

CBE, Sierra Club, Center, ForestEthics et al. Comments on the Revised Draft Environmental Impact Report for the Phillips 66 Company Rail Spur Extension and Crude Unloading Project

ATTACHMENT B:

Expert Report of Greg Karras on the Revised Draft Environmental Impact Report for the Phillips 66 Rail Spur Extension and Crude Unloading Project, November 2014.

Expert Report of Greg Karras
Communities for a Better Environment (CBE)
24 November 2014

Regarding the

**Phillips 66 Company Rail Spur Extension and Crude Unloading Project
Revised Draft Environmental Impact Report (RDEIR)** dated October 2014
Prepared for San Luis Obispo County
State Clearinghouse #2013071028
County File #DRC2012-00095

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I, Greg Karras, declare and say:

1. I reside in unincorporated Marin County and am employed as a Senior Scientist for Communities for a Better Environment (CBE). My duties for CBE include technical research, analysis, and review of information regarding industrial health and safety investigation, pollution prevention engineering, pollutant releases into the environment, and potential effects of environmental pollutant accumulation and exposure.

Qualifications

2. My qualifications for this opinion include extensive experience, knowledge, and expertise gained from nearly 30 years of industrial and environmental health and safety investigation in the energy manufacturing sector, including petroleum refining, and in particular, refineries in the San Francisco Bay Area.

3. Among other assignments, I served as an expert for CBE and other non-profit groups in efforts to prevent pollution from refineries, to assess environmental health and safety impacts at refineries, to investigate alternatives to fossil fuel energy, and to improve environmental monitoring of dioxins and mercury. I served as an expert for CBE in collaboration with the City and County of San Francisco and local groups in efforts to replace electric power plant technology with reliable, least-impact alternatives.

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I served as an expert for CBE and other groups participating in environmental impact reviews of related refinery projects, including, among others, the Chevron Richmond refinery “Hydrogen Renewal Project” now subject to reanalysis pursuant to a California Court of Appeals Order,¹ and the Phillips 66 “Propane Recovery Project” now pending before Contra Costa County.² I serve as an expert for CBE in collaboration with labor, academic, and other community based and environmental groups in a project involving comprehensive investigation of environmental health and safety impacts of, and alternatives to, refining denser, more contaminated types of crude oils.

4. I authored a technical paper on the first publicly verified pollution prevention audit of a California petroleum refinery in 1989 and the first comprehensive analysis of refinery selenium discharge trends in 1994. I authored an alternative energy blueprint, published in 2001, that served as a basis for the Electricity Resource Plan adopted by the City and County of San Francisco in 2002. From 1992–1994 I authored a series of technical analyses and reports that supported the successful achievement of cost-effective pollution prevention measures at 110 industrial facilities in Santa Clara County. I authored the first comprehensive, peer-reviewed dioxin pollution prevention inventory for the San Francisco Bay, which was published by the American Chemical Society and Oxford University Press in 2001. In 2005 and 2007 I co-authored two technical reports that documented air quality impacts from flaring by San Francisco Bay Area refineries, and identified feasible measures to prevent these impacts.

5. My recent publications include the first peer reviewed estimate of combustion emissions from refining denser, more contaminated “lower quality” crude oils based on data from U.S. refineries in actual operation, which was published by the American Chemical Society in the journal *Environmental Science & Technology* in 2010, and a follow up study that extended this work with a focus on California and Bay Area refineries, which was peer reviewed and published by the Union of Concerned Scientists in 2011. Most recently, I presented invited testimony on *inherently safer systems* requirements for existing refineries that change crude feedstock at the U.S. Chemical Safety Board’s public hearing on the Chevron Richmond refinery fire that was held on 19 April 2012. My curriculum vitae and list of publications are attached hereto.

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¹ *See* CBE v. City of Richmond 184 Cal_App.4th.

² *See* Contra Costa Pipeline Project file, County File #LP072009, SCH #2007062007.

Scope of Review

6. In my role at CBE I have reviewed the proposed project called the Phillips 66 Company Rail Spur Extension and Crude Unloading Project (project) and the October 2014 Revised Draft Environmental Impact Report (RDEIR) released by San Luis Obispo County for public review of the proposed project. My review of the project and DEIR reported herein is focused on the primary energy source and scope of the project as those relate to its potential environmental impacts. My opinions on these matters and the basis for these opinions are stated in this report.

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Energy Source

7. The RDEIR states that the project would install, at the Phillips 66 Santa Maria Facility (SMF), rail spur modifications, a mainline turnout, an unloading facility, an unloading system, a fire protection and safety system, pipelines, access roads, emergency vehicle access, a security fence, spill containment and response facilities, and buildings. (RDEIR at 2-8.) This would enable delivery via rail of crude oil for processing at the SMF. Proposed equipment could unload DOT-111 rail cars that, when filled to their weight limits with high-density ('heavy') crude, could carry $\approx 52,000$ barrels per 80-car train (RDEIR at 2-22), and unload each train's rail cars in ≈ 11.5 hours. (RDEIR at 2-29.) This suggests a maximum *offloading*¹ capacity of $\approx 104,000$ b/d (2 trains/day).

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8. In a significant change from the project described by the November 2013 DEIR, the RDEIR states no Bakken crude would be delivered. (RDEIR at 2-1, 2-22.) It also says new infrastructure would allow steam-heating to unload rail cars if the highly-viscous crude in them cools below its pour point during transit. (RDEIR at 2-14, 2-15.) It further states each rail car would carry less than its nominal capacity—approximately 27,300 gallons instead of its capacity of 31,808 gallons—because of weight limits and the high density of the crude to be delivered. (RDEIR at 2-22.) Finally, the examples of 'potential crude by rail sources' given are bitumen-derived oils extracted from the Alberta tar sands. (RDEIR at 2-33.²) These disclosures, and the tar sands' predominance among North American sources of oils with the high density and viscosity thus disclosed, indicate that tar sands oils would likely dominate the new crude source.

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¹ SMF's proposed *processing* capacity of 48,950 b/d indicates a real capacity of ≈ 1 train/d or 344 trains/year. The RDEIR provides no data supporting its "expected" maximum of 250 trains/year.

² Access Western Blend and Peace River Heavy are tar sands oils; *see* www.crudemonitor.ca.

9. Tar sands bitumen is fundamentally different from heavy oil or conventional crude.³ The RDEIR states that the purpose of the rail spur is to “[a]llow the refinery to obtain a range of competitively priced crude oil by providing the capability to obtain raw material from North American sources that are served by rail.” (RDEIR at 2-1.) However, “the availability of these competitively priced” North American crude streams might drive the project only “[i]n the short-term (three to five years).” (RDEIR at 2-36.) The rail spur would be expected to operate for “20 or 30 years, if not longer.” (*Id.*) The RDEIR does not disclose that the project would enable a long-term switch to a fundamentally different primary energy source for transportation fuels.

