VALERO

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April 2, 2013

Crude by Rail Project
Response to ESA Data Request No. 2
Valero Refining Company – California

Mr. Tim Morgan
Project Manager
ESA
1425 N. McDowell Boulevard, Suite 200
Petaluma, CA 94954

Dear Mr. Morgan:

Enclosed is Valero's response to ESA's questions in Data Request No. 2, associated with Valero's Crude by Rail project at the Valero Refinery in Benicia, California. This request was submitted by ESA to Valero by email on March 15, 2013.

Please contact me at 707-745-7203 if you have any questions or need additional information.

Sincerely,

Susan K. Gustofson, P.E.
Staff Environmental Engineer

SKG/

Enclosures

cc: (w/enclosures)
Mr. Charlie Knox, City of Benicia
Mr. Corey Barringhaus, ESA
Mr. Chuck Bennett, ESA
Mr. Matthew Fagundes, ESA

ecc: (w/enclosures)
Ms. Lynn McGuire, ERM

Document # 23691

VALERO RESPONSES TO:

VALERO CRUDE BY RAIL PROJECT
DATA REQUEST NUMBER 2
April 2, 2013

REVIEW OF CRUDE BY RAIL AIR PERMIT APPLICATION

ESA has reviewed Valero's Crude by Rail (CBR) Project Air Permit Application relative to the City's CEQA review for the project and has the following comments, questions, and requests.

1. **Potential Decline in Crude Oil Feed Stocks by Pipeline**
   a. Contra Costa County recently approved a crude tank project for another Bay Area refinery (Shell Martinez). The project allows the refinery to maintain current production levels by increasing marine vessel deliveries, necessary because it was projected that San Joaquin Valley (SJV) crude oil feed stocks now received by pipeline would continue to diminish. While the CBR has not been proposed for this reason, the air permit application and other documentation are silent on whether crude oil supply delivered by pipeline would decline and be replaced by crude oil delivered by rail.
   b. Also, we note that the second to last paragraph on application page 10 indicates that the proposed crude oil throughput at tank S-97 (Tank 1776) would be offset by a corresponding decrease in throughput at the facility's other crude oil storage tanks that are currently served by ship and by pipeline, which suggests the possibility that some of the oil delivered by rail could offset oil now delivered by pipeline. Please clarify.
   c. How can the City be sure that the CBR project crude will not replace crude shipments by pipeline?

Responses 1-a, 1-b, 1-c, 2-b. *Valero does not anticipate a change in the amount of crudes received by pipeline. This project was implemented to take advantage of land-locked North American crudes that have recently become available. Valero plans to continue to receive crude at the Benicia refinery via pipeline, and does not anticipate a change in the volume of crudes received by pipeline as a result of this project. The North American sourced crudes proposed to be received by railcar are similar to crudes currently supplied by marine vessel from the Alaskan North Slope (ANS look-alikes).*

Pipeline-supplied crudes have different crude characteristics than the ANS look-alikes. The crudes supplied by pipeline require storage in a heated tank. The existing crude storage tanks are located in the crude storage tank field and are configured only to receive crude by pipeline and by marine vessel. These tanks are not configured to receive crude from the proposed railcar unloading rack. The North American sourced crudes proposed by this project will be transported in unheated railcars and will be stored in an unheated storage tank that is in the vicinity of the unloading rack and in a different location than the existing crude storage tank field.

The Benicia refinery processes a mixture of crudes from throughout California, the United States and the world. These crudes are blended together at the refinery to assure safe and compliant

processing utilizing current refinery hardware and within permitted limits. Because there will be no change to the process units as a result of the proposed method of crude receipt, the refinery's 'diet' of crudes processed must also remain within existing parameters.

We understand that there has been discussion that the California crudes received via pipeline may decline in the future. Crude availability from any source is driven by factors that are outside of Valero control. Because only a portion of the crude supply to the Benicia Refinery is by pipeline, we anticipate that this crude conveyance will remain an available and viable source of supply in the foreseeable future.

The BAAQMD has the jurisdiction to regulate air emissions in the San Francisco Bay Area. Valero's VIP project was a fully-offset emissions reduction project (no net emissions increase) permitted by the BAAQMD. A provision of the VIP permit included a limit on ship emissions from waterborne materials receipts. Valero currently operates well within this permit limit. The VIP permit also included a provision allowing Valero to amend this emission limit if, for example, crude supplied to the Benicia refinery via pipeline were to decline. To maintain marine deliveries of crude at levels allowed in the VIP permit, that provision provided a process to increase waterborne crude receipts provided there were no net emissions increase (fully offset). This means that emissions increases from waterborne receipts would require emissions reductions elsewhere at this facility. If the availability of pipeline crude were to decline today, the Title V permit allows an increase in waterborne crude up to the limits of the current permit. Valero does not, however, anticipate a change in the amount of crudes received by pipeline.

2. Marine Baseline Emissions Assumptions and Air Permit Limits

a. The BAAQMD permit application analysis includes baseline marine vessel emissions calculated starting from the sea buoy (approximately 11 nautical miles west of the Golden Gate Bridge) and ending at the Refinery Wharf. Other CEQA lead agencies (e.g., Contra Costa County and California State Lands Commission) recently have used lower distance assumptions to estimate marine vessel emissions associated with refinery marine terminal projects in the Bay Area. For the Shell Crude Tank Replacement Project (2012), Contra Costa County used vessel travel emissions starting at Golden Gate Bridge. For the NuStar Shore Marine Oil Terminal Lease Project (2012), State Lands used a marine vessel transit distance from the nearest ship lane in the bay to the marine terminal. Clearly the distance affects the CBR project baseline emissions, and the assumption that emissions begin to be counted at the sea buoy represents the least conservative option for marine vessel travel distance. What is the justification for using the sea buoy rather than another location, such as the Golden Gate Bridge, for the marine vessel start locations?

b. The last sentence on page 13 indicates that no changes are proposed related to the existing air permit limits associated with existing ship and barge delivery emissions estimates. This gives the City no assurance that the proposed crude oil shipments by rail would actually result in a decline in marine vessel deliveries. What mechanism do you propose to assure the City that the CBR project would actually reduce marine vessel deliveries and emissions?

