CBE Comment Letters

BY ELECTRONIC MAIL

21 October 2015

Greg Nudd
Eric Stevenson
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

COMMUNITIES FOR A BETTER ENVIRONMENT

Re: **Supplemental Comment on Air District Staff Proposal, Rules 12-15 and 12-16; Evidence of Increasing Bay Area Refinery GHG and $PM_{2.5}$ Emissions**

Dear Mssrs. Nudd and Stevenson,

CBE believes that the Air District Staff has improperly rejected enforceable limits set to current actual emission rates in part because the Staff has not considered adequately, and has not informed the public and its Board about, the following data and information:

1. Air District data document and forecast increasing Bay Area refinery greenhouse gas emissions.

Air District actual and forecast greenhouse gas (GHG) emissions data are reported in the Air District GHG Emission Inventory that is appended hereto as Attachment 1.[1] The most recent actual GHG emissions data reported by the Air District, its Emission Inventory data for reporting year 2013, were provided with CBE's September 2015 comments in this matter and are appended hereto as Attachment 2.[2] These data are given by year, indicating data sources specifically, in the table below.

BAAQMD refinery GHG emissions & forecasts from 1990–2029 (MM metric tons CO_2e/year)

Year	Data type & source	Refining processes	Make gas burning	Natural & other gas	Liquid fuel burning	Solid fuel burning	Total (5 refineries)
1990	actual[a]	3.3	3.8	4.5	0.1	0.8	12.5
1993	actual[a]	3.5	4.0	4.3	0.1	0.9	12.8
1996	actual[a]	3.6	3.7	4.5	0.1	0.9	12.8
1999	actual[a]	3.7	4.4	4.5	0.1	0.9	13.6
2002	actual[a]	3.5	4.5	4.6	0.1	1.0	13.7
2005	actual[a]	3.4	4.7	4.8	0.1	1.0	14.0
2008	actual[a]	3.5	4.8	4.9	0.1	1.0	14.3
2011	forecast[a]	3.6	5.0	5.1	0.1	1.0	14.8
2013	actual[b]	*Sum of all sources at 5 refineries and 3 support facilities*[c]					15.9
2014	forecast[a]	3.7	5.1	5.2	0.1	1.1	15.2
2017	forecast[a]	3.8	5.3	5.4	0.1	1.1	15.7
2020	forecast[a]	3.9	5.4	5.5	0.1	1.1	16.0
2023	forecast[a]	4.0	5.6	5.7	0.1	1.2	16.6
2026	forecast[a]	4.2	5.8	5.9	0.1	1.2	17.2
2029	forecast[a]	4.3	5.9	6.1	0.1	1.2	17.6

(a) BAAQMD, Attachment 1 Table U; (b) BAAQMD, Attachment 2; (c) Two hydrogen plants and a cogeneration plant are included as support facilities; see CBE Sept. 2015 comments.

These AQMD data indicate that refinery emissions increased from 12.5 million metric tons in 1990 to 15.9 million metric tons in 2013, the most recent year actual refinery GHG emissions are reported. For Bay Area refineries in the aggregate, the AQMD data for reporting year 2013 (15.9 MM MT) compares to Air Resources Board 2013 data (16.2 MM MT) reasonably well.

AQMD forecasts further increasing emissions, with Bay Area oil refining emissions reaching 17.6 MM MT in 2029. However, this AQMD forecast was reported in 2010, and actual emissions in 2013 (15.9 MM MT) exceed this forecast for the later years 2014 (15.2 MM MT) and 2017 (15.7 MM MT). This indicates that as of 2013, Bay Area refinery GHG emissions are rising faster than AQMD had forecast in 2010.

2. Air District data document and forecast increasing Bay Area refinery particulate matter ($PM_{2.5}$) emissions.

AQMD's 2010 $PM_{2.5}$ emission inventory is appended hereto as Attachment 3.[3] This document reports refinery emissions, broken into "processes" (a category that includes waste water, cooling and flare systems as well as fugitives), product "evaporation" in refineries, and "external combustion" categories. AQMD's 2012 report *Understanding Particulate Matter* is appended hereto as Attachment 4.[4] Appendix A of this document reports the same 2010 $PM_{2.5}$ emission rate, uses the same refinery emission categories, and forecasts emissions in five-year intervals through 2030. An excerpt from an AQMD Staff March 2015 Workshop Presentation is appended hereto as Attachment 5.[5] In this document AQMD reports the same refinery $PM_{2.5}$ emissions rates for 2010 and 2015 along with emissions in 2000 and 2005. These data are given by year in the table below.

BAAQMD direct emissions of $PM_{2.5}$ from refineries, emissions & forecasts: 2000–2030

Year	BAAQMD data source	$PM_{2.5}$ Emissions from Bay Area Oil Refineries	
		(short tons/day)	(short tons/year)
2000	a	2.3	839
2005	a	2.4	876
2010	a, b, c	2.7	985
2015	a, c	2.8	1,020
2020	c	3.0	1,090
2025	c	3.1	1,130
2030	c	3.2	1,170

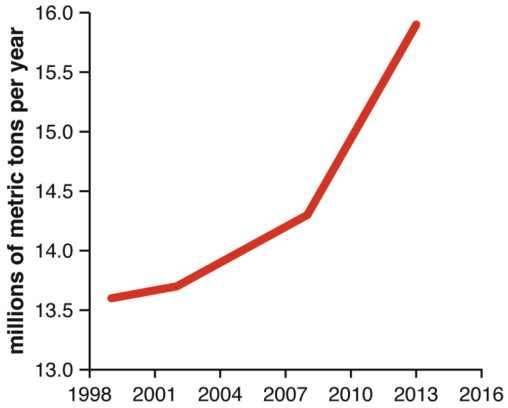
(a) BAAQMD, Attachment 5; (b) BAAQMD, Attachment 3; (c) BAAQMD, Appendix A in Attachment 4.

Emissions increased from 839 short tons in 2000 to 985 tons in 2010 and 1,020 tons in 2015. Emissions could continue to increase (in a 'business as usual' scenario) and could reach 1,170 tons emitted in 2030, according to the forecast reported by AQMD in 2012.

The AQMD Emissions Inventory (Attachment 2) provides a partial check on these data. It shows that the refineries emitted ≈1,300 tons of particulate matter in reporting year 2013. This value (1,300 tons PM) exceeds AQMD's 2015 refinery PM_{10} emissions reported in Attachment 4 (3.0 tons/d or 1,095 tons/y). Approximately 93% of this 1,300 tons (≈ 1,210 tons) was $PM_{2.5}$ based on the ratio of $PM_{2.5}$ to PM_{10} emitted by refineries in 2010 and 2015 from AQMD's data in Attachment 4, and this 2013 estimate (1,210 tons $PM_{2.5}$) exceeds the estimate for 2015 in attachments 4 and 5 (1,020 tons). Refinery emission measurements by Sánchez de la Campa and others, appended hereto as Attachment 6,[6] provide support for AQMD's high $PM_{2.5}$ to PM_{10} emission ratio. However, if the AQMD data in Attachment 4 overestimate the percentage of refinery PM emissions that are $PM_{2.5}$ then actual 2013 $PM_{2.5}$ emissions could be closer to 1,020 tons. These data indicate that refinery $PM_{2.5}$ emissions are increasing at least as fast as the AQMD forecast.

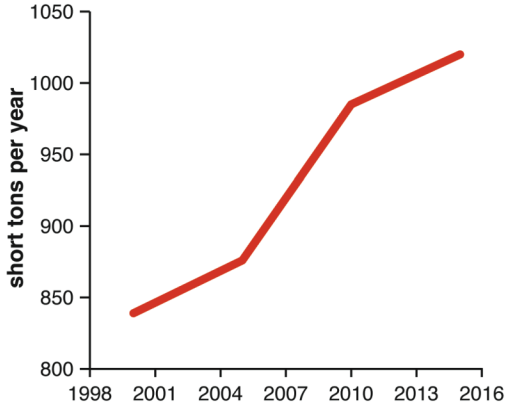
Greenhouse Gas (CO_2e) Emissions from Bay Area Oil Refineries, 1999–2013.

Data from Bay Area Air District: see attachments 1 and 2.



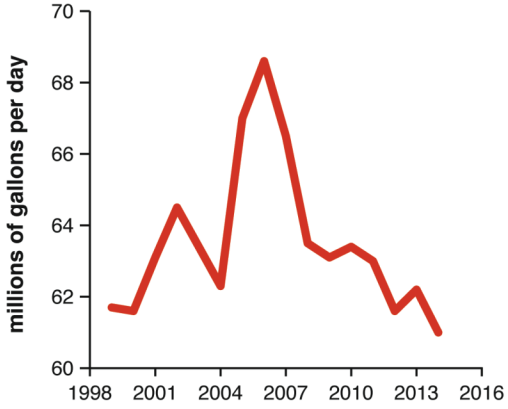
Particulate Matter ($PM_{2.5}$) Emissions from Bay Area Oil Refineries, 2000–2015.

Data from Bay Area Air District: see attachments 3–5.



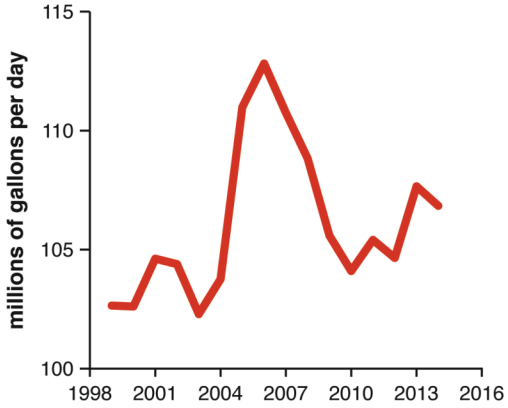
U.S. West Coast (PADD 5) Sales of Gasoline, 1999–2014.

Data from USDOE, Energy Information Information Administration (EIA): see Attachment 8.



U.S. West Coast (PADD 5) Sales *and* Exports of Gasoline, Distillate Oil (including diesel) & Kerosene Jet Fuel, 1999–2014.

Data from EIA: see attachments 8 & 9.



3. Air District data document increasing refinery emissions despite declining engine fuels demand in the markets served by the refineries.

US Energy Information Administration (EIA) data for refined product movements between US regions are appended hereto as Attachment 7.[7] These data indicate domestic markets for engine fuels refined in the Bay Area are limited to the West Coast (PADD 5). EIA data for West Coast refined product sales are appended hereto as Attachment 8.[8] These data show that West Coast gasoline demand has declined since 2006. EIA data for exports of refined product from the West Coast are appended hereto as Attachment 9.[9] These data show that although total refined product exports increased strongly, total West Coast sales plus exports of engine fuels (gasoline, distillate and diesel, and kerosene jet fuel) still declined after 2006. These data, shown with Bay Area refinery emissions of GHG and $PM_{2.5}$ in the charts above, demonstrate that changes in the demand for engine fuels cannot explain the increase in these Bay Area refinery emissions.

4. Air District data demonstrate that GHG and $PM_{2.5}$ co-emit from fossil fuel combustion sources in Bay Area refineries.

Source-specific data excerpted from the AQMD Emissions Inventory documents in Attachment 2 for reporting year 2013 are appended hereto as Attachment 10.[10] Sources in Attachment 10 are categorized as in the AQMD Inventory documents: equipment that is permitted to emit for each specific fuel or feed material fed to that equipment. These data show that PM, the PM precursor NO_x, the PM precursor SO_2, or more than one of these pollutants that cause $PM_{2.5}$ air pollution co-emit with GHG from at least 379 sources in the Bay Area refining industry.

Data in Attachment 6 further show that refinery PM emissions include environmentally significant amounts of metalliferous ultra-fine PM (UFPM). UFPM is not currently measured or controlled effectively by AQMD or other air officials. Thus, the $PM_{2.5}$ that co-emits with GHG from refineries includes otherwise unregulated air pollutants.

The AQMD data in Attachment 3 and in Appendix A of Attachment 4 indicate that combustion caused 89% (2.4 tons/day) of the total Bay Area refinery $PM_{2.5}$ emissions (2.7 tons/day) in 2010, and 89% (2.5 out of 2.8 tons/day) of these refinery emissions in 2015. Similarly, combustion of make gas, natural gas, other gases and liquid and solid fuels accounts for 75% of total refinery GHG (CO_2e) emissions based on the AQMD data in Table U of Attachment 1. Including process emissions from hydrogen plants, which burn and otherwise consume substantial amounts of fossil fuels, the use of fossil fuels for process energy causes more than 90% of refinery CO_2e emissions.

These data demonstrate that GHG and $PM_{2.5}$ co-emit from the same sources and proximate cause—fuel consumption—in Bay Area refineries. Consuming more fossil fuel in refineries would further increase refinery emissions of these co-pollutants.

5. Peer-reviewed science shows that severe processing needed to maintain engine fuels production from lower quality oil increases refinery energy intensity, thereby increasing refinery fuel combustion emissions.

A 2007 report on USEPA's study of mercury in refinery oil feedstock that was peer reviewed and published by the American Chemical Society in *Environmental Science & Technology* is appended hereto as Attachment 11.[11] This study found a wide range of mercury concentrations among individual crude streams, and it shows that USEPA has long recognized the need to monitor feedstock quality for environmentally significant differences in emission potential among industries and among individual facilities.

Robinson and Dolbear wrote a chapter in a technical reference book on heavy oils and residua, published in 2007, that is appended hereto as Attachment 12.[12] They state rapid changes in oil feed quality cause hydroprocessing upsets, and quantify the greater heat, pressure and hydrogen production requirements for hydroprocessing denser cuts of crude. This document examples the fact that the industry has long known making the same product slate from lower quality oil increases refinery fuel energy consumption.

A CBE report on combustion emissions from refining lower quality oil that was peer reviewed and published by the American Chemical Society in *Environmental Science & Technology* is appended hereto as Attachment 13.[13] It reports detailed quantitative analysis of data from operating refineries—data from actual, real-world operating conditions—across 97% of the U.S. industry. A peer-reviewed report on modeling of factors driving refinery CO_2 intensity, also published in 2010, is appended hereto as Attachment 14.[14] A peer reviewed 2011 report that built in part on the work in Attachment 13 and encompassed the full fuel cycle of Canadian tar sands oils is appended hereto as Attachment 15.[15] A report that built on the work in Attachment 13 and was peer reviewed and published by the Union of Concerned Scientists in 2011 is appended hereto as Attachment 16.[16] A peer reviewed report on detailed public data-based modeling of crude quality and process configuration impacts on refinery energy and GHG intensities that was published in 2012 is appended hereto as Attachment 17.[17] A report for the Natural Resources Defense Council on emissions of toxic and criteria air pollutants from delayed coking and catalytic cracking in scenarios where diluted bitumen oils replace 20–50% of the current US crude feed, published in 2015, is appended hereto as Attachment 18.[18] Also in 2015, the Carnegie Endowment built on the refinery energy and GHG emissions work in Attachment 17, and argued for public oil quality monitoring and to "think before building new infrastructure" for low-quality grades of oil, in a report that is appended hereto as Attachment 19.[19]

The data and information in attachments 12–19 demonstrate that making engine fuels from lower quality oil increases the energy intensity, fuel consumed for that energy, and emissions of oil refining. These impacts are driven by physical (e.g., volatility) and chemical (e.g., molecular structure; hydrogen and contaminants content) differences among crude oils and their fractional components that—for well mixed multi-plant blends of many crude oils—correlate with crude feed density and sulfur content.

