered via marine vessels is received at the Valero Marine Terminal at 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 Valero Marine Terminal. Valero currently uses external floating roof ("EFR") tanks with the same configuration as Tank 1776 to store crude oil (e.g., Tank 1707 and Tank 1708). 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 bbl per day on a maximum daily basis and 165,000 bbl per day on an annual average basis.

Valero currently exports petroleum coke and LPG from the Refinery to off-site customers. Once per day, typically around 11:00 am to noon, rail cars loaded with petroleum coke leave the Refinery via Track 700, cross Park Road, and go towards the AMPORTS 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. Valero also occasionally imports LPG. Other current rail operations in and around the Benicia Industrial Park support the existing Park customers 7 days per week.

2.0 COMPONENTS

The Project would include new and modified facilities to enable Valero to meet the Project objectives discussed above. The Project would consist of the following primary components:

- Provide facilities to allow receipt of crude oil by rail car:
    - Add crude oil to existing Tank 1776 storage service options
    - Install rail car unloading rack
    - Construct rail spurs to access the rail car unloading rack and store rail cars in preparation for departure
- Install ancillary facilities:
    - Install crude oil piping and associated components
    - Replace and relocate tank farm dikes
    - Relocate an existing firewater pipeline, compressor station, and existing underground infrastructure
    - Relocate groundwater wells along Avenue "A"
    - Add a service road adjacent to the proposed unloading rack

For each Project component listed above, the relation to the Project objectives, a description of current operation, and the Project's proposed changes in operation and equipment are presented below.

2.1 Crude Oil Deliveries

2.1.1 Current Operations

As noted above, the Refinery currently receives crude oil only by marine vessels and pipeline. 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 quality of crude oil varies by oil well locations and reservoir formations; therefore, 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 Benicia Refinery's existing crude oil slate gravity ranges from 20 to 30° API and sulfur content ranges from 0.6 to 1.9 weight percent based on 2011 to 2012 laboratory data.

2.1.2 Proposed Changes

The Project proposes to change the shipment method of up to 70,000 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 Project could reduce marine vessel deliveries by up to 25,550,000 bbl per year. Based on the

3-year baseline period from 10 December 2009 through 9 December 2012, annual marine vessel deliveries could be reduced by up to 81 percent.

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 current crude oil. 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 crude oil. 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 continue to be blended in the same manner. Since the North American-sourced crude oils would be replacing crude oil receipts of 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 described as part of the Project) as a result of accepting and refining the proposed North American-sourced crudes.

2.2 Tank 1776 Service Change

2.2.1 Current Operations

Tank 1776 (BAAQMD Source No. S-97) is an EFR tank with a diameter of 128 feet, a height of 48 feet, and a working capacity of 101,400 bbl (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 bbl 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 comprises 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.

2.2.2 Proposed Changes

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 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 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.

There would be no physical modifications to Tank 1776 that would impact breathing emissions. However, the tank would be repurposed for crude oil storage. To that end,

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, as required, for crude water draw service. Tank 1776 would not require heating because the proposed North American crude oil would flow readily at ambient temperatures. The Project would not increase Refinery steam demand and production.

As noted above, the 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. The use of Tank 1776 for the new crude oil storage is necessary because of the proximity of this tank to the proposed rail unloading rack. Use of this nearby tank would reduce the amount of infrastructure required, such as a new pipeline, 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 Project, material currently stored in Tank 1776 would be stored in existing storage tanks currently permitted for storage of similar materials.

2.3 Rail Car Unloading Rack

2.3.1 Current Operations

The Refinery is currently serviced by UPRR. UPRR transports Refinery products to off-site customers. Currently, there is no crude oil unloading facility at the Refinery.

2.3.2 Proposed Changes

An unloading rack capable of unloading two parallel rows of rail cars, on each side, and transferring crude oil to Tank 1776 would be constructed for this Project. 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 adjacent to Sulphur Springs Creek 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 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. The access walkways that cross the track would achieve this height. 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.

2.4 Unloading Rail Spurs

2.4.1 Current Operations

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.

2.4.2 Proposed Changes

As a part of the Project, existing tracks would be realigned and two unloading rail spurs and a parallel storage and departure spur would be constructed on the Refinery property 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.

It is proposed to install approximately 8,200 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 reused and five new track turnouts would be installed. The Project also proposes realigning approximately 2,370 track-feet located on Refinery property.

2.5 Ancillary Facilities

2.5.1 Current Operations

Ancillary facilities affected by this 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. 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. There is an existing firewater pipeline, several groundwater monitoring wells, a compressor station, and a carbon dioxide line in the vicinity of Avenue A.

2.5.2 Proposed Changes

The proposed Project would introduce the following changes to ancillary facilities:

- Install crude oil piping and associated components. Approximately 4,000 feet of primarily 16-inch-diameter, aboveground piping and associated components and infrastructure would be installed, between the unloading rack and Tank 1776, and from Tank 1776 to the existing crude supply piping.

- Replace and relocate tank secondary containment berms. 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 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.

- Relocate the existing firewater pipeline, compressor station, and carbon dioxide pipeline to accommodate the new rail tracks.

- Relocate groundwater wells. 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.