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10. The RDEIR asserts that “[t]he ability of the SMR to operate at the maximum approved throughput level is based on the existing infrastructure and is not dependent on, or related to, the SMR rail project.”⁴ This assertion is inaccurate and misleading. The Throughput Increase Project referenced is not yet implemented (and appears to await an approval). Based on the most recent three-years before the rail project notice, average 2010–2012 SMF crude throughput ($\approx 38,000$ b/d⁵) would have to increase by $\approx 29\%$ to achieve its ‘maximum approved’ annual average throughput level ($48,950$ b/d⁶). Moreover, the SMF’s ability to boost crude rate and achieve this ‘maximum approved throughput’ on a sustained basis is limited by its existing crude delivery infrastructure. Built to tap local oil fields, the SMF lacks infrastructure to receive crude via ship or rail. A pipeline system that connects the SMF only to local oil fields “is currently the only way that the Phillips 66 refinery can receive crude oil.” (RDEIR at 2-35.) And as the RDEIR acknowledges (RDEIR at 2-36), crude production from the key Central Coast oil fields that feed the SMF via this pipeline system is dwindling.

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11. Indeed, the RDEIR admits: “In the long-term, the need for the SMR rail project could be driven by declines in local production of crude oil that can be delivered by pipeline.” (RDEIR at 2-36.) This indicates that the throughput increase *would* depend on the rail spur, and that rather than merely enabling speculation on the crude oil market, the project would enable the SMF to be re-purposed, from serving local crude production, to upgrading imported tar sands oil. Failure to disclose *that* is a clear error in the RDEIR.

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³ *See* Meyer et al. at 2; USGS Open-File Report 2007-1084; (<http://pubs/usgs.gov/of/2007/>).

⁴ RDEIR at 2-35. This assertion references the SMF ‘Throughput Increase Project’ (*Id.*)

⁵ Based on 37,785 b/d (2010), 38,701 b/d (2011), and 37,602 b/d (2012); *see* RDEIR at 2-35.

⁶ RDEIR at 2-35 (proposed ‘Throughput Increase Project’ to an annual average of 48,950 b/d).

12. The RDEIR does not include or analyze relevant data to evaluate the extent to which Phillips' rail spur proposal could replace locally produced crude feed for the SMF. It omits data describing production rates of oil fields that currently supply the SMF, such as McCool Ranch, and fields in the San Joaquin Valley Basin. It also omits data on the portion of each field's production that is needed by other refiners, committed to other refiners, or both. The RDEIR also does not include or analyze year-on-year production to support more robust trend analysis and forecasts.

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13. Abundant evidence that the RDEIR does not include or analyze demonstrates that declining local and regional crude production could greatly affect SMF operation.⁷ Total California crude production supplied to refineries statewide has declined by 43% from its peak of 1.10 million barrels per day in 1986 to 631 thousand barrels/day (Mb/d) in 2013, and California crude now supplies only 40% of statewide refinery crude input.⁸ Statewide, coastal onshore production was 137 Mb/d in 1977 but only 60.3 Mb/d in 2012, indicating a gross decline of -56% and a year-on-year decline averaging -2.0%/year in this period.⁹ State offshore production peaked in 1978 at 107 Mb/d and was 35.6 Mb/d in 2012, indicating a gross decline of -67% and a year-on-year decline averaging -3.6%/y.¹⁰ In California's San Joaquin Basin, crude production peaked in 1986 at 745 Mb/d and was 405 Mb/d in 2012, a gross decline of -46% and annual decline averaging -2.3%/y.¹¹ California federal Outer Continental Shelf (OCS) production peaked in 1995 at 197 Mb/d and was 41.1 Mb/d in 2012, a gross decline of -79% and an average year-on-year decline during this period of -8.3%/y.¹² Some 13 Central Coast OCS, state offshore and onshore fields have been identified as sources of crude for the SMF.¹³ Total production from these 'local supply' sources was 191 Mb/d in 1995 but only 67.1 Mb/d in 2012, a gross decline of -65% and a year-on-year decline ranging from -2.8%/y since 2003 to -5.8%/y since 1995.¹⁴ See Figure 1. This 2.8-5.8%/year decline is within the range found elsewhere in the state that is discussed above (2.0-8.3%/y). As Figure 1 illustrates, this

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⁷ This finding also applies to the Rodeo Facility of the Phillips 66 San Francisco Refinery.

⁸ Cal. Energy Commission (http://energyalmanac.ca.gov/petroleum/statistics/crude_oil_receipts).

⁹ U.S. Energy Information Admin. (http://www.eia.gov/dnav/pet/pet_crd_pres_dc_u_rcac_a.htm).

¹⁰ U.S. EIA (http://www.eia.gov/dnav/pet/pet_crd_pres_dc_u_rcasf_a.htm).

¹¹ U.S. EIA (http://www.eia.gov/dnav/pet/pet_crd_pres_dc_u_rcaj_a.htm).

¹² U.S. EIA (<http://tonto.eia.gov/dnav/pet/hist/LeafHandler.ashx?PET&s=RCRR10R5F+1&f=A>).

¹³ The Pt. Perdernales, Pt. Arguello, Santa Ynez, Elwood S. Offshore, Arroyo Grande, San Ardo, Cat Canyon, Orcutt, Santa Maria Valley, Lompoc, Casmalia, McCool Ranch, and Zaca fields.

¹⁴ Data from State Division of Oil, Gas, & Geothermal Resources (DOGGR) and US DOI Bureau of Safety and Environmental Enforcement (BSEE). See Exhibit 1 Appended hereto.