Compared with so-called conventional or lighter crude, a larger portion of denser, more contaminated, lower quality oil refinery feedstock is very different from gasoline, diesel or jet fuel both physically and chemically. Making the same amounts of engine fuels from these very different oils requires more severe processing that requires more energy, requires more hydrogen, and creates dirtier-burning byproducts in greater amounts. Most of this hydrogen must be produced by steam reforming that consumes still more energy, and substantial portions of those dirtier byproducts are burned in-plant as part of the basic design of processes such as fuel gas recovery and catalytic cracking. The net result is consuming more and dirtier-burning fossil fuel for the energy needed to process each barrel of denser, more contaminated oil refined. Making engine fuels from denser, more contaminated oil feedstock increases refinery energy intensity, and thereby increases refinery fuel combustion emissions intensity—the refinery emissions of combustion products such as CO_2 and PM per barrel of crude refined.

6. Average oil feed quality is lower and average refinery emission intensity is higher in the Bay Area as compared with other parts of the US.

Attachment 13 documents the average refinery crude feed density and sulfur content, the energy and emission impacts explained by those feed properties, and actual emissions observed from refineries in the BayArea and other U.S. refining regions. Recent EIA data for average crude input qualities in the other regions are appended hereto as Attachment 20.[20] Comparison of attachments 13 and 20 shows the other regions' crude feed qualities that distinguish them from Bay Area refineries in Attachment 13 persist. The table below excerpts data from Table S8 in Attachment 13.

Average refinery crude feed oil quality (OQ) observed, refinery energy intensity (EI) predicted by OQ, and actual refinery CO_2 emission intensity observed in 2008 by region.

Region	Actual crude feed quality (OQ)		EI predicted by OQ	Actual emissions
	Density (kg/m^3)	Sulfur (kg/m^3)	(Gigajoule/m^3 oil)	(kg CO_2/m^3 oil)
East Coast PADD 1	864	7.08	3.35	296
Midwest PADD 2	863	11.7	3.51	289
Gulf Coast PADD 3	879	14.9	4.54	325
S.F. Bay Area	900	11.9	5.31	360

Data from CBE's peer reviewed work in Attachment 13. *See* Table S8.

As shown by the data in this table, on average, refineries in the Bay Area process denser crude, process lower quality crude as gauged by energy consumed per barrel refined, and emit more CO_2 per barrel refined than those in other major U.S. oil refining regions.

7. Refining greater amounts of bitumen-derived 'tar sands' oils would further lower the quality of the average Bay Area refinery crude feed.

A 2007 U.S. Geological Survey report on bitumen ('tar sands') oils and heavy oils is appended hereto as Attachment 21.[21] Data in attachments 13, 18 and 21 show that the average density and sulfur content of tar sands bitumen (1,04 kg/m^3 *d;* 45.5 kg/m^3 *S*) and those of Canadian tar sands diluted bitumen 'dilbit' (926 kg/m^3 *d;* 35.2 kg/m^3 *S*) are greater than those of the Bay Area refinery crude feed (900 kg/m^3 *d*; 11.9 kg/m^3 *S*). Thus, adding tar sands oil to the Bay Area refinery crude feed would increase its density and sulfur content.

A 2010 California Energy Commission report that forecasts continuation of the long-observed trend of replacing dwindling Californian and Alaskan oil with foreign oil inputs to refineries statewide is appended hereto as Attachment 22.[22] Comparison of data in attachments 16 and 21 shows that the average density and sulfur content of bitumen are greater than those of the Californian and Alaskan crude streams refined in the Bay Area. Thus, replacing declining Californian and Alaskan crude supplies with tar sands bitumen would increase the density and sulfur content of the Bay Area refinery crude feed.

Data in Attachment 21 show that compared with other types of crude, the hydrogen content and gasoline-range distillation yield is lower, the yield of 'residuum' that does not boil off in distillation is higher, and the concentrations of nitrogen, acids, aluminum, copper, iron, lead, nickel, titanium, and vanadium are higher, in tar sands bitumen. Data in Attachment 18 show that the yield of distillate oils (including kerosene and diesel) from Canadian tar sands dilbit is very low compared with the averages for the U.S. crude feed and Strategic Petroleum Reserve. Available data on the density and sulfur content of gas oil—the densest cut of crude that boils off in distillation—are appended hereto as Attachment 23.[23] Comparison of data in attachments 18 and 23 shows that the average gas oil distilled from tar sands dilbits (964 kg/m^3 *d*; 32.8 kg/m^3 *S*) is denser than 99% of all 404 gas oils reported from non-bitumen crude oils and higher in sulfur than 98% of those non-bitumen gas oils. Thus, data on many processing characteristics confirm the low quality of tar sands crude that is predicted by its extreme density and sulfur content.

8. The oil industry reports plans to refine more tar sands oil here.

A 2007 report in *Oil & Gas Journal* describing industry plans to expand the market for price-discounted oil produced in the Canadian oil sands by, among other things, sending large amounts of this oil to California refineries as a new potential growth market, is appended hereto as Attachment 24.[24]

Note that in industry jargon, the terms "oil sands" and "Canadian heavy crude" refer to bitumen-derived tar sands oils, and the term "cost-advantaged," in reference to North American crude, refers to tar sands oil, fracked shale oil, or both depending on context.

A paper published by the Society of Petroleum Engineers in 2009 concluding that the Canadian tar sands is "the most promising source for California refineries" to replace dwindling current crude supplies in the long term is appended hereto at Attachment 25.[25]

A 2013 Alberta Energy Resources Conservation Board report that describes projects to send tar sands oil to California if standards in this state allow the resultant emissions, and noting "90 per cent of its refinery capacity is able to process heavier crudes," is appended hereto as Attachment 26.[26] These "heavier" oils include tar sands bitumen and bitumen-derived dilbit; fracked shale oils such as North Dakota Bakken are very light oils.

Excerpts from a 2013 report to investors by Valero are appended hereto as Attachment 27.[27] In these excerpts Valero reports its "strategy" to refine "cost-advantaged crude oil" and its plan to bring that "cost advantaged" oil to its Benicia refinery by train. They also include a chart showing that Western Canadian Select (WCS), a tar sands dilbit, is the most price-discounted crude targeted, costing much less than shale oil from the Bakken.

A 2013 report to investors by Phillips 66 stating its plans for "moving Canadian crudes down into California … refineries" is appended hereto as Attachment 28.[28] A 2014 report to investors by Phillips 66 stating its plans to bring "advantaged crude into California" by train and ship via Ferndale, WA and by train to Santa Maria is appended hereto as Attachment 29.[29] This Santa Maria project would bring tar sands oil through the Bay Area by rail for processing at the Phillips 66 San Francisco Refinery (SFR) refining facilities at Nipomo and Rodeo. A map downloaded from a Phillips 66 website on 16 October 2015 showing crude oil delivery arrows pointing from the Canadian tar sands to the SFR is appended hereto as Attachment 30.[30]

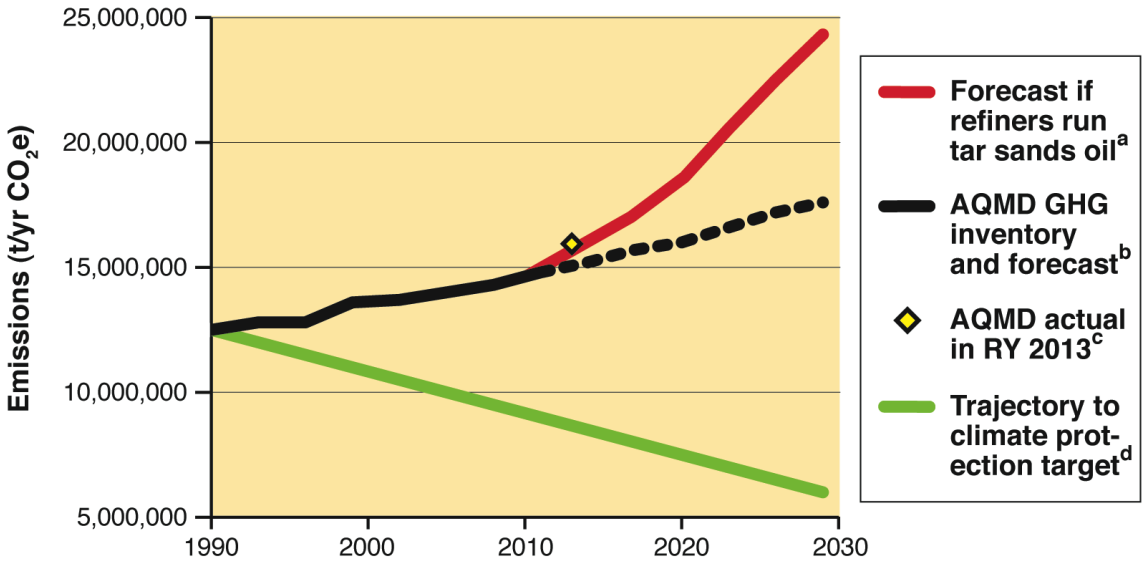
A 2014 presentation to investors by Tesoro is appended hereto as Attachment 31.[31] In Slide 12 of this document Tesoro reports projects to "strengthen refinery conversion capability" for "feedstock flexibility." In Slide 14 of this document Tesoro reports greater future crude production in the Canadian tar sands than any other "key Tesoro market." In Slide 17 of this document Tesoro reports that its rail-to-marine terminal project in Vancouver would be "competitive with direct rail cost to California."

A 2015 Canadian Association of Petroleum Producers crude oil forecast, markets, and transportation report is appended hereto as Attachment 32.[32] This report describes, among other things, plans for exporting more tar sands oil to California refineries via pipeline, ship, and rail. A 2015 report by CBE and ForestEthics that identifies oil industry projects which could potentially replace up to 40–50% of California refinery crude feed by rail alone is appended hereto as Attachment 33.[33]

The evidence in attachments 24–33 documents oil industry plans to refine more tar sands oil at Bay Area refineries.

9. The Air District-forecast increase in Bay Area refinery emissions underestimates potential emissions from oil feedstock switching.

The data and information in attachments 12–23 show that increasing the amount of bitumen-derived oil in the Bay Area refinery crude feed could further increase Bay Area refinery GHG and PM emissions. Data and information in attachments 16, 22, and 24–33 show that more than half of Bay Area refinery crude feed could potentially be replaced by bitumen-derived tar sands oil before 2030. Attachment 16 quantifies the potential GHG emissions from California refineries in this scenario based on data and information in attachments 13 and 16. Potential emissions from Bay Area refineries in this 'tar sands' scenario, based on Attachment 16, are compared with the Air District's reported and forecast refinery GHG emissions in the chart below.



Refinery greenhouse gas emissions and forecasts, S.F. Bay Area, 1990–2029
[a]CBE *after* UCS (2011). [b]BAAQMD *GHG Inventory* (2010). [c]BAAQMD 2013 Em. Inventory. [d]–80% from 1990 rate by 2050.

AQMD's forecast is illustrated by the dashed black line in this chart. As stated above, in 2010 the AQMD forecast that Bay Area refinery GHG emissions could increase to 17.6 million metric tons per year by 2029. But in the scenario where refiners replace declining Californian, Alaskan, and other crude supplies with bitumen oils, the forecast potential emissions rise more steeply, as illustrated by the solid red line in the chart, and approach 25 million metric tons/year by 2029. In RY2013, the most recent year for which AQMD reports emissions—illustrated by the yellow diamond in the chart—actual emissions exceed the AQMD forecast and are close to those in the tar sands scenario forecast.

This evidence indicates that the increase in Bay Area refinery emissions forecast by the Air District in 2010 underestimates the potential increase in Bay Area refinery emissions from a switch to tar sands oil feedstock.

10. Oil train traffic, emissions, and health and safety hazards could worsen if a further increase in Bay Area refinery emissions is allowed.

An image of the Bay Area excerpted from the State of California's Rail Risk and Response interactive map is appended hereto as Attachment 34.[34] Comparison of attachments 33 and 34 shows that many communites in the Northeast, East and South Bay could be impacted by nearby oil train traffic—including Fairfield, Benicia, Oakley, Antioch, Pittsburg, Vine Hill, Martinez, Port Costa, Crockett, Rodeo, Pinole, San Pablo, Richmond, El Cerrito, Albany, Berkeley, Emeryville, Oakland, San Leandro, Hayward, Livermore, Pleasanton, Union City, Fremont, Alviso, Milpitas, Santa Clara, San José, Morgan Hill, Gilroy, and others.

Attachment 33 summarizes and cites evidence that oil train operations and derailments cause serious health and safety hazards, including acute and chronic air pollution, and it documents disparately severe oil train hazards in communities of color, low-income communities and linguistically isolated communities.

A report for Shell Oil Co. showing that plant design configurations prevent Bay Area refineries from processing large amounts of light crude efficiently is appended hereto as Attachment 35.[35] Evidence in attachments 13–19, 24, and 25 strongly supports this finding. This inability to process large amounts of much lighter crude, such as fracked shale oils from the Bakken, is consistent with the industry's stated plans, documented above, for oil trains to deliver tar sands oils, which are denser, to Bay Area refineries. However, as Attachment 26 suggests, and as attachments 13–35 document, industry plans to greatly increase oil train delivery of tar sands oils to Bay Area refineries are contingent on whether environmental requirements allow the increased refinery emissions that would result from processing tar sands oil in the Bay Area. Thus, allowing Bay Area refinery emissions to further increase could worsen health and climate hazards from oil trains as well as those from direct refinery emissions.

Conclusion

Data the Air District reports elsewhere document a substantial long-term increase in Bay Area refinery emissions of GHG and $PM_{2.5}$ that co-emit from refinery fuel combustion. EIA data show that refined fuels demand cannot explain the reported emissions increase. Peer reviewed science shows that refining lower quality oil contributed to this emissions increase and could further increase emissions from Bay Area refineries if their current, declining, crude oil supply is replaced with bitumen-derived 'tar sands' oil.