Response 2a. *The sea buoy was used to estimate marine vessel travel distances based on feedback from BAAQMD and amended BAAQMD Regulation 2-2. Prior to estimating marine vessel emissions, ERM contacted Ms. Alison Kirk, a CEQA planner at BAAQMD, to determine if there were any BAAQMD guidelines that specified the distance over which marine vessel emissions should be estimated. Ms. Kirk stated BAAQMD did not have such guidelines, but recommended including the distance up to the sea buoy (also known as the point where the bar pilot boards the ship), which is approximately 11 nautical miles west of Golden Gate Bridge, to estimate marine vessel emissions. This distance is consistent with amended BAAQMD Regulation 2-2 (adopted December 19, 2012), which specifies in Section 610 that emissions from cargo carriers operating within California Coastal Waters up to 11 nautical miles from the Golden Gate Bridge should be included as part of the source's emissions for the purposes of estimating offset requirements.*

Response 2b. *As indicated previously, the refinery's total crude processing capacity is limited by its BAAQMD Permit to Operate, so that any increase in volumes of crude received by rail will necessarily result in a corresponding decrease in volumes received by marine vessel. Valero proposes that the existing constraints on processing capacity in the BAAQMD Permit to Operate are sufficient to ensure that the CBR project will result in reducing marine vessel deliveries and emissions.*

3. Storage Tank Baseline Emissions

Given that there would be no change in product produced at the refinery under the CBR project, we assume that the jet fuel now stored at tank S-97, but displaced by crude brought in by rail, would be stored at other existing refinery product tanks that currently operate below their permitted limits. Under this assumption, the jet fuel fugitive POC and TAC baseline emissions should not be subtracted from the project emissions for the CEQA analysis because they would continue to be emitted at the Refinery. Is this correct? If not, please explain why not?

Response 3. *Yes, your comment is correct. POC and TAC baseline emissions from the products currently stored in S-97 should not be subtracted from the project emissions for CEQA analysis because they could continue to be emitted from other existing sources within the facility that are currently permitted for storage and service of those materials.*

4. Other Miscellaneous Requests

a. Please provide the estimated project-related increase in daily electricity usage (i.e., kilowatt-hours) as well as the associated indirect GHG emissions estimates.
b. Please provide a health risk assessment that includes the tank-related benzene emissions as well as diesel particulate matter that would be associated with the proposed train deliveries.

Response 4a. *The increase in electric consumption for this project is offset by a proportionate decrease in electric energy consumption from a reduction of waterborne crude deliveries. For this project alone, electric use would be incurred from two crude oil unloading pumps and the unloading rack utility lighting. At approximately 3,100 gallons per minute crude unloading rate (196 Hp each), each pump would operate up to 7.9 hours per day to unload up to the daily permitted quantity of crude oil. The annual electricity consumption by the pumps is estimated to be 870 MWh. Unloading rack utility lighting with an estimated power rating of 20 kW would operate for approximately 12 hours a day. The annual electricity consumption from light fixtures is estimated to be approximately 88 MWh. Based on the total peak electric use of 958 MWh per year, the GHG emissions are estimated to be 198 tons of carbon dioxide equivalents per year (0.54 ton CO_2e per day). An emission factor of 412 pounds per MWh is used to estimate carbon dioxide emissions. This emission factor is obtained from the CPUC GHG Calculator for Pacific Gas and Electric (PG&E) Company for the year 2014. The calculator provides an independent forecast of PG&E's emission factors as part of a model on how the electricity sector would reduce emissions under AB 32. Emission factors for methane and nitrous oxide are obtained from The Climate Registry's 2013 Default Emission Factors (Released January 2013) for CAMX/WECC California eGRID subregion.*

Response 4b. *Results of a screening-level health risk assessment (HRA) performed by ERM for the BAAQMD permit submittal are provided in Table 1 below. This includes risk analysis for toxics listed in BAAQMD Reg. 2-5, and includes Benzene and Particulate Matter (PM), as well as Ethylbenzene, Toluene, Xylenes, and Hexane. 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) 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 and Non-cancer 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 ≥ 40 m from the train tracks.	2.27 Worst case risk at 150 m west of train tracks (578686E, 4215678N)	0.009 Worst case risk at 150 m west of train tracks (578686E, 4215678N)	0.0002 (575494E, 4212545N)
Maximum Exposed Individual Worker (MEIW)	4.46 (576144E, 4214145N)	0.014 (576144E, 4214145N)	0.0021 (575944E, 4214395N)
Maximum Sensitive Receptor – Day Care Center	0.29 (574594E, 4212895N)	0.0005 (574594E, 4212895N)	0.0001 (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. *Tank-1776 – as circular area source; and*
5. *Fugitive equipment leak – as rectangular area source*

Locomotive emissions during transit mode were modeled over a track length of 4 miles out from the unloading rack. 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.

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*

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 along the 4 miles of modeled train route. However, there are residences as close as 40 meters 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, 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 farthest from the facility, to account for the exposure to nearby residences as the train passes through Fairfield. Residences in Benicia near the refinery are much further away from the locomotive activity than 40 meters. Therefore, for TAC exposure from locomotive idling, Tank-1776, and fugitives, the estimated MEIR risk shown below is very conservative.

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 (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.