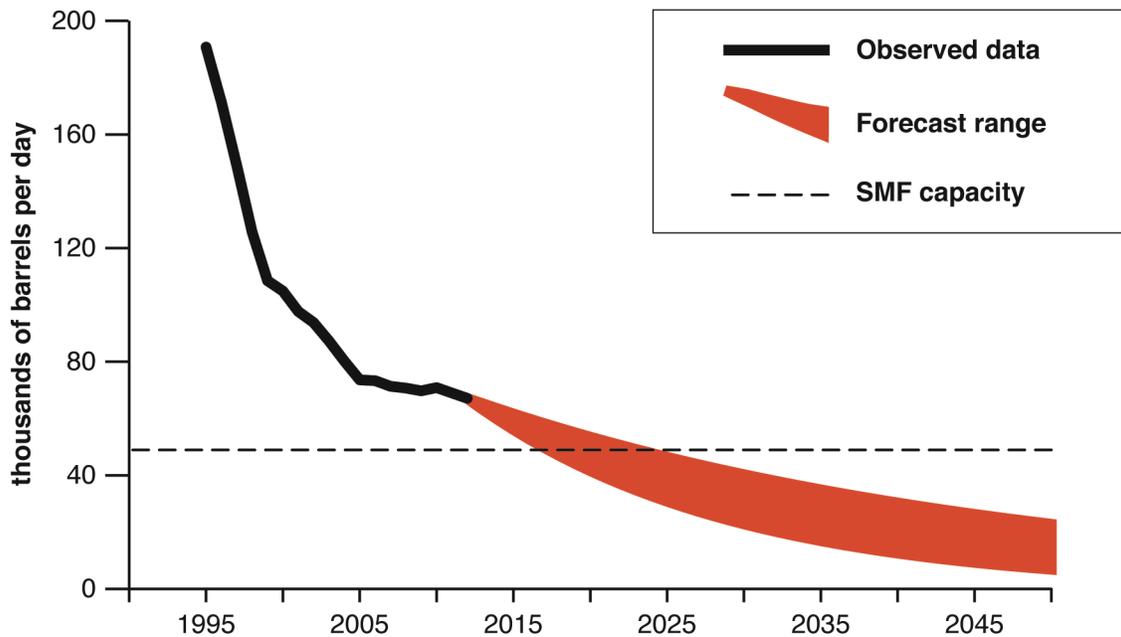


Figure 1. Total Central Coast OCS, offshore, and onshore oil production of fields supplying crude oil to the Phillips 66 SMF from 1995–2012, and forecast to 2050.

Observed production by year, in thousands of barrels per day (Mb/d)

1995	191 Mb/d	2001	97.7 Mb/d	2007	71.3 Mb/d
1996	171 Mb/d	2002	93.8 Mb/d	2008	70.7 Mb/d
1997	149 Mb/d	2003	87.3 Mb/d	2009	69.7 Mb/d
1998	126 Mb/d	2004	80.2 Mb/d	2010	70.9 Mb/d
1999	108 Mb/d	2005	73.6 Mb/d	2011	69.0 Mb/d
2000	105 Mb/d	2006	73.3 Mb/d	2012	67.1 Mb/d

Data from Cal. Dept. of Conservation (DOGGR) and U.S. Dept. of Interior (BSEE); *see* Exhibit 1 for details. Oil fields included are Pt. Perdernales, Pt. Arguello, Santa Ynez, Elwood S. Offshore, Arroyo Grande, San Ardo, Cat Canyon, Orcutt, Santa Maria Valley, Lompoc, Casmalia, McCool Ranch, and Zaca.

Forecast range based on range of average year-on-year decline rates (2.8–5.8%/yr) from a more recent (2003–2012) and longer (1995–2012) period, after CEC method (*see* CEC-600-2010-002-SF at 138).

SMF capacity based on Santa Maria Facility maximum proposed rate (48,95 Mb/d) from RDEIR at 2-35.

2.8–5.8%/year rate of decline could result in total production from these ‘local supply’ sources falling below the maximum capacity of the SMF to process crude within a few years, and then falling further, to a small fraction of SMF design capacity, within the expected operating life of the proposed rail spur. When its crude rate falls too far below the design specifications of its existing equipment, such as its pipelines and vacuum unit, the existing SMF cannot operate efficiently or profitably.

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14. This evidence shows that, as the RDEIR’s incomplete analysis acknowledges, the project would enable the long-term replacement of declining local SMF crude supplies. The SMF, a facility sited, designed, and built to serve and be supplied by local crude oil production that now, some 60 years later, is dwindling, will soon outlive this purpose. Thus, Phillips’ proposal presents a choice: should it be allowed to extend this refining operation for several decades by re-purposing the SMF to process tar sands oil that is imported by rail? The RDEIR should have evaluated this choice and its environmental implications instead of obscuring them.

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Project Scope

15. Phillips’ Santa Maria and Rodeo facilities (SMF and RF, respectively) are interdependent parts of its San Francisco Refinery (SFR), and its SMF rail spur,¹⁵ SMF throughput increase,¹⁶ and RF LPG¹⁷ proposals are interdependent parts of a larger project that has been piecemealed, as shown below.

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16. SFR is identified and reported as a single oil refinery comprised of the SMF and RF by government and industry authorities,¹⁸ by San Luis Obispo County,¹⁹ and by Phillips itself (see Phillips 66 website).²⁰ SFR’s primary, and from Phillips’ perspective essential, products are gasoline, diesel and jet fuel. (*Id.*) But the SMF does not make *any* finished gasoline, diesel, or jet fuel by itself, and lacks the hydroprocessing and naphtha reforming capacity necessary to do so—all of the SFR hydrocracking, hydrotreating, hydrogen production, and naphtha reforming capacity is at the RF.²¹ Instead, Phillips 66 sends all of the partially upgraded feedstock that the SMF produces (gas oil and naphtha-pressure distillate) through a proprietary pipeline to the RF, where all of the SFR’s

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¹⁵ “Rail Spur Extension and Crude Unloading Project”; SCH #201307028; this RDEIR.

¹⁶ “Throughput Increase Project”; SCH #20081010111; pending approval (see RDEIR at 2-35).

¹⁷ “Propane Recovery Project”; SCH #2012072046; comment on revised DEIR due 12/2/14.

¹⁸ Compare refinery capacity reports by EIA (<http://www.eia.gov/petroleum/refinerycapacity/>) and *Oil & Gas Journal* (<http://www.ogj.com/ogj-survey-downloads.html#worldref>) to facility configuration and throughput reports by State Regional Water Quality Control board permits (Order R3-2013-0028 at Table F-9 and Order R2-2010-0027 at Table F-1C); see also RDEIR at 2-32; Throughput Increase FEIR at 2-12; and ‘Propane Recovery’ RDEIR at 3-10 through 3-19.

¹⁹ See this RDEIR at 2-4; Throughput Increase FEIR at 2-1. Notably, the ‘Propane Recovery’ RDEIR’s only references to the SFR are in its reference titles and a footnote on page 1-3 regarding changes of ownership: it fails to disclose that the RF is a component of the SFR.

²⁰ www.phillips66.com/EN/about/our-businesses/refining-marketing/refining/Pages/index.aspx

²¹ Compare refinery capacity reports and facility-level orders and EIRs cited in the note above.

finished gasoline, diesel and jet fuel is made and then shipped from the RF product pipelines and wharf for sales.²² The SMF thus depends upon the RF for transport fuel production and financially sustainable operation.