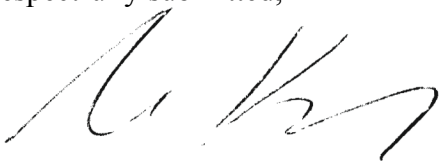
Forecasts the Air District reports elsewhere show that Bay Area refinery GHG and $PM_{2.5}$ emissions could further increase. The peer reviewed science shows that Bay Area refinery emissions could greatly exceed even these forecasts if the refiners replace their declining current oil supply with bitumen-derived tar sands oil. In fact, industry reports document plans to replace Bay Area (and California) refiners' declining current oil supplies with that tar sands oil—if the resultant emissions increase is allowed.

Moreover, those industry-reported plans include a major expansion of Bay Area oil train traffic that—since Bay Area refineries cannot process very large amounts of light shale oils efficiently—could be allowed here ***if*** the emissions increase from refining the large amounts of tar sands oil these trains would deliver is allowed.

CBE requests that the Air District revise and recirculate its environmental analysis of rules 12-15 and 12-16 to report the information documented here to the public and its Board transparently, consider and address this information properly, and address the health and climate impacts identified adequately.

A safeguard against further increasing refinery emissions is needed without further delay. The Air District, however, proposes no such safeguard that is specific, enforceable upon adoption, and would apply to refineries facility-wide. Therefore, given the absence of any other such safeguard proposal, CBE's September 2015 proposal for limits set to current facility emission rates, and the community-proposed moratorium on permits for projects to enable lower quality oil, should be considered favorably in your revisions.

Respectfully submitted,



Greg Karras
Senior Scientist

Copy: Ken Alex, Office of the Governor
John Gioia, Stationary Source Committee Chair
Air District Board members
Richard Corey, Air Resources Board
Jack Broadbent, Air Pollution Control Officer
Interested organizations and individuals

Attachments—*see* attachments list herein below.

Attachments List (four pages).

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[1] Attachment 1. *Source Inventory of Bay Area Greenhouse Gas Emissions;* Updated February 2010. Bay Area Air Quality Management District: San Francisco, CA.

[2] Attachment 2. *Bay Area Air Quality Management District Emissions Inventory;* includes facility- and source-specific oil refinery and refinery support facility emissions data for reporting year 2013. Files are attached as provided in response to CBE's request for review pursuant to the California Public Records Act. See CBE's September 2015 Comment-1 on Rule 12-16 for additional information. Eight tables in Excel format.

[3] Attachment 3. *Table 1. Bay Area Winter Emissions Inventory for Primary $PM_{2.5}$ and PM Precursors: Year 2010;* adopted by the BAAQMD Board for State Implementation Plan review by USEPA. Bay Area Air Quality Management District: San Francisco, CA.

[4] Attachment 4. *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area;* November 2012. Bay Area Air Quality Management District: San Francisco, CA. Includes Appendix A. Bay Area Winter Emissions Inventory for Primary PM + PM Precursors: 2010–2030.

[5] Attachment 5. *Regulations to Track and Mitigate Emissions from Petroleum Refineries Regulation 12, Rules 15 and 16: Refinery Emission Trends 1980–2015 and Main Causes of Reductions;* Excerpt from BAAQMD Staff's March 2015 Workshop Presentation for proposed rules 12-15 and 12-16. Includes an insert by CBE facilitating reference to scale. Bay Area Air Quality Management District: San Francisco, CA.

[6] Attachment 6. Sánchez de la Campa et al., 2011. Size Distribution and Chemical Composition of Metalliferous Stack Emissions in the San Roque Petroleum Refinery Complex, Southern Spain. *Journal of Hazardous Materials* **190:** 713-722. DOI: 10.1016/j.jhazmat.2011.03.104.

[7] Attachment 7. *Movements by Tanker, Pipeline, Barge and Rail between PAD Districts;* includes annual data on petroleum and petroleum project movements from West Coast PADD 5 to other US regions (PADDs 1–4); U.S. Energy Information Administration: Washington, D.C. Attachment includes four documents labeled 7A through 7D.

[8] Attachment 8. *PADD 5 Prime Supplier Sales Volumes of Petroleum Products;* U.S. Energy Information Administration: Washington, D.C.

[9] Attachment 9. *West Coast (PADD 5) Exports of Crude Oil and Petroleum Products;* U.S. Energy Information Administration: Washington, D.C.

[10] Attachment 10. *Data Excerpted from the BAAQMD Emission Inventory for 5 Refineries and 3 Refinery Support Facilities, Reporting Year 2013: Sources Reported as Emitting GHG along with PM, PM Precursors, or Both.* Excerpts from Attachment 2. *See* CBE's September 2015 Comment-1 in this matter for additional details.

[11] Attachment 11. Wilhelm et al., 2007. Mercury in Crude Oil Processed in the United States (2004). *Environmental Science & Technology* **41**(13): 4509–4514. DOI: 10.1021/es062742j.

[12] Attachment 12. Robinson and Dolbear, 2007. Commercial Hydrotreating and Hydrocracking. In *Hydroprocessing of Heavy Oils and Residua;* Ancheyta and Speight, Eds.; Chemical Industries; CRC Press, Taylor & Francis Group: Boca Raton, FL; Vol. 117, pp. 281–311.

[13] Attachment 13. Karras, 2010. Combustion Emissions from Refining Lower Quality Oil: What is the Global Warming Potential? *Environmental Science & Technology* **44**(24): 9584–9589. DOI: 10.1021/es1019965. Supporting Information is included.

[14] Attachment 14. Bredeson et al., 2010. Factors Driving Refinery CO_2 Intensity, with Allocation Into Products. *International Journal of Life Cycle Assessment* **15:** 817–826. DOI: 10.1007/s11367-010-0204-3.

[15] Attachment 15. Brandt, 2011. Variability and Uncertainty in Life Cycle Assessment Models for Greenhouse Gas Emissions from Canadian Oil Sands Production. *Environmental Science & Technology* **46**: 1253–1261. DOI: 10.1021/es202312p.

[16] Attachment 16. Karras, 2011. *Oil Refinery CO_2 Performance Measurement;* report peer reviewed and published by the Union of Concerned Scientists (UCS). Technical analysis prepared by Communities for a Better Environment (CBE) for UCS. Union of Concerned Scientists: Berkeley, CA. Supplemental Information is included.

[17] Attachment 17. Abella and Bergerson, 2012. Model to Investigate Energy and Greenhouse Gas Emissions Implications of Refining Petroleum: Impacts of Crude Quality and Refinery Configuration. *Environmental Science & Technology* DOI: 10.1021/es3018682.

[18] Attachment 18. Karras, 2015. *Toxic and Fine Particulate Emissions from U.S. Refinery Coking and Cracking of 'Tar Sands' Oils;* Report on work conducted for the Natural Resources Defense Council at part of a technical assistance contract. Natural Resources Defense Council: San Francisco, CA. Supplemental Information is included.

[19] Attachment 19. Gordon et al., 2015. *Know Your Oil: Creating a Global Oil-climate Index;* By Deborah Gordon, Adam Brandt, Joule Bergerson and Jonathon Koomey; Carnegie Endowment for International Peace: Washington, D.C. www.CarnegieEndowment.org/pubs.

[20] Attachment 20. *Refinery Crude Oil Input Qualities;* Data from US EIA for the years 2009–2014; table of data downloaded from www.eia.gov/petroleum/data.cfm on 14 October 2015. U.S. Energy Information Administration: Washington, D.C.

[21] Attachment 21. Meyer et al., 2007. *Heavy Oil and Natural Bitumen Resources in Geologic Basins of the World;* USGS Open-file Report 2007-1084, available at http://pubs.usgs.gov/of/2007/1084/. U.S. Geological Survey: Washington, D.C.

[22] Attachment 22. Schremp et al., 2010. *Transportation Energy Forecasts and Analyses for the 2009 Integrated Energy Policy Report;* Final Staff Report; CEC-600-2010-002-SF; California Energy Commission: Sacramento, CA. *See* pp. 134–142.

[23] Attachment 23. All publicly available data for gas oil density and sulfur content, compiled by CBE in April 2014, with selected crude oil assay data. Ten-page table.

[24] Attachment 24. *Canadian, US Processors Adding Capacity to Handle Additional Oil Sands Production;* Special report in: *Oil & Gas Journal;* **105**(26). 9 July 2007. www.ogj.com/articles.

[25] Attachment 25. Croft and Patzek, 2009. The Future of California's Oil Supply. Paper prepared for presentation at the 2009 Society of Petroleum Engineers Western Regional Meeting held in San Jose, California, USA, 24–26 March 2009. SPE-120174-PP.

[26] Attachment 26. *ST98-2013: Alberta's Energy Reserves 2012 and Supply/Demand Outlook 2013–2022;* ISSN 1910–4235. May 2013. Energy Resources Conservation Board: Calgary, Canada. www.ercb.ca. *See* esp. page 1-10.

[27] Attachment 27. *Valero Investor Presentation: November 2013;* excerpts from report at: http://www.sec.gov/Archives/edgar/containers/fix034/1035002/000119312513439300/d627324dex9901.htm downloaded October 2015.

[28] Attachment 28. *Phillips 66 2013 Barclays CEO Energy-Power Conference: Greg Garland, Chairman and CEO, Phillips 66;* 2013 Barclays CEO Energy-Power Conference, 12 September 2013, 11:05 a.m. ET. Nine pages.

[29] Attachment 29. *03-Sep-2014 Phillips 66 (PSX) Barclays CEO Energy-Power Conference;* September 2014. Corporate participants: Greg C. Garland, Chairman & Chief Executive Officer, Phillips 66; other participants: Paul Cheng, Analyst, Barclays Capital, Inc. Corrected Transcript. Eleven pages.

[30] Attachment 30. *Phillips 66 Advantaged Crude Activities: Updated May 2013;* Image from Phillips 66 info-graphic downloaded on 16 October 2015 from its Web Site: http://www.phillips66.com/EN/Advantaged%20Crude/index.htm.

[31] Attachment 31. *Tesoro: Transformation through Distinctive Performance;* Presentation including forward-looking statements within the meaining of the Private Securities Litigation Reform Act of 1995. Simmons Energy Conference. 27 February 2014.

[32] Attachment 32. *Crude Oil Forecast, Markets & Transportation;* Canadian Association of Petroleum Producers (CAPP); June 2015. Report by Canada's oil and natural gas producers. http://www.capp.ca/publications-and-statistics/publications/264673. *See* pages iii, iv, 20-22, and 29-34.

[33] Attachment 33. Krogh et al., 2015. *Crude Injustice on the Rails: Race and the Disparate Risk from Oil Trains in California;* report by Communities for a Better Environment and ForestEthics. June 2015. *See* esp. pp. 8, 12, 15, 18, and 21–26.

[34] Attachment 34. *Rail Risk and Response;* excerpt from the State of California interactive map entitled "Rail Risk and Response." The image copied shows BNSF and UPRR rail lines, major refineries, existing and proposed oil train terminals, hospitals and geologic faults near rail, active petroleum pipelines, rail-stream intersections, and place names, in the Bay Area. California Office of Emergency Services: Sacramento, CA. http://california.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=928033ed043148598f7e511a95072b89.

[35] Attachment 35. Vautrain, 1992. *Submission to the Regional Water Quality Control Board, San Francisco Bay Region, Prepared on Behalf of Shell Oil Company;* December 1992; report on technical considerations for crude substitution at Bay Area refineries in relation to selenium discharge prevention;13 pages; Purvin & Gertz: Los Angeles, CA.

COMMUNITIES FOR A BETTER ENVIRONMENT

November 23, 2015

Eric Stevenson
Bay Area Air Quality Management District
939 Ellis Street
San Francisco CA, 94109

VIA EMAIL
estevenson@baaqmd.gov

RE: Comment on the Draft Environmental Impact Report for Adoption of District Regulation 12, Rule 15 and Rule 16

Dear Mr. Stevenson,

As the Bay Area is flooded by refinery expansion projects to enable the refining of a lower quality feedstock,[1] the Bay Area Air Quality Management District ("Air District") has an historic opportunity to address the local pollution and climate change impacts from the refining industry's shift to those more polluting and hazardous oils. Both proposed Regulation 12, Rule 15: Petroleum Refining Emissions Tracking ("Rule 12-15") and Regulation 12, Rule 16: Petroleum Refining Emission Limits and Risk Thresholds ("Rule 12-16") were intended to address this industry wide shift in crude oil feedstock and subsequent increase in pollution. Unfortunately, after more than three years of debate, the Draft Environmental Impact Report for those rules ("Rule DEIR") largely ignores that underlying air pollution concern. As the Rule DEIR fails to adequately acknowledge that essential issue, it cannot inform the Air District Board of Directors and the public of the significant environmental impacts ignored and implicated by this rulemaking. The Rule DEIR fails as an informational document. Communities for a Better Environment ("CBE") offers the following comment addressing the several inadequacies of the Rule DEIR.

This comment was prepared with the invaluable assistance of the students at the Stanford Law School Environmental Law Pro Bono Project. It is supported by the several undersigned community, environment, labor and academic groups.

As set forth below, as well as in our prior submittals regarding the proposed rulemaking, the accompanying attachments A-D, and in the Supplemental Comment of CBE

[1] *See eg.*, the Valero Benicia Refinery Crude by Rail Project (available at http://www.ci.benicia.ca.us/index.asp?SEC={FDE9A332-542E-44C1-BBD0-A94C288675FD}); the Tesoro Amorco Marine Oil Terminal Lease Consideration Project (available at http://www.slc.ca.gov/Info/CEQA/Tesoro_Amorco.html); the Chevron Richmond Refinery Modernization Project (available at http://chevronmodernization.com/); the Phillips 66 San Francisco Refinery Propane Recovery Project (available at http://www.co.contra-costa.ca.us/4729/Phillips-66-Propane-Recovery-Project); the WesPac Pittsburg Energy Infrastructure Project, available at http://www.ci.pittsburg.ca.us/index.aspx?page=700; and the Kinder Morgan Richmond Terminal transport of fracked Bakken shale crude (http://sanfrancisco.cbslocal.com/2014/03/14/trains-carrying-fracked-oil-spotted-in-bay-area/).

Senior Scientist, Greg Karras,[2] the Rule DEIR suffers from numerous deficiencies that render it inadequate under CEQA[3] and the CEQA Guidelines.[4] We respectfully request that the Board of Directors reject the Rule DEIR as an environmental review document, require adequate consideration of our alternative proposal and direct staff to revise the Rule DEIR to comply with CEQA.