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

2.6 Impacts on Resources

2.6.1 Energy Use

As noted above, Tank 1776 would not require any retrofits and heating because the proposed North American crude oil would flow readily at ambient temperatures. Therefore, this Project would not increase the steam demand and the associated energy consumption at the Refinery. Energy needs would be limited to electricity to run equipment, such as pump motors, and for lighting. Valero has prepared a lighting plan and submitted that information to the City of Benicia.

2.6.2 Water, Wastewater, and Storm Water

As noted above, this Project would not increase water or steam demand, and should not cause impacts to water and wastewater handling at the Refinery.

The facility operates groundwater monitoring wells along Avenue A. As noted above, some of these wells would be relocated or abandoned in accordance with Solano County and California Department of Water Resources procedures. Groundwater monitoring and reporting continues on a quarterly basis. Three Board Orders are currently applicable to the site and were issued between 1994 and 1997: 94-070, 94-144, and 97-077.

Storm water outfalls in the Project vicinity include EFF-007, EFF-008, EFF-009, EFF-010, and EFF-003. The facility's Storm Water Pollution Prevention Plan describes the location of these outfalls. The facility's National Pollutant Discharge Elimination System Permit sets permit limits for storm water discharge from these outfalls. Storm water runoff during construction and operation would be contained and treated at the facility wastewater treatment plant.

3.0 CONSTRUCTION

3.1 Construction Areas

The proposed Project construction activities would take place mostly near the lower tank farm area, along Avenue "A". Pipeline construction would take place between this area and Tank 1776, which includes Avenue "A", Avenue "D", 9th Street, and 14th Street.

3.2 Construction Schedule

Project construction would potentially begin in mid-2013. The overall construction period is estimated to be approximately 25 weeks.

3.3 Construction Activities

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.

3.3.1 Excavation and Grading

Most of the area that would be disturbed by the proposed 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. The following earth movement volumes are approximate. New tracks would result in a cut volume of 11,000 cubic yards and fill volume of 3,000 cubic yards. Containment berm work would result in a cut volume of 5,000 cubic yards. The new rail unloading rack would also result in a cut volume of 600 cubic yards. The net cut volume is 13,600 cubic yards.

3.3.2 Construction Material Deliveries

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, temporary office trailers for construction contractors).

3.4 Construction Labor Force

The construction workforce would include workers conducting activities inside the Refinery in and around the Project area. The total workforce is estimated to include 121 construction workers. This staffing level is well below cyclical increases that occur for turnaround maintenance.

3.5 Construction Traffic and Parking

The 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. If dictated by the results of the traffic analysis, public safety would be maintained by traffic control measures 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 Valero property. There would be no parking or other services off site.

The laydown areas located off site north and east of the Refinery would host Project equipment, and may also contain temporary office trailers, security lighting, and other incidental features.

4.0 OPERATION

The Project would install two parallel rail car unloading spurs on each side of the unloading rack. 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). 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, connected to a common header routed 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 was finished). Two pumps, operating in parallel, would pump the crude oil from the unloading rack header via a new 16-inch pipeline to Tank 1776. 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.

The unloading rack would be used only for unloading crude oil, up to 70,000 bbl per day (25.55 million bbl per year); there would be no loading of crude oil or other materials at this rack.

A typical rail car handling scenario is described below:

1. UPRR-operated locomotives would haul up to 100 crude oil rail cars a day from the UPRR Roseville Railyard to the Refinery. The rail cars are nominally 60 feet long, with a capacity of approximately 700 bbl and a maximum estimated load of 211,600 pounds each.
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 Valero 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.

Once operational, this Project would employ approximately 15 full-time-equivalent personnel to service California logistics.

5.0 EMISSIONS REDUCTION MEASURES

Construction of the proposed Project components would temporarily result in dust, criteria pollutant, and greenhouse gas generation and noise associated with use of heavy construction equipment. Construction emissions would be mitigated by implementing the mitigation measures recommended by BAAQMD in Table 2 and Section 4.2 of the BAAQMD CEQA Guidelines (December 1999). Some of these measures include watering to control dust from disturbed areas, minimizing idling times, and regular maintenance and tune-up of construction equipment to reduce exhaust emissions.

Operational emissions from the proposed Project would mainly consist of volatile organic compounds from Tank 1776 and fugitive component leaks. Tank 1776 and all the pipeline components including valves, pump seals, flanges, etc., would meet the BAAQMD BACT requirements. A reduction in emissions from transportation of crude oil is anticipated as a result of the proposed Project.

6.0 REQUIRED PERMITS AND APPROVALS

The Project would require or potentially require the permits and approvals listed in Table 6-1.

Table 6-1 Agency Permits or Approvals Potentially Required

Agency Permit or Approval	Requirement	Applicability to Project
City of Benicia	Land-Use Permit	Required for new facilities that manage listed hazardous substances and for construction of projects above City thresholds
Bay Area Air Quality Management District	Authority to Construct / Permit to Operate, Title V Permit Amendment	Required in order to construct or modify and to operate certain stationary emission sources
Regional Water Quality Control Board	Construction General Permit (Notice of Intent and Construction Storm Water Pollution Prevention Plan)	Required to control surface runoff during construction
Regional Water Quality Control Board	Storm Water Control Plan	Required to control post-development storm water runoff.
Ministerial Permits	Building, electrical, etc.	Pursuant to local codes