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17. The RF, in turn, relies on the SMF for sufficient feedstock delivery and deep conversion (coking) capacity. San Joaquin Valley Pipeline (SJVP) crude delivery to the RF is declining with declining San Joaquin Basin production (see paragraph 13), and this decline has already driven a throughput increase at the RF wharf (BAAQMD, 2012).²³ Even with this new wharf capacity, however, oil delivery across the wharf is limited to only 51.2 Mb/d. (*Id.*) Crude delivery and upgrading via the SMF—the only other way the SFR receives crude—is a substantial portion (≈ 38.0 Mb/d²⁴) of its total crude supply. All SFR crude input is necessarily finished at the RF to make a financially sustainable product slate (see paragraph 16), so the SFR, and thus the RF, needs this SMF-derived crude. Moreover, roughly half of the coking capacity utilized by the SFR currently is at the SMF.²⁵ The RF needs this additional deep conversion capacity at SMF to feed its hydrocrackers sufficient heavy gas oil for the SFR to convert its crude slate into gasoline, diesel, and jet fuel efficiently and, from Phillips’ standpoint, economically. Indeed, the new heavy gas oil hydrocracker at the RF that is fed this SMF gas oil²⁶ was built for exactly that purpose,²⁷ and could become a stranded asset without that feed.

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18. Similarly, the SMF relies on existing infrastructure for feedstock. The SMF relies on a pipeline system fed by declining local crude supplies that cannot maintain its current crude rate for long, much less sustain a crude rate increase of $\approx 29\%$ to 48.95 Mb/d, the proposed throughput increase—but the rail proposal could do so. (Paragraphs 7–14.) In the absence of a new port, interstate pipeline, long-distance trucking plan, or any other

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²² See this RDEIR at 2-4 and the Throughput Increase FEIR at 2-1; see also the product export facilities discussion in the ‘Propane Recovery’ RDEIR at 3-18. As stated, the SMF was sited on the Central Coast to tap local crude sources there. This, together with San Francisco Bay/Delta tanker port capacity afforded to the RF, helps explain the SFR’s geographically unusual design.

²³ See BAAQMD, 2012. *Marine Terminal Offload Limit Revision Project CEQA Initial Study* at i, 1–3, 17 (crude and gas oil offloading limit increase of 20,500 b/d to 51,182 b/d to replace equal volume California crude via pipeline, based on CSLC 1995 EIR); and CLSC 1995 FEIR (SCH #91053082) at Section 4 page S-4 (“it is assumed that sources of San Joaquin” and “Alaskan crude, will decline” and “[m]ore reliance will be placed on crude imports from foreign sources”).

²⁴ Based on 37,785 b/d (2010), 38,701 b/d (2011), and 37,602 b/d (2012); see RDEIR at 2-35.

²⁵ From 23,200 b/d (Order R3-2013-0028 Table F-9) v. 47,000–48,000 b/cd (*Oil & Gas J.*; EIA).

²⁶ See ‘Propane Recovery Project’ RDEIR at 3-10 through 3-12.

²⁷ See ‘Clean Fuels Expansion’ Nov. 2006 Prelim. EIR SCH #2005092028 at 3-1, 3-18, 3-22/23.

credible proposal for sustained delivery of sufficient imported crude to implement this project component, the proposed throughput increase is dependent upon the rail spur.

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19. A third component of the piecemealed project involves propane and butane, which are liquefied petroleum gases (LPG).²⁸ LPG is in refiners' hydrocarbon streams because it distills out from oil feeds, and because it is created in coking, hydrocracking, and other refining processes that 'crack' (break apart) larger, denser, or higher boiling-point hydrocarbons in the oil feeds. LPG is burned as refinery fuel, recovered, or both. Not all LPG present in all refinery hydrocarbon streams is recoverable with currently available technology. Propane and butane that is recovered can be sold as fuel or as petrochemical feedstock, and butane can be blended into winter gasoline. Phillips 66 proposes to recover propane and additional butane at its RF. This 'Propane Recovery Project' would install a hydrotreater, recovery columns, pressure storage bullets, and a rail loading spur and rack, and—decades after other refiners stopped exploiting the San Francisco Bay/Delta in this way—would expand Phillips' once-through cooling system. Contra Costa County requests comment on a revised draft EIR for this LPG proposal at the same time²⁹ San Luis Obispo County seeks comment on the SMF rail spur RDEIR.

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20. The publicly verifiable data in the record indicate that insufficient propane and butane is recoverable in the project baseline to implement Phillips' LPG proposal without the additional cracking process feedstock, additional LPG-rich naphtha/pressure distillate, or both, that its SMF throughput increase and rail spur could supply. My past comments, and those of others, raised and documented this finding. Unfortunately, instead of reporting and analyzing publicly verifiable data on current and potential sources of recoverable LPG, the counties' environmental reviews, thus far, have dismissed those comments with unsupported and contradictory assertions. I reassert my September 2013 expert report comment and 20 January 2014 supplemental technical comments regarding CEQA review of this 'Propane Recovery Project.' These comments remain valid and have not been addressed in the revised draft EIRs for the Rodeo LPG proposal or the Santa Maria rail proposal. See esp. exhibits 2-5.³⁰

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²⁸ Herein, "LPG" means propane and butane, the only gases Phillips' proposal would recover.

²⁹ Comment is requested by 2 Dec 2014. See SCH #2012072046 Notice dated 17 Oct 2014.

³⁰ The 4 Sep 2013 Expert Report of Greg Karras regarding the Phillips 66 Company Propane Recovery Project, SCH #2012072046, CC County File #LP12-2073 (Exhibit 2); 7 January 2014 CBE Supplemental Evidence-B (Exhibit 3); 14 January 2014 CBE Supplemental Evidence-C (Exhibit 4); and 20 January 2014 CBE Supplemental Evidence-D (Exhibit 5).

21. The new argument that vapor pressure limits do not allow any more LPG to be sent from the SMF to Rodeo³¹ is totally unsupported by any data in the RDEIRs, improbable,³² erroneous,³³ and ultimately may be little more than a distraction. This ‘vapor pressure’ argument ignores, and thereby distracts from a crucial point: LPG feedstock sent to Rodeo not as LPG, but as gas oils and pressure distillate (naphtha), yields substantial amounts of recoverable LPG from processing at Rodeo. Ignoring this link between the facilities’ project components would be a fatal error.