An EIR is "the heart of CEQA."[5] "The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project."[6] The EIR "is an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return. The EIR is also intended 'to demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the ecological implications of its action.' Because the EIR must be certified or rejected by public officials, it is a document of accountability."[7]

The Rule DEIR fails entirely to live up to this mandate. By only skimming the surface of this rulemaking's overarching purpose to address crude quality concerns, Rule 12-15 does not provide accurate or sufficient monitoring to meet its intended objective. Similarly, the Rule EIR's analysis of Rule 12-16 does little more than account for the environmental impacts of the installation of various pollution control equipment, and does not adequately address the underlying crude quality concern. For the reasons outlined below, the Rule DEIR violates CEQA and several principles of Environmental Justice.

I. THE DEIR'S PROJECT DESCRIPTION IS INADEQUATE.

A. An Inadequate Project Description Compounds the DEIR's Vulnerable Environmental Review Mechanism Resulting in Potential Significant and Unmitigated Environmental Impacts.

As an initial matter, CBE highlights the potential significant impacts, and perhaps unintended consequences, of adoption of these rules as proposed due to the design of the Rule DEIR. The Air District has prepared the Rule DEIR under CEQA Guidelines Section 15187,[8] Environmental Review of New Rules and Regulations, which provides:

> [the Rule EIR] satisfies the requirements of this section provided that the document contains information to analyze reasonably foreseeable environmental impacts of the methods of compliance; reasonably foreseeable mitigation measures of those impacts;

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[2] Supplemental Comment on Air District Staff Proposal, Rules 12-15 and 12-16; Evidence of Localized Bay Area Refinery GHG and $PM_{2.5}$ Emission Impact, Greg Karras, Senior Scientist, Communities for a Better Environment, 23 November 2015 ("Karras Supplemental Comment 2").
[3] Pub. Res. Code § § 21000 *et seq.*
[4] 14 Cal. Code Regs. § § 15000 *et seq.*
[5] *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal. 3d 376, 392 ("*Laurel Heights I"*).
[6] Pub. Res. Code § 21061
[7] *Laurel Heights I*, 47 Cal. 3d at 392 (citations omitted).
[8] Rule DEIR at 1-1.

an analysis of reasonably foreseeable alternative means of compliance with the rule or regulation.[9]

In addition, the Rule DEIR must also comply with other policies and substantive CEQA requirements that govern the actions of agencies;[10] those include the need for an adequate project description in order to assess potential (and even unintended) significant impacts of the agency rulemaking. As more fully detailed immediately below, the Rule DEIR, in ignoring and failing to assess the issue of the refining industry's shift to a lower quality crude, suffers from an ambiguous and unstable project description.

Moreover, the need for an adequate project description in this specific rulemaking is particularly important given the regulatory environmental review mechanism established by CEQA Guidelines § 15187. The CEQA Guidelines provide a streamlined mechanism for the implementation of rules and regulations adopted pursuant to CEQA Guidelines § 15187, such as the instant Rule EIR. Agencies may interpret the Rule DEIR to authorize the preparation of a "focused EIR" in order to comply with the requirements of the Rule EIR.[11] Those focused EIRs contain less information than traditional EIRs. They do not require an analysis of cumulative impacts, an analysis critical to maintain the public health and safety of environmental justice communities.[12] Those focused EIRs also require a limited discussion of environmentally superior alternatives.[13]

Proposed rules 12-15 and 12-16 will be the Bay Area's rules to address the increase in pollution from the refining of a lower quality oil feedstock. If rules 12-15 and 12-16 are implemented as proposed, the refining industry could claim that any of the several refinery expansion projects currently proposed around the Bay Area[14] that enable a shift to a lower quality oil feedstock, need not undergo any further environmental review, at least in the realm of air quality impacts. The refining industry could argue that the CEQA Guidelines streamlined 15187/15187 process dictates that the performance of that analysis is included in this Rule DEIR process. Although this process alleviates the burden from other local agencies to conduct the same type of analysis, it also requires that analysis to be as accurate and protective as possible. The Air District's proposed, and admittedly under-protective, approach to resolve the issue, is simply not as robust, and protective of public health and safety, as the existing environmental review mechanism for current refinery expansion projects.

Fossil-fuel infrastructure developers have previously exhibited a desire to "tier" off of earlier, and already approved, EIRs.[15] Currently, without Rules 12-15 and 12-16, CEQA

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[9] CEQA Guidelines § 15187.
[10] *See eg. Environmental Protection Information Center, Inc. v. Johnson* (1st Dist. 1985) 170 Cal. App. 3d 604, 616-618, discussing the parallel Public Resources Code § 21080.5 certified regulatory program provisions.
[11] CEQA Guidelines § 15188.
[12] *Id.*
[13] *Id.*
[14] *Supra*, fn. 1.
[15] *See eg.* the permitting of the Bakersfield Crude Terminal, cited by the U.S. Environmental Protection Agency for 10 violations of the Clean Air Act, a major air pollution source that should have been subjected to rigorous environmental review during the permitting process (May, 2015, but crude by rail terminal instead approved on the basis of environmental analysis conducted in an outdated 2010 South Kern County General Industrial Plan EIR); *see also*, How a major terminal to ship Utah coal to the Far East sneaked into Oakland, September 22, 2015, *available at* http://www.eenews.net/stories/1060025067 (reliance on 2001 environmental review to authorize a currently proposed coal export terminal in Oakland).

requires that lead agencies, in coordination with Bay Area refineries, prepare an EIR that includes an analysis of crude oil feedstock refined and subsequent environmental impacts before and after implementation of the project under environmental review.[16] As proposed, Rules 12-15 and 12-16 would shift this obligation away from the lead agencies, overseeing such refinery expansion projects, to the sole purview of the Air District and the instant rulemaking. The current status quo has resulted in greater public participation in decision-making and subsequent design of mitigation measures to address the increased use of tar sands bitumen or other lower quality oil feedstocks.[17] Adoption of Rules 12-15 and 12-16 as proposed would forego those specific case-by-case approaches for only the various pollution reduction methods outlined in the Rule DEIR.

Nor is this scenario a remote possibility. Numerous cases have adjudicated the issue of whether the concept of tiered environmental review and specific provisions apply for particular pollution control methods.[18] Furthermore, the Rule DEIR notes that

> Other local public agencies, such as cities, county planning commissions, etc., may use the EIR for the purpose of evaluating emission reduction projects, if local approvals are required, e.g., use permits or building permits.[19]

Such authorization implicates each of the current Bay Area refineries that seek use permits or building permits from local agencies for their expansion projects. For instance, the Phillips 66 Rodeo (San Francisco) Refinery Propane Recovery Project claims to be an emissions reduction project. The Air District itself has previously supported the Chevron Richmond Refinery Hydrogen Renewal Project, ultimately rejected by the Court of Appeal for its inadequate EIR analysis of crude quality, as an "emission reduction project."[20]

The Rule DEIR is vulnerable to Bay Area refiners' potential claims that the crude quality question has already been addressed and adequately analyzed for purposes of CEQA by the Air District in this rulemaking. If that industry argument were to prevail, the current analyses of those issues by different Bay Area lead agencies of different projects would cease; the Air District could assume sole responsibility for establishing mitigation measures for air pollution changes due to changing crude slates, through Rules 12-15 and 12-16. The Rule DEIR fails to outline or provide any adequate safeguards against this perhaps unintended consequence and the potential for its clear and significant environmental impacts.

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[16] *CBE v. City of Richmond; Chevron Products Co*. (2010) 184 Cal. App. 4th 70, 89.
[17] *See eg.* Chevron Modernization Project, Final EIR and Community Investment Agreement, *available at* http://chevronmodernization.com/project-documents/
[18] *See eg. City of Arcadia v. State Water Resources Control Bd.* (2006) 135 Cal. App. 4th 1392, 1423.
[19] Rule DEIR at 1-3.
[20] BAAQMD Amicus Brief to *CBE v. City of Richmond; Chevron* (2010).

B. The Project Description Fails to Disclose an Industry Shift to a Different Quality Crude Feedstock

Peer reviewed science shows that refining lower quality crude oil feedstock contributes to increased emissions of greenhouse gases ("GHGs") and particulate matter ("PM").[21] As detailed below, the Air District similarly acknowledges the possibility of this logical direct correlation between refining energy intensity and emissions of pollutants. As evidence in the record indicates, those increased emissions could keep increasing as Bay Area refineries rush to get their facilities permitted to replace their traditional, declining, crude oil supply with lower quality oils, such as bitumen-derived "tar sands" oil. A description of how the proposed rules interact with the current environmental setting also cannot ignore the potential for increased hazards, including severe episodic pollution, whether from refinery equipment failure or the transport of that new and more hazardous feedstock by rail.

In order for an environmental document to adequately evaluate the environmental ramifications of a project, it must first provide a comprehensive description of the project itself. "An accurate, stable and finite project description is the sine qua non of an informative and legally sufficient EIR."[22] As a result, courts have found that even if an EIR is adequate in all other respects, the use of a "truncated project concept" violates CEQA and mandates the conclusion that the lead agency did not proceed in a manner required by law.[23]

Furthermore, "[a]n accurate project description is necessary for an intelligent evaluation of the potential environmental effects of a proposed activity."[24] Specifically,

> A curtailed or distorted project description may stultify the objectives of the reporting process. Only through an accurate view of the project may affected outsiders and public decision-makers balance the proposal's benefit against its environmental cost, consider mitigation measures, assess the…no project alternative…and weigh other alternatives in the balance.[25]

In one case, the *County of Inyo v. City of Los Angeles*, the Court of Appeal struck down an EIR that had been drafted differently than intended.[26] The EIR in question was supposed to address the extraction of groundwater for export and use in the entire Los Angeles area. The document that was produced did not focus its analysis on that intended purpose; instead, it analyzed only the use of the groundwater in two areas of Los Angeles, pre-supposing and skewing the analysis regarding identification of alternative solutions and subsequent conclusion.[27] The Court of Appeal noted that such inconsistencies confused the public, and

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[21] Supplemental Comment on Air District Staff Proposal, Rules 12-15 and 12-16; Evidence of Increasing Bay Area Refinery GHG and PM2.5 Emissions, Greg Karras, Senior Scientist, Communities for a Better Environment, 21 October 2015 ("Karras Supplemental Comment 1"), attached as Attachment B.
[22] *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal. App. 4th 713, 730, quoting *County of Inyo v. City of Los Angeles* (1977) 71 Cal. App. 3d 185, 193.
[23] *Id.* at 730.
[24] *Id.* (citation omitted).
[25] *County of Inyo v. City of Los Angeles* (1977) 71 Cal. App. 3d 185, 192-193.
[26] *Id.*
[27] *Id.*

held that "a curtailed, enigmatic or unstable project description draws a red herring across the path of public input."[28]

Similarly here, the Rule DEIR's Project Description fails to include an adequate discussion regarding the scope of the switch in crude oil feedstock supply at Bay Area refineries, including its current implications for Bay Area pollution. The closest that the Rule DEIR comes to addressing the crude quality issue is in respect to Rule 12-15. The Rule DEIR states that Rule 12-15 "is being proposed…to identify any potential relationship between crude oil quality and emissions of air pollutants."[29] The Rule DEIR then includes a project objective of largely the same language: "analyze significant changes to the crude slate (such as the refining of heavier and/or more sour crude oil) to determine whether such changes will result in increased emissions of air pollutants."[30] The Rule DEIR includes no other discussion of the purpose of the rule, to address potential environmental impacts as a result of a refinery's switch to a lower quality oil feedstock. The Rule DEIR Project Description includes no discussion of the potential increased GHGs, co-pollutants or PM from refining a lower quality oil feedstock. It does not address the correlation to increased hazards. The Rule DEIR completely glazes over any discussion of the issue, foreclosing any analysis of how the proposed rules interact with or address the problem. Just as in the *County of Inyo v. City of Los Angeles* case, the Rule DEIR pre-supposes a solution to the problem without adequately discussing the problem. As stated by the Court of Appeal, "an EIR may not define a purpose for a project and then remove from consideration those matters necessary to the assessment of whether the purpose can be achieved."[31]

Administrative Rulemaking Intent

Moreover, the Air District has consistently expressed its intent for this rulemaking to address increasing pollution from refining a lower quality oil feedstock – until the Rule DEIR. As noted in the Concept Paper for the rulemaking, released in 2012, the quality of crude imports to the U.S. has decreased over the past decades, as refineries have imported heavier and more sulfur-rich fuel.[32] The Concept Paper continues: "the use of lower quality crude at refineries could…increase emissions of air contaminants…Emissions could also increase as a result of accidents related to the increased corrosiveness of lower quality crudes."[33]

In its Response to Comments on the Initial Draft of Regulation 12-15, the Air District has acknowledged that "it is reasonable to expect" that the Bay Area refineries will "follow the general industry-wide trend towards increased processing of lower quality crudes," and that processing these crudes tends to "cause more emissions."[34]

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[28] *Id.*
[29] Rule DEIR at 2-1.
[30] *Id.* at 2-2.
[31] *County of Inyo v. City of Los Angeles* (1981) 124 Cal. App. 3d 1, 7.
[32] BAAQMD Regulation 12, Rule 15: Petroleum Refining Emissions Tracking, Regulatory Concept Paper, *available at* http://www.baaqmd.gov/~/media/files/planning-and-research/rules-and-regs/workshops/2013/1215_dr_rpt032113.pdf?la=en.

[33] *Id.*
[34] *Id.*

The Staff Report for the Rule DEIR also echoes that intent to address the crude quality issue, acknowledging Bay Area refiners' current shift to a lower quality oil feedstock: "It is anticipated that refineries will update and/or modify their equipment to…process crude oil from different sources… proposed rules provide a means to determine overall changes in refinery emissions as both processes and equipment change, and to ensure that any changes in emissions do not pose a threat to the health of nearby communities."

On May 19, 2015, the Bay Area Air Quality Management District issued a memorandum entitled "Five Point Action Plan to Address Refinery Emissions"; and three days later it published Resolution 2015 ("Resolution Establishing a Comprehensive Regulatory Program to Reduce Greenhouse Gases From Stationary Sources").[35] In these documents, the Air District reaffirmed its resolve to reduce greenhouse gas emissions from Bay Area refineries and adopt a comprehensive regulatory program to achieve the 80% reduction goal of greenhouse gases in the Bay Area by 2050.[36] In the memorandum, the Air District specifically highlighted proposed Regulations 12-15 and 12-16 as playing an important role in achieving these reductions.[37] This latter commitment is particularly important, given the proposed rules' abandonment of a proposal to reduce GHGs.

