Comments on
Initial Study/Mitigated Negative Declaration (IS/MND)
Valero Crude by Rail Project
Benicia, California

Use Permit Application 12PLN-00063

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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

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[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

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[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:

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[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.

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[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

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[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.

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[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.

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[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

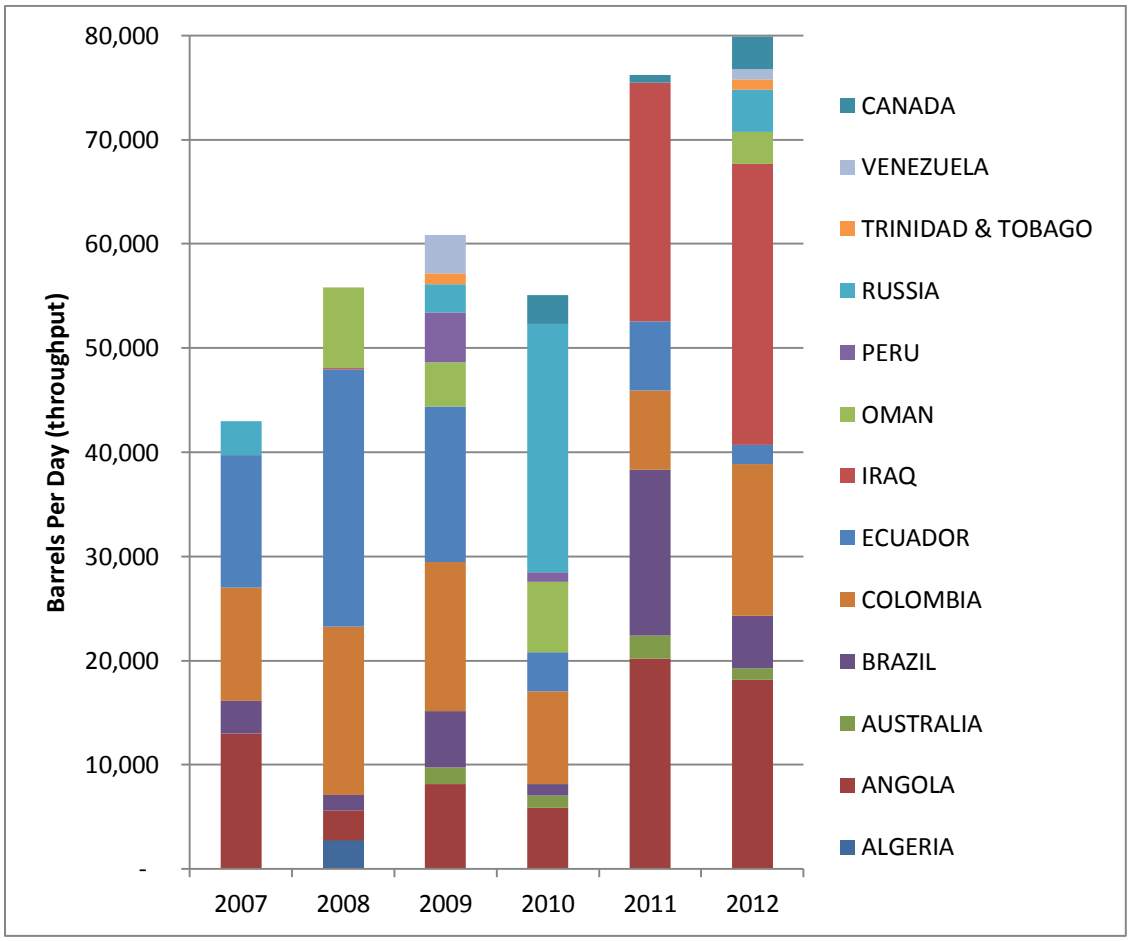
[47] The North American-sourced crudes that "fall into the lower right corner of the graph" and are "ANS look-alikes or sweeter" appearing on the chart also include LLS Light and WTI, but these crudes are not commonly delivered by rail.

[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]

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[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

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(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