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22. Some of the volumetric implications for RF hydrocracking and reforming of gas oil and naphtha in a ‘SMF projects’ scenario, in which the rail and throughput proposals are implemented, and in ‘No SMF projects’ scenarios, in which those projects are not implemented, are summarized in Table 1. Gas oil and naphtha/pressure distillate are the major SMF exports to the RF. Gas oils are hydrocracked at the RF to make gasoline, diesel, and jet fuel sized hydrocarbon molecules with high enough hydrogen:carbon ratios for these high-value products—and produces significant amounts of propane and butane in this process. The gasoline stream (naphtha) must also be ‘reformed’ to boost octane rating, and thus is processed via catalytic naphtha reforming at the RF. The table shows changes from current (2010–2012) conditions in both scenarios identified above.

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23. As stated, available evidence indicates insufficient currently recoverable LPG. Estimates based on publicly verifiable data for LPG known to be recoverable with available technology indicate that roughly half of Phillip’s proposed LPG recovery capacity would be idle in these ‘baseline’ conditions. (See exhibits 2, 4, and 5.) Implementing the SMF throughput increase and rail components, however, would boost its naphtha and gas oil deliveries to Rodeo by ≈29% and boost *total* RF gas oil hydrocracking by ≈11%. See Table 1. Because hydrocracking is a significant

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³¹ *Response to Appeals by the Rodeo Citizens Association and Communities for a Better Environment*; letter from Mark E. Evans, Phillips 66 San Francisco Refinery Manager, to Chair Karen Mitchoff and Members of the Contra Costa County Board of Supervisors. 6 January 2014; Rail Spur RDEIR at 2-31; and Propane Recovery RDEIR at 3-25, 2-36.

³² The naphtha-pressure distillate and gas oil produced and delivered would be expected to have vapor pressures substantially below the cited limits.

³³ CBE has gathered relevant data that the RDEIR omits and will submit our full analysis of this point separately. See comments of Phyllis Fox. Nevertheless, based on the APCD’s Throughput Increase FEIR description at least some of the tanks are controlled, should be exempt from the cited vapor limits for that reason, and would be well within those limit values in any case.

Table 1. Estimated oil feedstock effects at the refinery's Rodeo Facility in 'project' and no project' scenarios for the Santa Maria crude by rail and throughput increase.

****Figures EXCLUDE additional LPG-boosting effects of tar sands 'dilbit' processing****

Data in thousands of barrels/day (Mb/d), and percent

	Current conditions	Santa Maria Project Component Scenarios	
		SMF projects	No SMF projects
Santa Maria Facility			
crude throughput (Mb/d)	38.00	48.95	17.82
Δ vs. current (%)	—	29%	-53%
naphtha to Rodeo (Mb/d)	11.63	14.98	5.45
% Δ vs. current	—	29%	-53%
gas oil to Rodeo (Mb/d)	20.71	26.68	9.71
% Δ vs. current	—	29%	-53%
Rodeo Facility			
hydrocracking			
capacity (Mb/d)	58.00	58.00	58.00
feed rate (Mb/d)	51.75	57.72	40.75
utilization rate (%)	89%	99%	70%
Δ in feed rate (%)	—	11%	-21%
naphtha reforming			
capacity (Mb/d)	31.00	31.00	31.00
feed rate (Mb/d)	29.40	32.75	23.22
utilization rate (%)	95%	106%	75%
Δ in feed rate (%)	—	11%	-21%

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Current crude rate is the 2010–2012 average of data from RDEIR at 2-35; SMF projects crude rate is proposed Throughput Increase. (Id.) 'No SMF projects' crude rate is from the median year-2045 forecast illustrated in Figure 1 and the conservative assumption that all crude produced by Central Coast OCS, state offshore and onshore oil fields now identified as SMF suppliers will send all crude to the SMF (other plants received 45% of total production from these oil fields during 2010–2012). SMF naphtha and gas oil supplied to Rodeo are throughputs reported by the SLOAPCD emission inventory, for all SMF plant naphtha and gas oil product tanks. This SLOAPCD data appear reasonable based on design performance and measurements of similar processes and crude slates as those at the SMF. Rodeo 2014 capacities in b/cd from USEIA (<http://www.eia.gov/petroleum/data.cfm>); Rodeo feed rates are multi-year averages from SFRWQB NPDES Order R2-2011-0027. Scenario feed rates are based on changes in gas oil (HCU) or naphtha (CRU) feed rate.

** Effects of LPG-rich diluents and harder-to-crack bitumen in tar sands dilbits (not shown in the table) would greatly boost LPG-per-barrel processed in the 'SMF projects' scenario.

LPG producer, LPG available for recovery at the RF would increase proportionately more than this 11%. Recoverable LPG would increase still more from the additional coking (not shown) of 29% more crude feed and, given that tar sands dilbits are the most likely new crude feed, from the LPG-rich diluents in these dilbits (See Fox comments.)

The sum of these increments could boost recoverable LPG at Rodeo from roughly 50% to somewhere around roughly 70% of the proposed project’s design capacity.

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24. In the ‘No SMF projects’ scenario, SMF crude throughput would rely on terminally declining local/regional crude supplies and would decline as illustrated in Figure 1. A conservative (less steep) estimate of this decline and its effects on processing is described in Table 1 (see caption), for the time frame roughly around 2045, which is within the project duration as the RDEIR acknowledges. SMF-to-RF naphtha and gas oil volumes drop by about half and *total* RF gas oil hydrocracking drops by ≈21%. This is a conservative estimate; if it does not replace its already-declining crude feedstock supply by then, the SMF might more likely be shut down by 2045. (See Figure 1.)

CBE-89

25. The Propane Recovery RDEIR has revised its estimate of LPG recoverable in the baseline—among other things, tacitly admitting at least some limitations in current LPG availability—and now asserts a small baseline shortfall below proposed project design capacity ranging from roughly 4–20% of its capacity being idled, depending upon the averaging period chosen. This estimate is not supported by publicly verifiable data, overestimates the baseline by applying maximum conditions as average ones for at least some streams, and further inflates the baseline by including LPG streams that are not feasible to recover in its ‘recoverable’ estimate.³⁴ Even if the RDEIR’s overestimate is assumed, however, the 21% reduction in gas oil hydrocracking in the ‘No SMF projects’ scenario and the further LPG supply losses from idled coking and distillation capacity at the SMF could reduce LPG at the RF enough to idle roughly 40–50% of the proposed project capacity. Thus, regardless of the uncertainty driven by still-undisclosed data and debate over the LPG baseline, the proposed project cannot be implemented as designed in the ‘No SMF projects’ scenario. Therefore, the Rodeo LPG component of the project depends upon the SMF throughput increase and crude by rail components for feedstock.