The perceived environmental concern surrounding shifting crude quality feedstock at Bay Area refineries is consistent with industry reports and data. The Society of Petroleum Engineers concluded in 2009 that Canadian tar sands offer "the most promising source for California refineries" to replace currently dropping crude supplies.[38] In addition, several of the Bay Area refineries, including Valero, Phillips 66, and Tesoro, have issued investor reports announcing plans to import Canadian crudes.[39] The Alberta Energy Resources Conservation Board and the Canadian Association of Petroleum Producers have also announced plans to export more tar sands oil for processing by California refineries.[40] A 2007 report in Oil & Gas Journal describes industry plans to expand the market for price-discounted oil produced in the Canadian oil sands by, among other things, sending large amounts of this oil to California refineries as a new potential growth market.[41] A 2015 Canadian Association of Petroleum Producers crude oil forecast, markets, and transportation report outlines plans for exporting more tar sands oil to California refineries via pipeline, ship, and rail.[42] A 2015 report by CBE and ForestEthics identifies oil industry projects which could potentially replace up to 40–50% of California refinery crude feed by rail alone.[43]

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[35] Bay Area Air Quality Management District, Resolution 2015 and Memorandum (May 2015), https://d3n8a8pro7vhmx.cloudfront.net/350bayarea/pages/2242/attachments/original/143258 1470/BAAQMD-Resolution-2015.pdf?1432581470.

[36] *Id.*

[37] *Id. (recognizing these rules as a part of the Air District's "Refinery Emission Reduction Strategy . . . identifying specific rulemaking to meet the goal of reducing refinery emissions by 20%");* Bay Area Air Quality Management District, Petroleum Refinery Emission Reduction Strategy: Workshop Report 1-2 (September 2015), *available at:* http://www.baaqmd.gov/~/media /files/communications-and-outreach/community-outreach/refinery-rules/workshop_report_final-pdf.pdf?la=en (listing Rules 15 and 16 as central components in the Air District's four-part strategy of emissions reduction).

[38] *Id.*

[39] *See* Karras Supplemental Comment 1.

[40] *Id.*

[41] *Id.*

[42] *Id.*

[43] Krogh et al., 2015. Crude Injustice on the Rails: Race and the Disparate Risk from Oil Trains in California; report by Communities for a Better Environment and ForestEthics. June 2015, *available at,* http://www.forestethics.org/news/crude-injustice-rails-california.

It is therefore surprising that the Rule DEIR, intended to offer a robust environmental analysis of the proposed rules and how they are tailored to tackle the issue of increased emissions from refining lower quality oil, effectively skirts the issue. The references to the crude quality shift in regards to Rule 12-15 merely skim the surface of these underlying concerns. Similarly, from the outset, the DEIR's analysis of Rule 12-16 generally limits its project and project-related impacts analyses to the installation of pollution control equipment. However, this project, this rule, is not a simple emissions control installation infrastructure project. The Rule DEIR presents the same "red herring" issues as presented in the *County of Inyo* case. By shifting from the project description that was originally intended, the Rule DEIR skews its proposed solutions, ignores significant impacts caused by its proposed rules tailored to a narrower and inadequate project description, and limits the required analysis and assessment of available, and more suitable, alternatives. Ultimately, "the incessant shifts among different project descriptions do vitiate the…EIR process as a vehicle for intelligent public participation."[44]

Finally, as the Rule DEIR notes, the degree of specificity required in an EIR corresponds to the degree of specificity involved in the underlying activity described in the EIR.[45] The Rule DEIR fails to adequately describe possible connections between project objectives and the underlying project purpose and tailor a means to address that purpose and meet those objectives. As one example, the Air District cannot claim a project objective of reducing sulfur dioxide (SO_2) emissions without discussing considerations bearing on crude quality that could cause or increase that pollution. The proposed rules would establish maximum refinery-wide emissions limits for SO_2, and require refinery operators to demonstrate that their facilities will not cause an exceedance of the National Ambient Air Quality Standards (NAAQS) for SO_2.[46] Nevertheless, the distinction in crude oil feedstock matters. The chemical composition of raw materials that are processed by a refinery directly affect the amount and composition of the refinery's emissions.

> The amount and composition of sulfur in the crude slate, for example, ultimately determines the amount of [sulfur dioxide] that will be emitted from every fired source in the refinery and the amount of odiferous hydrogen sulfide and mercaptans that will be emitted from tanks, pumps, valves, and fittings. The composition of the crude slate establishes the CEQA baseline against which impacts must be measured.[47]

Other significant impacts, such as increased energy consumption, air emissions, toxic pollutant releases, flaring and catastrophic incident risks, are also entirely dependent on the quality of crude oil processed at the facility.[48] As detailed further below, a heavier crude oil feedstock has also been identified as a contributing factor to potentially catastrophic incidents

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[44] *County of Inyo,* 71 Cal. App. 3d at 197.
[45] *Id.* and citing CEQA Guidelines §15146
[46] Rule DEIR at 1-2 and 1-4.
[47] *See* Expert Report of Phyllis Fox on the Phillips 66 Rodeo Refinery Propane Recovery Project, *available at*, http://www.co.contra-costa.ca.us/DocumentCenter/Index/2713.
[48] *See* Karras Supplemental Comments 1 and 2.

at refineries, and a root cause of the August 6, 2012 fire at the Chevron Richmond Refinery.[49]

The courts rejected Chevron's EIR for its Hydrogen Renewal Project because its project description failed to adequately discuss the issue of crude quality, within the context of which that project was proposed.[50] Similarly, it is within the context of a change in the same crude supply for Bay Area refineries that this rule is proposed. The Rule DEIR project description fails to include such an illustration of the crude quality issues intended to be addressed by this rulemaking and how it could implicate particular hazards, increased pollution, or more frequent and severe episodic emissions. Only with adequate disclosure of these impacts, and their interactions with the rules as proposed, can the Air District Board of Directors and public adequately ascertain the environmental implications of this rulemaking, or engage in the meaningful consideration of alternative methods to address the underlying crude quality concern.

II. THE DEIR FAILS TO ANALZE SEVERAL POTENTIAL SIGNIFICANT AND UNMITIGATED IMPACTS OF THE PROPOSED RULEMAKING

In order to effectuate the fundamental purpose of CEQA, it is critical that an EIR meaningfully inform the public and its responsible officials of the environmental consequences of their decisions *before* they are made."[51] Only with a genuine, good faith disclosure of a proposed project's components, can a lead Agency analyze the full range of potential impacts of the project, and identify appropriate mitigation measures where necessary, prior to project approval.[52]

Here, because the Rule DEIR fails to include an adequate project description, the Rule DEIR asks the wrong questions, diminishing or even foreclosing an analysis of the true environmental impacts of proposed Rules 12-15 and 12-16. Ignoring an analysis of the interplay between the the new regulations and the underlying industry shift to a lower quality crude oil feedstock, the Rule DEIR limits its discussion of significant environmental effects to the impacts of the construction and subsequent operation of pollution control technologies. The Rule DEIR assesses the impact these technologies will have with respect to air quality, climate change, hazards and hazardous materials, and hydrology and water quality.[53] At no point does the DEIR discuss the impact a switch in crude quality would produce on any of these elements, or even how proposed Rules 12-15 and 12-16 could even contribute to foreseeable significant environmental impacts. The Rule DEIR's failure to address the environmental impact of the enactment of these regulations in the context of current changes in crude composition is especially jarring given the obscured underlying purpose of this rulemaking. This comment highlights the following ten impacts that could be avoided if the

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[49] *See* Chemical Safety Board, Chevron Richmond Refinery Interim Investigation Report, April 2013, *available at* http://www.csb.gov/assets/1/19/Chevron_Interim_Report_Final_2013-04-17.pdf.

[50] *CBE v. City of Richmond*, 184 Cal. App. 4th at 83.

[51] *Laurel Heights Improvement Ass'n v. Regents of University of California* (1993) 6 Cal. 4th 1112, 1123; CEQA Guidelines § 15126.2(a) ("[a]n EIR *shall* identify and focus on the significant environmental effects of the proposed project") (emphasis added throughout).

[52] Pub. Res. Code § 21002 (public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects); Guidelines § 15126.4.

[53] Rule DEIR at 3.1-7.

Rule DEIR and rule proposals are revised in order to properly tailor those proposals to the rulemaking's underlying crude quality concern:

(i) Undisclosed Significant Air Quality Impacts due to the Potential Failure of the Regulatory Proposals on account of the Proposed Definition of Oil Feedstock

Currently as proposed, the Air District requires reporting of "crude slate volumes and properties" in order to meet its objective of tracking a relationship between crude oil feedstock quality and air emissions. The definition of crude slate information to be collected is, however, too vague to ensure collection of data suitable to make such a determination.[54] Moreover, Rule 12-15 includes a definition of oil feedstock processed[55] that is inconsistent with the description of oil feedstock to be reported.[56] These two errors thwart any effort to meet the project objective, jeopardizing the success of the regulatory effort, leading to significant and unmitigated increases in air pollution, where Bay Area oil-refiners process increased quantities of lower quality crude oil feedstocks under an ineffective regulatory framework. The Air District must either revise proposed Rule 12-15 to account for this risk, or disclose the full extent of the risk in a revised Rule EIR.

(ii) Undisclosed Significant Air Quality Impacts due to the Potential Failure of the Regulatory Proposals on account of Inadequate Requirements to Report Emissions-related Oil Feedstock Data

Similarly, the same adequate analysis of crude quality properties requires revision to Rule 12-15's requirements of oil feedstock information reporting requirements. As proposed, Rule 12-15 requires the collection of crude density information. As noted in the accompanying attachments,[57] although crude density can predict refinery energy and emission intensity from an industry-wide basis, in order to make plant by plant determinations and meet the project objective and underlying regulatory intent of this rulemaking, further data is required, including distillation characteristics and hydrogen content.[58] As it is "risky to assume that significant oil feed-driven changes in emissions from the refinery would be identified reliably-without knowing its oil feed in at least this level of detail," the Air District must either revise proposed Rule 12-15 to account for this shortfall, or disclose the possibility of the regulatory framework's failure and resulting significant environmental impacts in the Rule EIR.

(iii) Undisclosed Significant Climate Change Impacts

As illustrated by ample evidence in the record, the accompanying attachments and also by the environmental review documents for various proposed refinery expansion projects,[59] increased GHG emissions and climate change impacts are directly related to the quality of the feedstock refined. The Intergovernmental Panel on Climate Change has recently voiced

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[54] *See* Supplemental Comments of Communities for a Better Environment Including Revisions to Proposed Rules 12-15 and 12-16, September 2015, ("CBE September 2015 Comments") Part 2, attached as Attachment A.
[55] *See* Proposed Rule 12-15-212 *and* CBE September 2015 Comments, Part 2.
[56] *See* Proposed Rule 12-15-401.7 *and* CBE September 2015 Comments, Part 2.
[57] *See eg.* CBE September 2015 Comments, Part 2 at 13.
[58] *Id.*
[59] *See eg.* Phillips 66 Santa Maria Rail Spur Extension Project Recirculated Draft EIR at 4.3-70.

serious concerns regarding the "irreversible" effects of climate change.[60] The report concluded that "continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts," calling for the need for dramatic cuts in pollution.[61] Amidst the domestic and international recognition of the risk of a climate catastrophe, and the clear data demonstrating the increased GHG emissions from the refining of lower quality oils, the Rule EIR remarkably remains silent on the issue of GHG emissions.

Even more glaring, the Rule EIR highlights that refineries are among the largest single sources of GHG emissions in the Bay Area.[62] The Staff Report that accompanies the Rule DEIR even notes that the refining of lower quality oils, such as Canadian tar sands, "may increase GHG emissions due to the need for more intensive processing."[63] Nevertheless, the same Staff Report puts the onus of GHG regulation on the California Air Resources Board ("CARB"), claiming that the cap and trade system will adequately regulate any perceived GHG emission increases pending additional rule development by the Air District.

As Bay Area refiners increase their efforts to permit their Bay Area expansion projects and re-tool their refineries to handle a lower quality crude oil feedstock, the Air District has chosen to hang its hat on future, as of yet specifically undetermined rules, and also, a program that ends in 2020.

"Formulation of mitigation measures should not be deferred until some future time." [64] "Numerous cases illustrate that reliance on tentative plans for future mitigation after completion of the CEQA process significantly undermines CEQA's goals of full disclosure and informed decision making; and consequently, these mitigation plans have been overturned on judicial review as constituting improper deferral of environmental assessment." [65]

AB 32 requires California to reduce GHG emissions to 1990 levels, and to do so by 2020. The Cap and Trade program's fate post-2020 is still undetermined. The refining industry's shift to a lower quality crude oil feedstock will inevitably extend past 2020, at which time, affected fenceline refinery community members and workers will still look to this regulation for adequate measures to reduce GHG emissions, and in particular, locally harmful co-pollutants. However, as the Air District's rules are currently proposed, what GHG reduction measures will be available in 2021? Or, how will any such measures differ from the Cap and Trade program in 2021? Will the Cap and Trade program even still exist in 2021? The legislature's course of action in 2020 cannot be predicted. At best, the proposed rulemaking only addresses the increase in GHG emissions from refining tar sands for the next five years. Anything thereafter is merely tentative and based on assumption. These shortcomings of the rules as proposed, and their related impacts must be disclosed in the Rule EIR.

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[60] *See eg.* "Effects of Climate Change "Irreversible"' available at http://www.washingtonpost.com/national/health-science/effects-of-climate-change-irreversible-un-panel-warns-in-report/2014/11/01/2d49aeec-6142-11e4-8b9e-2ccdac31a031_story.html?hpid=z1

[61] Report attached as Attachment D.

[62] Rule DEIR at 3-5.

[63] ET Rule Staff Report at 12-16-17.

[64] CEQA Guideline § 15126.4 (emphasis added).

[65] CBE v. City of Richmond, 184 Cal. App. 4th 70, 92.

Similarly, any plan to revisit the GHG question in future, as of yet to be determined revisions to permitting regulations also amount to nothing more than deferred mitigation of this significant and unaddressed impact. The Air District states that it "may" revise Regulation 2, Rule 2: New Source Review.[66] This issue is of particular concern given that these proposed rules, if approved as proposed, could lock in this this completely under-protective policy to respond to the GHG increases posed by refining a lower quality oil feedstock in the Bay Area. The Rule EIR must be revised to account for this shortcoming.