CBE-90

26. Importantly, an otherwise unexplained change in the project description for LPG recovery is informed by the ‘SMF project’ results for naphtha in Table 1. Naphtha from the Rodeo heavy gas oil hydrocracking unit (Unit 246) and from the HLSD Diesel Hydrotreating Unit (U250) is routed through the proposed new ‘fuel gas’ hydrotreater in Revised Figure 3-6 of the Propane Recovery RDEIR. These streams were routed through the proposed LPG recovery but *not* the proposed new hydrotreater in Figure 3-6 of the

CBE-91

³⁴ See Fox comments.

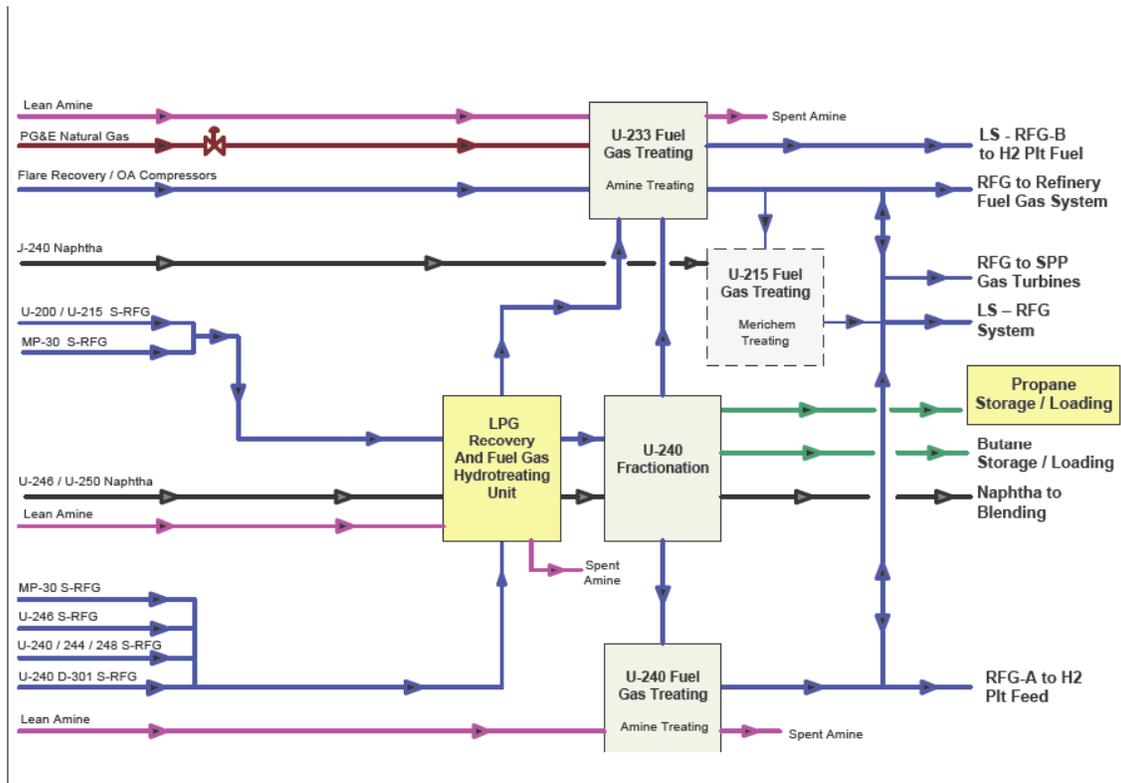
Propane Recovery DEIR. Further, these U246 and U250 streams are ‘wild naphtha’ derived at least in part from processing the SMF gas oil (‘SMGO;’ see Figure 3-4.³⁵) Finally, these wild naphtha streams are now fed through other processes to reforming units U231 and U244 (see Figure 3-4), but revised Figure 3-6 shows the project re-routing them to naphtha blending instead. In sum, these naphtha streams are fed to the Rodeo reformers now but the revised LPG recovery proposal would instead route them through the new hydrotreater. For convenient review, Revised Figure 3-6, Figure 3-4 (both from the Propane Recovery RDEIR), and original Figure 3-6 from the June 2013 Propane Recovery DEIR are excerpted below.

CBE-91
cont

27. The ‘current conditions’ and ‘SMR projects’ results for naphtha reforming in Table 1 are relevant to this project revision because they show that the Rodeo reformers are currently near maximum capacity (95% of 31.0 Mb/d) and would violate this maximum capacity limit if the SMF project components are fully implemented (106% of capacity). Further, the estimate in Table 1 probably underestimates this problem by conservatively assuming none of the expected further increase in naphtha inputs from the diluent in tar sands dilbits, though the throughput increase cannot be implemented without the rail spur, which would most likely tap these price-discounted and LPG-rich oil feeds. In any case, the units probably could not run properly, efficiently *and* safely if run beyond maximum capacity on a sustained basis, and either selling low-value unfinished naphtha into the new shale oil-dominated crude market at a deep discount, or cutting crude rate because of this limitation, could be costly. It also would mean that the throughput increase project could not be fully implemented. Routing some of the naphtha from the SMF to the new hydrotreater instead would relieve the bottleneck while allowing those streams to be part of the finished product slate—and that is what the LPG project revision described in paragraph 26 would do. Thus, the LPG component of the project enables full implementation of the SMF components.

CBE-92

³⁵ See also Fox comments.