(iv) Undisclosed and Significant Local Air Quality Impacts due to Co-pollutant Emissions

In addition, the Cap and Trade route of addressing GHG emissions does not alone account for GHG co-pollutants, an issue of particular importance to environmental justice communities.[67] CEQA is not concerned with impacts "on paper," but instead with actual, on the-ground impacts on human health and environmental quality.[68] For environmental justice communities, the success of any trading program must also include accompanying actual pollution reductions.

PM is a co-pollutant that is extremely concerning, especially in regards to the refining of a lower quality oil feedstock that increases combustion and therefore emissions of PM.[69] PM, the PM precursor NO_x, the PM precursor SO_2, or more than one of these pollutants that cause $PM_{2.5}$ air pollution co-emit with GHG from at least 379 sources in the Bay Area refining industry.[70] Moreover, refinery PM emissions include environmentally significant amounts of metalliferous ultra-fine PM ("UFPM").[71] The Air District's inability to adequately monitor UFPM has been documented: the Air District's PM emission monitoring and control requirements are set up to "measure the mass of particles" only, which barely tracks UFPM emissions.[72] It is reasonably foreseeable that these emissions could increase with the refining of a lower quality oil feedstock. Adoption of Rules 12-15 and 12-16 as proposed would lock in this under-protective policy for the foreseeable future. The Rule EIR fails to document and adequately inform the Board of Directors and the public of this un-assessed and potentially significant air quality regulatory gap, and associated impacts, which are directly related to the purpose of this rulemaking.[73]

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[66] *See eg.* Rule EIR at 3-15.
[67] *See* Minding the Climate Gap, Pastor, Morello-Frosch, Sadd and Scoggins, *available at*, http://dornsife.usc.edu/assets/sites/242/docs/mindingthegap.pdf.
[68] *See, e.g.*, CEQA Guidelines § 15358(b) (limiting CEQA analysis to impacts "related to a *physical* change") (emphasis added); CEQA Guidelines § 15002(g) (defining "significant effect on the environment as a substantial adverse change in the physical conditions which exist in the area affected by the proposed project"); CEQA Guidelines § 15126.4(a) (identifying mitigation measures as those which could minimize significant effects on the environment).
[69] *See* Karras Supplemental Comment 2 at 10.
[70] Karras Supplemental Comment 1 at 5.
[71] *Id.*
[72] *Id.*
[73] *See also* CBE September 2015 Comment, Part 2 at 14, detailing that "any reasonably comprehensive refinery emissions and health tracking program should also assess UFPM.

(v) Undisclosed and Significant Air Quality Impacts from a Flawed Health Risk Assessment Methodology and Inadequate Risk Reduction Audit Plan Submission Requirements

The Health Risk Assessment ("HRA") established by this proposed rulemaking does not fully represent the health hazard of air pollutants, especially if related to the accurate project description of reducing pollution from refining lower quality feedstocks. As CEQA is a document of accountability, which is not simply satisfied by demonstrating compliance with regulatory requirements, the Rule DEIR must inform the public of the HRA's known limitations, in particular, to the achieve the underlying project objective.[74]

Proposed Rule 12-16 then includes a Risk Reduction Audit Plan process to reduce identified health risks from refinery operations, including the refining of a lower quality crude oil feedstock. Those plans would reduce such health risks below significance levels, but as proposed, over the course of potentially up to five or ten years.[75] It is unreasonable to identify a significant health risk affecting low-income communities of color, and then allow up to 10 years to mitigate that air quality impact. In the meantime, the refineries are expanding to refine more polluting and toxic oils. Rule 12-16 must be revised to address this inadequacy, or, the Rule EIR must assess the significant air quality impact that could result during that interim 10-year period, especially with regard to health impacts on sensitive receptors.

(vi) Undisclosed and Significant Air Quality Impacts due to the Potential failure of the Regulatory Proposals on account of the Ineffective Identification and Monitoring of Hazardous Air Pollutants and Toxic Air Contaminants

As explained above, an accurate and stable project description will allow the tailoring of specific proposals to meet the stated project objective. By failing to include such an adequate project description, the Rule DEIR cannot properly assess the efficacy of the proposed rulemaking language. This is particularly problematic in regards to the monitoring provisions of proposed Rule 12-15. In order to best capture the intent of this rulemaking, tracking of crude quality must evidently track the unique chemical composition of those crude oils to enable their identification. Otherwise, the Rule EIR leaves significant air quality impacts unaddressed as Rule 12-15 would lock in an ineffective tracking methodology.

Tar sands crudes alone are comprised of higher molecular weight chemicals than the current slate traditionally processed at Bay Area refineries, including large amounts of benzene, toluene, ethyl-benzene, xylenes, and other heavy metals such as lead. These chemicals are found in both state and federal toxic emissions inventories, and are, therefore, of particular concern to both federal and state regulatory agencies.[76] The U.S. Geological Survey reports that "natural bitumen," the source of all Canadian tar sands-derived oils, contains 102 times more copper, 21 times more vanadium, 11 times more sulfur, 6 times more nitrogen, 11

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[74] *See id.* at 15.
[75] *See eg.* Rule DEIR at 1-6.
[76] *See, e.g.*, United States EPA, Clean Air Act 1990 List of Hazardous Air Pollutants, available at: http://www.epa.gov/ttn/atw/orig189.html, last accessed on Jan 26, 2014; *see also*, California Air Resources Board Toxic air Contaminant Identification List, *available at*, http://www.arb.ca.gov/toxics/cattable.htm

times more nickel, and 5 times more lead than conventional heavy crude oil.[77] The Rule EIR must disclose the limits of its proposals in being able to track all of these chemicals to provide an accurate identification of a particular lower quality oil feedstock.

Similarly, the Rule EIR further fails to outline the deficiencies of the rulemaking's BTEX (benzene, toluene, ethylbenzene and xylene) monitoring, which if improved, could create an accurate correlation to certain lower quality crudes. As proposed, Rule 12-15 requires monitoring of averaged BTEX contents. As noted further below, the Air District must clarify what "averaged" means. In addition, this monitoring requirement is qualified by: "to the extent such information is available."[78] The Rule EIR must disclose how such limitations could affect accurate BTEX reporting and subsequent adequate identification.

When blended with the diluents, tar sands "dilbit" crudes contain even higher concentrations of BTEX compounds, which have a significantly high potential to be released by way of transport and process related emissions. These contaminants can cause severe impacts on the environment, and can lead to grave human health problems. Moreover, because diluents also have a notably low molecular weight, and a high vapor pressure, they are highly prone to cause fugitive, gaseous releases by increasing vapor pressure in various refinery operation components, including rail cars and pipelines used for transport to and between facilities.[79]

In addition, benzene alone has notably high cancer potency, and is known to cause severe reproductive, developmental and immune systems impacts at even low exposure levels.[80] Systemic benzene poisoning, a long term exposure risk, includes the potential for severe hemorrhages, and may at times result in fatality.[81] Concentrated, acute exposure levels have also been known to cause headaches, and nausea.[82] While less information is available relating to longer term systemic and acute exposure levels to ethylbenzene, toluene and xylene, in California, the toxicity and risk levels of the three are currently under CARB scientific review.[83] BTEX compounds are known to be present in high concentrations in "DilBit" both in combination and each separately, present serious, non-cancer risks that must be independently analyzed. Also, the method of monitoring must be specifically tailored to yield the most reliable data. This includes "real time" fence line monitors, which would allow the public to identify acute spikes in emissions, whether from routine operations or more significant release events. The alternative use of canisters to collect ambient air data has historically proven particularly unsuccessful in this region. The Rule EIR must highlight those deficiencies.

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[77] *See*, Expert Report of Phyllis Fox on the Phillips 66 Santa Maria Rail Spur Extension Project DEIR, available at http://www.slocounty.ca.gov/Assets/PL/Santa+Maria+Refinery+Rail+Project+Comments/Organizations+and+Schools/Adams+Broadwell+Joseph+Cardozo.pdf.

[78] Proposed Rule 12-15-401.6.

[79] *See id.*

[80] Determination of Acute Reference Exposure Levels for Airborne Toxicants, March 1999, Acute Toxic Summary, BENZENE, available at: http://www.oehha.ca.gov/air/acute_rels/pdf/71432A.pdf.

[81] *Id*.

[82] *Id*.

[83] California Air Resources Board, Toxic Air Contaminant Identification List, available at: http://www.arb.ca.gov/toxics/cattable.htm

Moreover, the Rule EIR and proposed rules omits any impact analysis for other harmful air pollutants such as lead, which the CARB and the Center For Disease Control have identified as a pollutant for which there is no safe level of exposure.[84] Based on CARB's findings, the increase in lead from switching even a minimal percentage of the Refinery's current crude slate to tar sands alone is a significant impact.[85] Yet the Rule DEIR omits any mention of the potential to drastically increase lead emissions with a lower quality crude slate. The potential health impacts from lead exposure are, moreover, deeply concerning, as they can include serious, permanent neurological damage, particularly in children. The Rule DEIR's failure to identify, much less analyze or mitigate this category of known potential impacts stemming from a change in crude slate, would also become the region's approved and under-protective policy. The Rule EIR must be corrected in a revised, and re-circulated document, to quantify this regulatory gap and unintended, and significant, impact of adoption of the rules as proposed.

This error is compounded by the proposed and under-protective significance thresholds to be established by Rule 12-16. As proposed, Rule 12-16 includes a significance threshold for TACs of 25 in a million. Concurrently, the Air District has also proposed a 10 in a million threshold to reduce toxic emissions.[86] Certainly, many air districts have set the action level at 10 in a million.[87] Rule 12-16, if adopted, would effectively create a more lenient and under-protective standard. The Rule EIR must be revised to explain this apparent contradiction and assess any significant local air quality impacts that could result.

Finally, nothing in the language of AB 2588 limits the Air District's authority to monitor and collect information of substances routinely released into the air.[88] In fact, if the Rule EIR were revised to include an adequate project description, the Air District would be able to demonstrate the necessity of collecting information regarding certain unlisted chemicals in order to adequately meet the project objective of tracking specific lower quality crude oil feedstocks.

(vii) Undisclosed and Significant Air Quality Impacts due to Unreasonable Exemption of Accidental Air Releases from the Emissions Inventory

Flaring and other incidents cause acute exposure hazards from refinery air pollution in nearby communities, including environmental justice communities. As proposed, rule 12-15 establishes an emissions inventory, the Petroleum Refinery Emissions Profile ("PREP"), to establish a threshold for emissions.[89] The PREP as drafted, however, excludes emissions from accidental air releases. As noted above, the use of lower quality oil feedstocks has been found to be a root cause for equipment failure, and increased frequency of accidental releases. The

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[84] *Id*.
[85] *See* CBE Comments to Phillips 66 Santa Maria Rail Spur Extension Project, *available at*, http://www.slocounty.ca.gov/planning/environmental/EnvironmentalNotices/Phillips_66_Company_Rail_Spur_Extension_Project/Recirculated_Draft_EIR_Comments.htm.
[86] *See* CBE September 2015 Comments, part 2.
[87] *See* http://www.arb.ca.gov/ab2588/district_levels.htm.

[88] *See* http://www.arb.ca.gov/ab2588/ab2588.htm.
[89] Proposed Rule 12-15-215.

Rule EIR must be revised to reflect the likelihood of greater accidental air releases and how the proposals are able to account for that increased likelihood.

(viii) Undisclosed and Significant Air Quality Impacts due to Loosening of Current Emission Limits

Throughout this rulemaking process, the Air District has admitted that it first, still must calculate a refinery's potential to emit ("PTE"), and second, that the calculated PTE could be larger than the current CEQA baseline of current environmental conditions. In addition, as proposed, the PTE limit would also be incorporated into a refinery's Title V permit, making it fully enforceable. This new limit is conceptually different from the current regulatory structure, and moreover, could conflict with more protective determinations already established by either the Air District itself, or other lead agencies that have previously assessed various refinery expansion projects. For instance, a local agency may include several conditions of approval of a certain project, including those conditions that limit pollution to levels stricter than the NAAQS and Air District requirements.[90] The Air District must clarify which particular limits could be at risk of being supplanted by this rulemaking. The Rule DEIR must also quantify any resulting significant air quality impact as a result of proposed Rule 12-16's effective allowance of an increase in air pollution.

(ix) Undisclosed and Significant Air Quality Impacts due to the Unanalyzed and Continuing Transport of Hazardous Crude by Rail

In addition, CEQA requires an EIR to consider both direct and indirect impacts of a proposed project.[91] Indirect impacts are those that are "caused by the project and are later in time or farther removed in distance, but are still reasonably foreseeable."[92]

Several communities throughout the Bay Area are affected by the transport of crude by rail; those impacts include the risk of catastrophic failure due to train derailment, and increased GHG and PM emissions from fugitive and other rail car emissions along the rail lines. Moreover, these impacts disproportionately impact low-income communities of color.[93]

Moreover, the indirect nature of these wholly foreseeable emissions cannot be ignored as "it is inaccurate and misleading to divide the project's air emissions analysis into on-site and secondary emissions for purposes of invoking the presumption the project will have no significant impact."[94] For example, in *North Coast Alliance*, the lead agency's analysis of the identification of indirect sources of GHG emissions from electrical demand was found sufficient given that the agency conducted a thorough analysis of the project's demand on a utility's electricity generation and whether it would increase production at any fossil-fuel power plants.[95]

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[90] *See eg.* Memorandum of Understanding for the Chevron Refinery Modernization Project Final Environmental Impact Report, available at, http://chevronmodernization.com/wp-content/uploads/2014/07/ATT-1-4-Ex-C-BAAQMD-MOU.pdf *and* approved Conditional Use Permit, *available at*, http://chevronmodernization.com/project-documents/.
[91] CEQA Guidelines, 14 Cal. Code Reg. § 15358(a).
[92] CEQA Guidelines, 14 Cal. Code Reg. § 15358(a)(2).
[93] *See supra*, Crude Injustice on the Rails report.
[94] *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal. App. 3d 692, 717.
[95] *North Coast Alliance v. Marin Mun. Water Dist. Bd. of Directors*, 216 Cal.App.4th 614, 652.

Similarly here, an inextricable link exists between the adoption of Rules 12-15 and 12-16 and the likelihood of crude transport by rail. Just as it was foreseeable in *North Coast Alliance* that utility demand would be met, it is just as foreseeable that the refining industry will continue to pursue the demand for its lower quality oil feedstock and its current preferred method of transport to and from refineries by rail.

Moreover, the oil industry has documented plans to greatly increase oil train delivery of tar sands oils to Bay Area refineries, which are contingent on whether environmental requirements allow the increased refinery emissions that would result from processing tar sands oil in the Bay Area.[96] Approval of Rule 12-16 as proposed will likely allow Bay Area refineries to increase their emissions of pollutants associated with the refining of a lower quality oil, thereby increasing crude by rail transport and its attendant impacts.