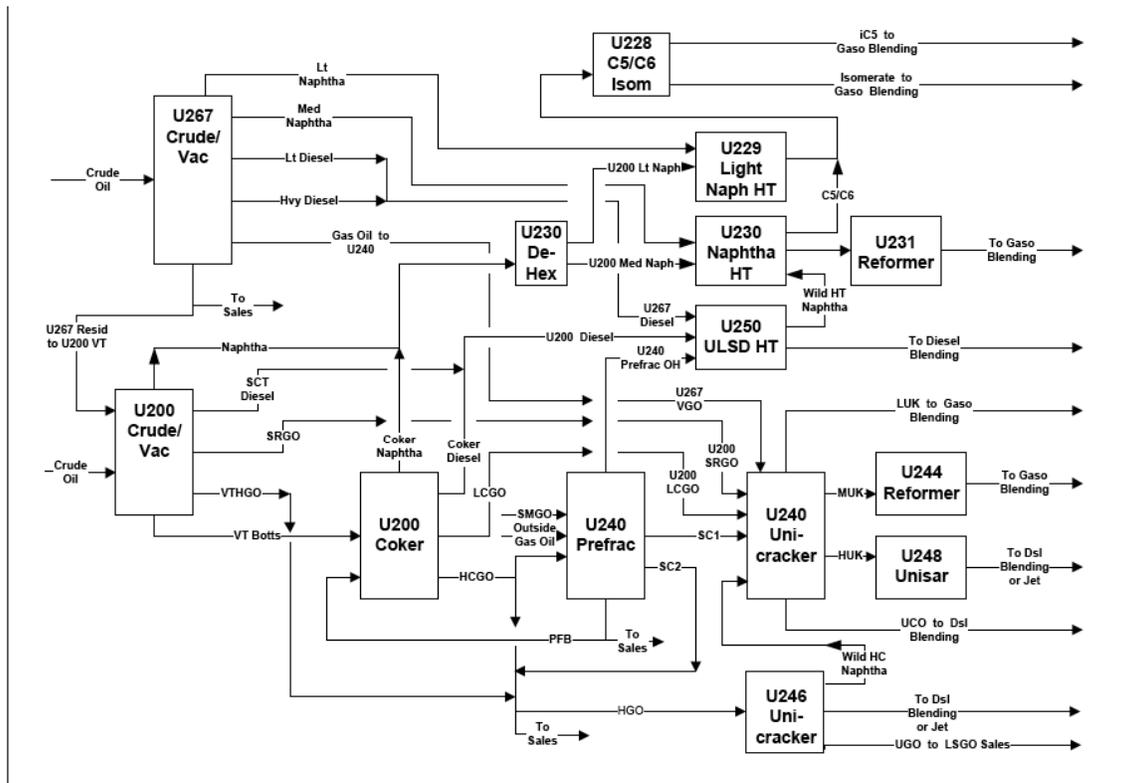


CBE-92
cont

SOURCE: Phillips 66 Company

Phillips 66 Propane Recovery Project . 120546

Figure 3-6 Revised
 Proposed Refinery Fuel Gas System Block Flow Diagram

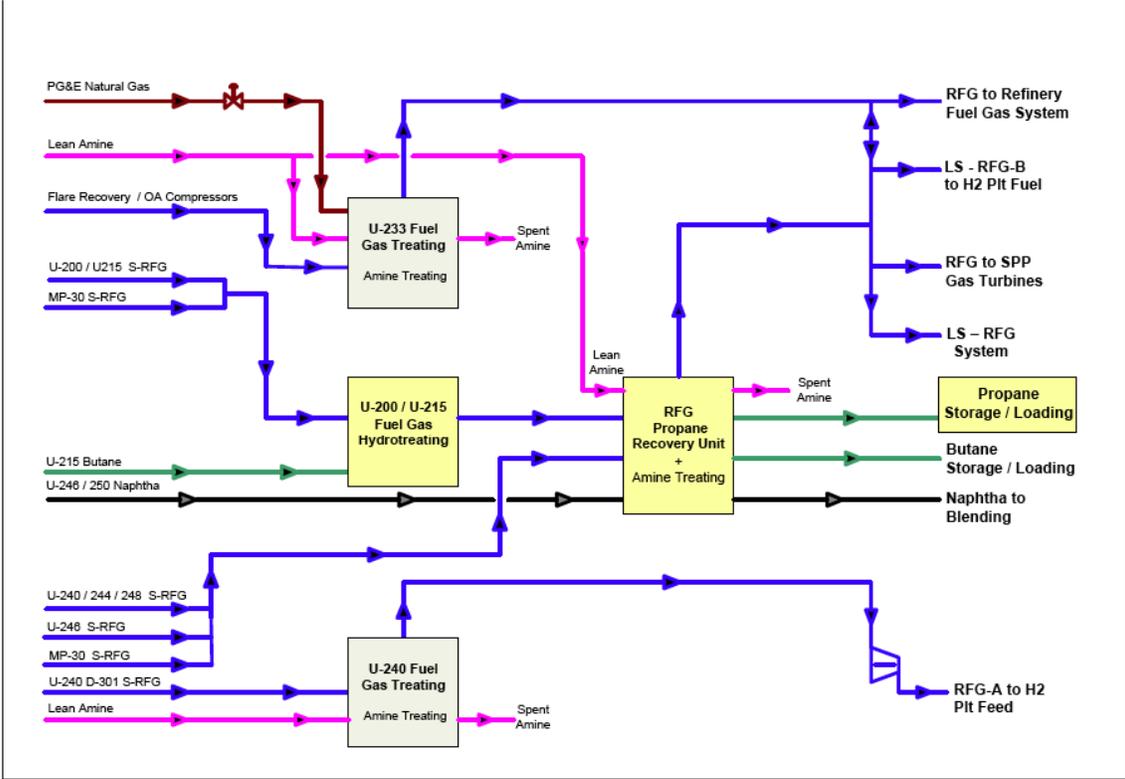


CBE-92
 cont

SOURCE: Phillips 66 Company

Phillips 66 Propane Recovery Project . 120546

Figure 3-4
 Overall Block Flow Diagram of Refinery



CBE-92
 cont

SOURCE: Phillips 66 Company

Phillips 66 Propane Recovery Project . 120546

Figure 3-6
 Proposed Refinery Fuel Gas System Block Flow Diagram

28. As discussed in paragraphs 15–27, the San Francisco Refinery’s proposed ‘projects’ in Santa Maria and Rodeo are inextricably interrelated. The Santa Maria throughput increase is dependent upon the proposed crude by rail proposal, the Rodeo hydrotreater/LPG recovery proposal is dependent upon those Santa Maria components, and those throughput increase and crude by rail components are dependent upon the Rodeo component for full project implementation. Therefore, the crude throughput rate increase, crude by rail, and hydrotreating/LPG recovery proposals are interdependent parts of a single project of larger scope that has been piecemealed.

CBE-93

29. The failure to evaluate this project as a whole results in underestimating the scope and severity of identified impacts. The greater climate-disrupting emissions, toxic air contaminant emissions, smog-forming emissions, and safety hazards of project crude-by-rail trains to the SMF and LPG-by-rail trains from Rodeo in *combination* on many of the same routes, are examples of this underestimation. It further results in failure to identify some impacts at all, such as the toxic, smog-forming, and climate-disrupting emissions from refining larger volumes of crude feedstock, and those from switching to processing of bitumen oils. These ‘tar sands’ oils are extremely dense, refractory and contaminated and require substantially more energy, and fuel combustion for that energy, per barrel refined,³⁶ thereby greatly boosting refinery emissions intensity. Equally important, evaluating the project only one piece at a time results in failure to identify feasible means to lessen or avoid impacts. For example, the switch to tar sands oil that is clear when the project is viewed as a whole would result in significant potential impacts from *refining*, not on the mainline rails, and as the RDEIR insists, the project allows choices among a *range* of oils. Thus, the County clearly *can*—and indeed, *should*—consider choosing to demand that Phillips 66 refrain from the most dangerous and polluting type of oil known. But the RDEIR mentions no such mitigation. In short, the piecemealing of this project is a fundamental flaw in the RDEIR.