The Bay Area also faces similar environmental risks and dangers but from the transport of crude by ship.[97] The Air District should revise the Rule DEIR to include an analysis of the degree that adoption of the Rules 12-15 and 12-16 would affect and contribute to the increased transport of lower quality oils by both rail and ship. That analysis should include an assessment of significant and unavoidable impacts.

(x) Undisclosed and Significant Air Quality Impacts from an Increase in Risk of Hazards

An EIR must provide sufficient information to evaluate all potentially significant impacts of a project, including public safety risks due to accidents, and it must state sufficient information to determine "how adverse [an] adverse impact will be."[98]

A switch to a heavier oil feedstock necessarily implicates a greater risk of corrosion of refinery components.[99] This greater risk of corrosion was identified as a root cause of the August 2012 fire at the Chevron Richmond Refinery that sent 15,000 residents to local hospitals.[100] Moreover, the Court of Appeal has rejected an EIR for failing to study a *one percent* increase in sulfur in a refinery's crude supply, warranting a writ of mandamus.[101] A few years later, the Chemical Safety Board cited a *0.8 percent* increase in the amount of sulfur in Chevron's crude blend as a root cause of the August 2012 fire.[102] Notably, at the time of the incident, the sulfur content of Chevron's crude blend remained within the design range of the refinery's equipment.[103]

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[96] Karras Supplemental Comment 1 at 11.
[97] *See eg.* Appendix A, Comments on the Tesoro Marine Oil Terminal Lease Consideration Project, *available at*, http://www.slc.ca.gov/Info/CEQA/Tesoro_Amorco.html; and the WesPac Pittsburg Energy Infrastructure Project, available at http://www.ci.pittsburg.ca.us/index.aspx?page=700.
[98] *Santiago County Water District v. County of Orange* (1981) 118 Cal. App. 818, 831.
[99] *See supra*; *also* Fox Comments on Mitigated Negative Declaration of Valero Crude By Rail Project, Use Permit Application 12PLN-00063, *available at* http://www.ci.benicia.ca.us/vertical/sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/Report_by_Dr._Phyllis_Fox.pdf.
[100] *See* Chemical Safety Board, Chevron Richmond Refinery Interim Investigation Report, April 2013, available at: http://www.csb.gov/assets/1/19/Chevron_Interim_Report_Final_2013-04-17.pdf.
[101] *CBE v. City of Richmond*, 184 Cal. App. 4th at 77.
[102] *Supra.*
[103] *Id.*

Proposed Rule 12-16's calculation of PTE method allows a refinery to pollute up to a similar maximum level. This will neither reduce nor avoid significant air quality impacts, such as those that resulted from the August 2012 Chevron Richmond Refinery fire incident. The Rule EIR must be revised to be both adequately identify this characteristic of a lower quality oil and also how the proposed rules do or do not address the significant air quality implications.

III. THE DEIR DEFERS MITIGATION OF SEVERAL IMPACTS THAT THE RULEMAKING IS DESIGNED TO ADDRESS

State agencies considering proposed actions with significant environmental impacts must not approve those actions "if there are feasible alternatives or feasible mitigation measures available that would substantially lessen a significant adverse effect that the activity may have on the environment."[104] California courts have therefore adopted the "general rule that it is inappropriate to postpone the formulation of mitigation measures" in EIRs.[105]

Specifically, courts have rejected at least two forms of mitigation measures: first, those that largely depend upon management plans that have not yet been formulated, and have not been subject to analysis and review with the EIR, and second, those whose implementation occurs "past the start of the project activity that causes the adverse environmental impact."[106]

Although not deferred mitigation of a project impact per se, the Rule DEIR suffers from deferring mitigation of the impact it is designed to address: increased pollution from refining lower quality oils. The Rule DEIR improperly defers mitigation, and therefore risks significant and unassessed air quality impacts with approval of Rules 12-15 and 12-16 as proposed. The Rule DEIR commits this error in the following five respects.

(i) By Failing to Consider the Timeline for the Risk Reduction Audit and Plan Submissions, the DEIR Inappropriately Defers Mitigation

The Rule DEIR improperly defers mitigation of air pollution by recognizing Risk Reduction Audit and Plan submissions that will be implemented substantially after the polluting behavior occurs. Under Rule 12-16 as proposed, refineries found in violation of their refinery-wide health risk assessments are required to submit a Risk Reduction Audit and Plan ("RRAP").[107] A refinery owner or operator is required to submit an RRAP within 180 days of notification from the APCO that the refinery exceeds permitted health risk levels; and the RRAP must reduce emissions or health risk "by no later than five years from the date of submission."[108] The APCO is allowed to extend this compliance period "up to five additional years" if the refinery owner demonstrates that implementation of the RRAP "places an unreasonable economic burden on the facility operator."[109] Under the proposed rule, then, refineries may be allowed to exceed pollution health risk levels for more than ten years before facing any regulatory action.

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[104] Cal. Pub. Res. Code § 21080.5(d)(2)(A)
[105] POET, LLC v. Cal. Air Res. Bd. (2013)160 Cal. Rptr. 3d 69, 105.
[106] *Id.*
[107] Proposed Rule 12-16-403.
[108] *Id.*
[109] Proposed Rule 12-16-403.1

The DEIR acknowledges that the air pollution regulated by the refinery-wide health risk assessments is a significant environmental and health impact.[110] Nonetheless, the DEIR does not address these impacts that will necessarily result if the Air District's RRAP timeline is approved. Instead, the DEIR assumes that "the direct effect of the proposed project would be reductions in the regulated pollutants."[111] This analysis depends on the implementation of mitigation measures (i.e., RRAPs) after the polluting activity has already occurred. It also depends on the approval of unformulated management plans, which have not been analyzed or reviewed in the DEIR. Because the Rule DEIR does not consider the decade-long gap between significant environmental pollution and the implementation of remedial plans, it inappropriately defers mitigation. Alternatively, the Rule DEIR must account for those significant local air pollution impacts, at least in those interim ten years.

(ii) By Delaying the Calculation of Potential to Emit, the DEIR Inappropriately Defers Mitigation

In *POET, LLC v. California Air Resources Board*, the court found that CARB improperly deferred mitigation when it delayed consideration of the impact of new fuel standards on the use of biofuels. Plaintiffs there claimed that the new standards would increase biofuel consumption, which in turn would increase NOx emissions—and that these increased emissions demanded mitigation measures. The Court found that the agency's reliance on a separate proposed rulemaking process to address this potential emissions increase was inadequate. Mitigation measures may only be deferred if the agency "commit[s] itself to specific performance criteria for evaluating the efficacy of the measures implemented," and if "practical considerations prevented the formulation of mitigation measures at the usual time in the planning process."[112]

Here, the Air District has deferred mitigation measures by failing to address the as-yet-unformulated Potential to Emit ("PTE") limit. Under proposed Rule 12-16, the APCO has one year to determine the PTE limit of each source of SO2 and PM2.5 within a refinery. Proposed Rule 12-16 defines PTE as "[t]he maximum capacity of a source or facility to emit a pollutant based on any physical or operational limitation."[113] Working from this vague definition, the Rule offers no guidance for how PTEs will actually be calculated. Instead, the Rule says, "the APCO shall publish and accept public comment on a protocol for determining and translating to a NAAQS-consistent metric [the] PTE for individual sources and categories."[114] Essentially, the rule itself defers the calculation of emissions limits for covered facilities, and then defers how these calculations will actually be determined to a later rule-making process run by the APCO.

The Rule DEIR fails to inquire into either the significant impacts or the necessary mitigation measures caused by this deferred mitigation. The Rule DEIR nowhere mentions the

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[110] "Toxic air contaminants can cause long-term health effects such as cancer, birth defects, neurological damage, asthma, bronchitis or genetic damage; or short-term acute effects such as eye watering, respiratory irritation, running nose, throat pain, and headaches," Rule DEIR at 3.2.1.4.
[111] Id. at 3.2.4
[112] POET, LLC v. Cal. Air Res. Bd.,160 Cal. Rptr. 3d 107-110.
[113] Proposed Rule 12-16-216.
[114] Proposed Rule 12-16-405.1.

environmental impacts of a delayed calculation of the PTE; nor does it attempt to address the varying effects of different PTE levels. Rather, the Rule DEIR looks at the impact of estimated pollution-reducing actions taken by the refineries, making the critical assumption that they will all exceed their PTEs.[115] The Rule DEIR escapes any such requisite environmental analysis by claiming that "[i]t is not currently known whether any affected refineries would exceed the refinery-wide emissions limits for SO_2 and $PM_{2.5}$ or significant risk levels for cancer and non-cancer health effects."[116] This variable remains "unknown" because the Air District has failed to set emissions limits.

By ignoring the obvious implications of its circuitous rule, the Air District has produced a Rule DEIR that gives no notice of the "significant effects of proposed projects" or the "feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects as required under CEQA. Rather, the Rule DEIR proposes a hazy "menu of potential mitigation measures" aimed at tackling pollution-reducing activities.[117] It then assumes that the refineries will enter into some sort of "bilateral negotiation" with the APCO to establish a PTE.[118] Worse yet, should those PTEs be exceeded, refineries will submit emission reduction plans that also "have not yet been formulated, and have not been subject to analysis and review with the EIR,"[119] and which have also historically proven even more delayed and ineffective, as outlined further below.

Furthermore, it may prove impossible to properly calculate a PTE. The lack of reported emissions data for TACs is by itself clear evidence that the information needed to properly complete permitting this proposed expanded PTE is not yet available.[120] Polluter self-monitoring and collection and reporting of data further cast doubt on any adequate PTE calculation.[121] Finally, each Bay Area refinery includes grandfathered sources that do not have a current PTE calculated at this time, making it even more difficult to ascertain a refinery wide PTE.

By delaying the calculation of PTE limits until December 2016, and failing to provide a reliable mechanism to calculate that PTE, the Rule DEIR inappropriately postpones the formulation of mitigation measures to address increased emissions from refining a lower quality feedstock, resulting in several significant and undisclosed air quality impacts of the rulemaking as proposed.

(iii) By Allowing an Exemption for Trade Secrets Disclosures in Refineries' Annual Petroleum Refinery Emissions Inventory, Monthly Crude Slate Reports, and Petroleum Refinery Emissions Profile Reports, the DEIR Inappropriately Defers Mitigation

Average refinery crude slate data should not be considered trade secret or otherwise confidential for three reasons: first, it has been reported publicly, or can be reverse engineered

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[115] Rule DEIR at 3.2.4.1
[116] *Id.*
[117] *See* CBE v. City of Richmond, 108 Cal. Rptr. 3d at 494.
[118] *Id.* at 495.
[119] *Id.* at 494. (*quoting San Joaquin Raptor Rescue Ctr*., 57 Cal. Rptr. 3d at 684).
[120] CBE September 2015 Comments Part 2, at 5.
[121] *See id*. at 7-8.

from publicly available data; second, it is known by competitors who buy, sell and trade crude supplies; third, refinery crude slate data is used to express and measure compliance with refinery emissions limits and is uniquely important emissions-related information that is essential to disclose for independent verification of air quality and health protection measures and crucial to the development of public air quality and health policy.

Rule 12-15 allows refineries to "designate as confidential any information claimed to be exempt from public disclosure under the California Public Records Act" when they submit their PREP Report, air monitoring plan, or any other documents or records required by the Rule.[122] The Rule DEIR reaffirms this right by recognizing that "[w]hile air pollutant emissions data and air monitoring data may not be considered trade secrets, many other types of information may be (e.g., production data used to calculate emissions data)."[123] The Rule DEIR specifies only that confidential information must be designated as such by the refinery, and that the refinery must "provide a justification for this designation" and "submit a separate public copy of the document with the information that is designated 'confidential' redacted."[124] The Rule DEIR minimizes the potential impact of this confidentiality exemption, saying that "CEQA recognizes that regulatory requirements consisting of data collection or information gathering do not typically generate environmental impacts." Therefore, the Rule DEIR notes that "Regulation 12-15 has been thoroughly evaluated and it has been concluded that . . . it has no potential to generate any other potentially significant adverse environmental impacts and, therefore, will not be evaluated further in the remaining environmental impact discussions."[125] The Rule DEIR should have, instead, analyzed how this confidential information exemption would apply to, or even thwart the effectiveness of Rule 12-15, leaving significant and unmitigated impacts of the rulemaking.

In conjunction with proposed Rule 12-16, this exemption renders "management plans that have not yet been formulated" even more indeterminate. The DEIR is essentially approving a plan to be developed in the future by the refineries and the Air District according to a series of metrics that the refineries may not even have to disclose. As the entire pollution mitigation scheme here relies upon refineries being held to account for the pollution metrics they produce (and building mitigation plans based off of emissions levels that exceed those metrics), this exemption for disclosure of information could render the rulemaking moot. At the very least, the Rule DEIR should take into account the potential environmental impacts of the rulemaking, should the refinery operators claim certain information as confidential.

Moreover, the Concept Paper for this rulemaking highlighted the importance of making "information associated with rule implementation…available to the public."[126] Crude quality information is not only associated with, but critical to rule implementation. Nevertheless, the Concept Paper also outlines the need to establish a *process* whereby information of a "business confidential" nature would be protected. To avoid any unintended significant environmental impacts of rule implementation, the Air District could require a similar process to that currently used by the California Public Utilities Commission where certain members of the public have

[122] Proposed Rule 12-15-411.
[123] Rule DEIR at 2.4.2.1.1.
[124] *Id.*
[125] *Id.* at 1.2.2.1.2
[126] 12-15 Regulatory Concept Paper at 4.

access to such confidential information, with specific protections for the industry, and also advancing the benefits of increased public participation in agency decision-making and regulation.

(iv) By Establishing an Emissions Minimization Plan Procedure, the DEIR Inappropriately Defers Mitigation

Air District Regulation 12, Rule 13, governs the operation and standards of performance of metal foundries and forging operations in the Bay Area. Rule 12-13 also includes the need for a facility to develop an Emissions Minimization Plan ("EMP") in order to ratchet down emissions of pollutants.

The EMP process and results have so far proven ineffective and problematic. For instance, the Air District is over a year late in approving and establishing recommendations for pollution reduction to be included in the EMP for a metal foundry in East Oakland, a community already disproportionately burdened by pollution.[127] The Air District should revise the Rule EIR to disclose and account for the likelihood of such a significant air quality impact (i.e., an additional delay in mitigation) and quantify the amount of pollution that local communities would have to face in the interim.