CBE-94

³⁶ The RDEIR appears to misinterpret my peer reviewed work in this field. My 2010 paper should not be interpreted to limit the analysis of plant-specific emission potential to oil density and sulfur content alone or to carbon dioxide alone. Rather, it cautions: “Other properties of crude feeds and incremental efficiencies from modernization of equipment and catalyst systems might explain up to 10% of [regional fuel efficiency differences] and could be more important for single plants and nondiverse crude feeds. Burning more fuel to refine lower quality oil emits toxic and ozone-precursor combustion products along with CO₂. Pastor et al. estimate that refinery emissions of such ‘co-pollutants’ dominate health risk in nearby communities associated with particulate matter emitted by the largest industrial sources of greenhouse gases in California and identify racial disparities in this risk” *See* Karras, 2010 (DOI: 10.1021/es1019965).

Cumulative Impacts

30. As stated the rail, throughput increase, and LPG components of the project are interdependent. (Paragraphs 15–29.) But even if the County does not believe that the project has been piecemealed, its components are related projects. Impacts from increased crude *and* LPG rail traffic emissions and hazard, increased throughput-driven emissions from *both* facilities, climate emissions from the plants *and* rail projects, new propane tank explosion *and* crude derailment hazards as SMF trains pass the Rodeo LPG spur, and many other such cumulative impacts should be analyzed. The RDEIR fails to include this analysis on multiple counts.

CBE-95

31. The RDEIR does not appear to mention the proposed ERG Foxen Petroleum Pipeline that is in CEQA review now, and fails to evaluate potential cumulative impacts of the project with this project that would pipe oil from the nearby Cat Canyon oil field. Cat Canyon currently supplies some of the SMF crude feed. In a CEQA document that states the Foxen oil pipeline would interconnect with Phillips’ pipeline, Santa Barbara County has identified a cumulative impact of that project with the SMF rail spur:

“There are several industrial and oil development projects proposed in the South Central Coast Air Basin. These projects are individually likely to have significant air quality impacts or to cause changes in the operations associated with existing oil and gas production within the area.

The proposed Phillips 66 Rail Spur project would enable the Santa Maria Refinery (SMR; in San Luis Obispo County) to import crude oil from out-of-state sources. A number of area producers use the Phillips 66 pipeline system to transport crude oil to the SMR. These include the Pt. Pedernales, Pt. Arguello, Santa Ynez Unit and the Ellwood Field offshore production; the Lompoc and Orcutt onshore oil and gas fields; and the Cat Canyon field (of which the proposed Project is a part). The Pt. Arguello, Santa Ynez Units and the Ellwood Field offshore production all have the capability to transport crude oil either to the SMR or to refineries in Los Angeles through the All American Pipeline system. The other producers do not have pipeline options for delivery of their crude oil to Bakersfield or Los Angeles area refining destinations.

CBE-96

In 2012, the SMR had about 11,000 bpd of excess refining capacity available. If the SMR were to decide, through market forces, to satisfy all of the excess capacity through rail shipments instead of from local producers, then the local producers would have no option except to truck their crude oil to other refineries, or shut down production. Under this scenario, the advantages of the proposed Project, i.e. reduced trauma risks and air quality impacts associated with the full production scenario (25,000 bbls/day), would not be realized.

Another option would be for the Phillips 66 pipeline connection from the All American pipeline to the SMPS to be reversed, allowing local producers to ship their crude oil via pipeline from area sources to Los Angeles via pipeline. A project proposed in 2002 to reverse the pipeline segment was approved and issued a permit, but the permit subsequently expired and the pipeline was never reversed. A reversal of the pipeline flow direction would allow production from area producers to be transported to area markets via pipeline instead of by truck if the SMR is not available, thereby allowing the benefits of the proposed Project to be realized.

There are also limits on the amount of crude oil that can be received and transported through the SMPS. According to the Santa Barbara County APCD permits (PTO 08218r8, 11754r2), the SMPS has a permit throughput limit of 26,000 bpd that could be unloaded by truck at the Santa Maria Pump Station, and a pipeline throughput capacity of 84,000 bpd as per County permit 91-DP-003. Therefore, truck transportation of the full production scenario from the proposed Project to the SMPS (as under the Emergency Operations scenario) may not be possible as trucks may not be able to unload the full amount without displacing other fields' production.

In summary, the scenario exists that local producers may have to transport their crude oil via truck to markets other than the SMR. This would increase air emissions associated with trucking the crude oil a farther distance or trucking as opposed to pipeline transportation. This could result in a significant cumulative impact.

ERG Foxen Petroleum Pipeline DEIR, SCH #[2013061011](#) (Sep 2014) at 4.3-19

32. The RDEIR does not identify or evaluate any potential impacts—direct, indirect, project-related, or cumulative—associated with barge-to-port-to rail delivery of crude to the proposed SMF rail unloading facilities. In particular, the new Kinder Morgan crude by rail terminal in Richmond, CA, is adjacent to both the Chevron refinery and the Richmond Port, and is aligned with a crude-by-rail route the RDEIR states would be used by the project. Although the Kinder Morgan terminal and Richmond refinery are essentially contiguous, Chevron is prohibited by permit from receiving crude oil from the Kinder Morgan facility. The RDEIR fails to include this crude by rail project in its cumulative impact analysis, does not say whether crude delivered by rail to the SMF might be loaded at the Kinder Morgan terminal, Richmond's port, or both and in fact, appears to provide no information at all about the Kinder Morgan rail terminal.

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CBE-97

Alternatives

33. In my opinion, the ‘No Project Alternative’ would lessen or avoid a commitment to significant and irreversible impacts associated with the project as proposed and would substantially reduce ongoing impacts relative to current conditions. For example, it could reduce the potential for irreversible loss of local groundwater uses to salt intrusion from overdraft in climate-related droughts as sea level rises. In another example, it would avoid an irreversible commitment to limited fossil fuel resources from an energy and climate standpoint. The No Project Alternative could avoid 24–43 million tonnes of petroleum combustion carbon over the expected project duration. Based on international consensus (IPCC AR5) that only another trillion tonnes of carbon dioxide can be emitted and still give society a better-than-even chance of stabilizing global mean temperature at 2 °C, 2050 world population, and assuming this burden shared equally, that could avoid emissions equivalent to the lifetime CO₂ allowance of 0.8–1.5 million people.

CBE-97
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34. I have given my opinions on these matters based on my knowledge, experience and expertise and the data, information and analysis discussed in this report.

CBE-98

I declare under penalty of perjury that the foregoing is true of my own knowledge, except as to those matters stated on information and belief, and as to those matters, I believe them to be true.

Executed this 24th day of November 2014 at Oakland,
California



Greg Karras