(v) By Establishing Future Rulemaking to Address Remaining Rulemaking Requirements, the DEIR Improperly Defers Mitigation.

As noted above, the Rule DEIR suggests mitigation of GHG emissions, or other environmental impacts from the refining of a lower quality crude oil feedstock, through this and other future rulemakings. Those future rulemakings are still tentative. In particular, the Air District has made no concrete and definitive steps in committing to a specific course of action for its amendments to the New Source Review ("NSR") permitting rules. In addition, those rules are rife with issues that are regularly litigated and subject to later judicial intervention and interpretation. The Rule DEIR must account for the reasonably foreseeable likelihood of future NSR efforts also facing the same political and adversarial barriers as this rulemaking. The Rule DEIR cannot simply rely on those future rulemakings as catchalls for whatever deficiencies arise from this rulemaking.

IV. THE DEIR FAILS TO INCORPORATE AN ANALYSIS OF BASELINE ENVIRONMENTAL CONDITIONS

In order to properly address the environmental impacts of a proposed project, CEQA requires that an EIR establish a baseline against which changes can be measured. "Establishing a baseline at the beginning of the CEQA process is a fundamental requirement so that changes brought about by a project can be seen in context and significant effects can be accurately identified."[128]

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[127] *See* CBE Comments on AB&I Foundry EMP and regulatory framework and timelines, *available at* http://www.baaqmd.gov/plans-and-climate/emissions-minimization-plans/metal-facilities.

[128] *CBE v. City of Richmond*, 108 Cal. Rptr. 3d at 491-92.

The Rule DEIR fails to include any analysis of baseline conditions. CBE and other community and worker groups' proposal to limit refinery wide emissions, as detailed further below, includes selection of current actual emission data reflecting a true baseline period from which to assess this rulemaking's impacts. Without such a baseline for emissions of covered air pollutants, it will be impossible to assess the impact of the proposed rules. Moreover, these baselines must reflect "established levels of a particular use," not hypothetical permitted levels.[129] Without these baselines, the Rule DEIR cannot inform the public about the effects that the proposed rules will have on refinery emissions.

This rulemaking establishes two apparent baselines: the PREP, based on a limited emission inventory, but then also another for emission limits based on the PTE. This latter reliance on permit limitations instead of actual emissions to establish baseline air quality is a clear violation of CEQA. This precise discrepancy was at issue in *Communities for a Better Environment v. South Coast Air Quality Management District*, where the Supreme Court rejected the Air District's argument that permit levels should be used to establish the baseline.[130] The air district argued that for a project employing existing equipment, the baseline should be the maximum permitted operating capacity of the equipment, even if the equipment is operating below those levels when the Notice of Preparation is issued.[131] The Supreme Court rejected the South Coast's illegal permit based approach, and clarified the need for the proper assessment of baseline for review under CEQA, such as that provided in our proposal.[132]

V. THE DEIR FAILS TO ADEQUATELY ANALYZE THE RULEMAKING'S CUMULATIVE ENVIRONMENTAL IMPACTS

The Rule DEIR limits its analysis of cumulative impacts of reducing emissions from the refining of lower quality oil feedstocks to simply the cumulative impacts of installing pollution reduction equipment.[133] The Rule DEIR stops its cursory analysis by concluding that direct and indirect impacts of pollution control equipment are "minor and less than significant."

CEQA, however, requires an EIR to discuss all of a Project's significant cumulative impacts.[134] A legally adequate cumulative impacts analysis views a particular project over time and in conjunction with other related past, present, and reasonably foreseeable future projects whose impacts might compound or interrelate with those of the project at hand. "Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."[135] These projects do not have to be from the same class of project.

A project has a significant cumulative effect if it has an impact that is individually limited but "cumulatively considerable."[136] "Cumulatively considerable" is defined as

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[129] *San Joaquin Raptor Rescue Ctr. v. Cty. of Merced* 57 Cal. Rptr. 3d 663, 674.
[130] *Communities for a Better Env't v. S. Coast Air Quality Management District* (*CBE v. SCAQMD*) (2010) 48 Cal. 4th 310.
[131] *CBE v. SCAQMD*, 48 Cal. 4th at 320.
[132] *Id.*
[133] *See* Rule EIR at 3-30.
[134] CEQA Guidelines § 15130(a).
[135] CEQA Guidelines § 15355(b).
[136] *Id*. §§ 15065(a)(3), 15130(a).

meaning that "the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."[137] Cumulative impacts analysis is necessary because "environmental damage often occurs incrementally from a variety of small sources [that] appear insignificant when considered individually, but assume threatening dimensions when considered collectively with other sources with which they interact."[138]

As noted above, the interaction of this rulemaking with the current and anticipated refinery expansion projects in the region will determine whether this rulemaking meets its intended purpose. The Rule EIR must discuss that basic point and, at a minimum, list what those projects are, at what stage of permitting approval they are at, and whether and how their operation may affect the implementation of the provisions of Rules 12-15 and 12-16 as proposed. Such an analysis should also discuss and evaluate cumulative air quality concerns on account of the transport of crude by rail throughout the Bay Area.

It is also important to note the cumulative impact of pollution on the local community. As illustrated throughout this comment, whether on account of unconsidered co-pollutants or other local pollution impacts due to unnecessary delay, implementation of Rules 12-15 and 12-16 as proposed could increase pollution locally. Increased emissions will inevitably result in greater cumulative impacts especially for the communities surrounding the refineries. Worse yet, these fenceline communities have been identified by the Office of Environmental Health and Hazards Assessment (OEHHA) as already bearing a concentrated burden of health hazards resulting from various pollution sources, including from refinery operations.[139] Moreover, this local refinery pollution has been proven to directly contribute significantly to indoor air pollution, and even indoors, would exceed the State's ambient air quality standard.[140]

The particular vulnerabilities of these communities, and the existing pollution burdens that exist in each such community, demand a full analysis of the additional burden that could result from this rulemaking. This is particularly important given the identified deficiencies of Rule 12-16's proposed HRA methodology, and the consequent, and unidentified, significant air quality impact on environmental justice communities. Only with such an analysis can any decision-making body properly ascertain the degree of significance of the cumulative impact of the implementation of Rules 12-15 and 12-16 as proposed. This analysis is an integral component of CEQA, one that the Rule DEIR illegally omitted.[141]

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[137] *Id*. § 15065(a)(3).
[138] *Communities for a Better Env't v. Cal. Res. Agency* (2002) 103 Cal.App.4th 98, 114.
[139] OEHHA Cal Enviro Screen 1.1 (amended), Statewide Zip code Results, Nipomo, Guadalupe, Santa Maria, available at: http://oehha.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=1d202d7d9dc84120ba5aac97f8b39c56,and Zip code Results, Rodeo, available at: http://oehha.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=1d202d7d9dc84120ba5aac97f8b39c56,
[140] Karras Supplemental Comment 2 at 8-9.
[141] CEQA Guidelines §§ 15064(d), 15125(c); *see also, Kings County Farm Bureau*, 221 Cal. App. 3d 692, 729.

VI. THE RULEMAKING AS PROPOSED IS INCONSISTENT WITH STATE AND LOCAL PLANS

An EIR must discuss any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans.[142] The Rule EIR fails to provide such an adequate analysis. In fact, for the reasons noted above, adoption of the Rules as proposed could result in undisclosed and significant air quality impacts. Those include climate change impacts that may thwart the Air District's own recently adopted May 2015 resolution to address climate change impacts of stationary sources.

Also, although not specifically a plan or policy, the U.S. Chemical Safety Board (CSB) has explicitly addressed the increased risks of corrosion in refineries due to refining a heavier oil feedstock. In particular, the CSB has identified the risk of catastrophic and hazardous failure from running higher sulfur crude in existing refineries built before 1985.[143] The CSB also found that such sulfur corrosion is not a new phenomenon, and that the petroleum industry is well aware of its potential to cause serious impacts on refinery equipment.[144] The Rule DEIR fails to recognize the CSB's analysis and should have at least included a brief discussion regarding the recommendations made by the CSB. The Rule DEIR should be revised to properly address similar and foreseeable issues of corrosion, and subsequent severe episodic air emissions, as identified at the Chevron Richmond Refinery, which lead to the catastrophic August 2012 Chevron Richmond Refinery fire.[145]

Moreover, because Rules 12-15 and 12-16 as proposed may not meet their intended purpose, the rulemaking raises serious safety and hazards concerns. The rulemaking, for instance, has the potential to lock in ineffective regulations that will, for the foreseeable future, enable the refining of lower quality oils to a greater degree. These perhaps unintended impacts, whether greater GHG, PM and UFPM emissions, or more hazardous job-site risks, are nevertheless significant, and conflict with the Occupational Health and Safety Act (OSHA) employee protection standards, as well as the President's August 2013 Executive Order (EO) to improve chemical safety and security.

Finally, the Legislature has established that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California."[146] With AB 32, California has set its objective to meet 1990 emission levels of GHGs by 2020. The Governor's recent executive order also establishes a California GHG reduction target of 40 percent below 1990 levels by 2030 - the most aggressive benchmark enacted by any government in North America to reduce dangerous carbon emissions over the next decade and a half.[147] Absent an inquiry into the GHG implications of the rulemaking, and taking into account the possible expiration of the Cap and Trade program in 2020, as detailed above, it is impossible for the Rule DEIR to describe whether Rules 12-15 and 12-16 as

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[142] CEQA Guidelines § 15125(d).
[143] *See* Chemical Safety Board, Chevron Richmond Refinery Interim Investigation Report, April 2013, available at: http://www.csb.gov/assets/1/19/Chevron_Interim_Report_Final_2013-04-17.pdf
[144] *Id*., at 15.
[145] *See* Chemical Safety Board, Chevron Richmond Refinery Interim Investigation Report, April 2013, *supra*.
[146] Assembly Bill (AB) 32, California Global Warming Solutions Act, Cal. Health & Safety Code § 38501(a).
[147] *See* Governor Brown Establishes Most Ambitious GHG Reduction Target in North America (April 29, 2015) *available at*, https://www.gov.ca.gov/news.php?id=18938.

proposed will meet, or even hinder, California's GHG reduction goals. Although the Rule DEIR includes some discussion of California's regulatory framework to combat climate change, without a sufficient GHG analysis, it precludes any decision-maker from coming to any sensible conclusion regarding how the impacts of Rules as proposed, especially in the context of their stated purpose, affect those goals. The Rule EIR must also at least discuss the issue of stranded assets, and what irreversible impacts could result from this rulemaking if refinery expansion projects to refine lower quality oils are built, and then left idle to meet the state's robust GHG reduction goals.

VII. THE DEIR FAILS TO ANALYZE A REASONABLE RANGE OF ALTERNATIVES

An EIR is not considered complete unless it has considered a "reasonable range of potentially feasible alternatives" to a proposed project.[148] The feasibility of an alternative is determined if it is "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors."[149] An EIR's alternatives analysis is considered satisfactory as long as it contains "sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project."[150] The Rule DEIR's analysis of alternatives fails to provide this meaningful analysis in two distinct respects.

(i) The DEIR Fails to Evaluate a Reasonable Range of Alternatives, Including CBE's Proposal for Enforceable Numeric Limits

The Rule DEIR fails to evaluate a reasonable range of alternatives and consider the alternatives in sufficient detail to allow any meaningful analysis and evaluation.[151]

CEQA does not have an established legal standard for the scope of the alternatives considered, but courts have held the scope of the alternative "must be evaluated on its facts," on a case-by-case basis.[152] The rule of reason judges the scope of the alternatives.[153] Those alternatives would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."[154] For purposes of CEQA review, an alternative is "feasible" if it is "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors."[155] Alternatives may only be eliminated for: "(i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts."[156]

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[148] CEQA Guidelines § 15126.6(a).
[149] Cal. Pub. Res. Code § 21061.1.
[150] CEQA Guidelines § 15126.6(d).
[151] *See* CEQA Guidelines § 15126.6(d).
[152] *Citizens of Goleta Valley v. Bd. of Supervisors* (1990) 52 Cal.3d 553, 566.
[153] CEQA Guidelines § 15126.6(a).
[154] *Id.*
[155] *Citizens of Goleta Valley v. Bd. of Supervisors* (1990) 801 P. 2d 1161, 1168 (quoting Cal. Pub. Res. Code § 21061.1)
[156] CEQA Guidelines § 15126.6(c).

Moreover, the lead agency "must publicly disclose its reasoning for selecting th[e] alternatives,"[157] because even if the lead agency is informed as to the feasibility of the alternatives, the public and the courts may not be.[158] In other words, the EIR should document any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination.[159]

Not only does the Rule DEIR fail to consider any alternative proposal that would meaningfully limit emissions at the refineries,[160] it does not even mention our proposal, detailed below and since at least September of this year to Air District staff, let alone provide even a brief explanation of its rejection.[161] This contravenes one of the core purposes of CEQA because it leaves the public in the dark regarding the Air District's process in considering alternatives. For instance, the public cannot know whether the Air District compared environmental impacts under a numerical emissions cap on refineries with the projected significant impacts that would result from implementation of the vague PTE scheme. To accomplish CEQA's objective of "support[ing] public participation," the public should have the opportunity to evaluate the Air District's conclusion regarding the feasibility of a numerical emissions cap. By failing to inform the public of what, if any, additional alternatives were considered the current Rule DEIR requires "blind trust by the public"—the very "blind trust" that courts have refused to recognize.[162]

The two alternatives that the Air District does identify in the Rule DEIR do not satisfy the required reasonable range of alternatives because neither alternative would "feasibly attain most of the basic objectives of the project." Neither alternative contemplated in the Rule DEIR would satisfy the underlying goal of this rulemaking: to adequately address the increasing emissions of pollutants from refining a lower quality crude oil feedstock.

The first alternative is the No Project Alternative, which would maintain the status quo, the Air District's incomplete monitoring, and lack of regulation of the underlying issue. The second alternative would implement only Rule 12-15 and not Rule 12-16. Monitoring, reporting and related requirements, however, make up only one side of the coin and emission reductions are also required to realize the intent and meet the objective of this rulemaking.

The Rule DEIR's failure to discuss any other alternatives that would accomplish the proposed Rules' overarching regulatory goal constitutes a failure to consider a reasonable range of alternatives. "The purpose of an EIR is not to identify alleged alternatives that meet few if any of the project's objectives so that these alleged alternatives may be readily eliminated. . . . [but rather] to allow the decision-maker to determine whether there is an

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[157] *Id.*

[158] *See* Laurel Heights, 764 P.2d at 291 ("Without meaningful analysis of alternatives in the EIR, neither the courts nor the public can fulfill their proper roles in the CEQA process.")

[159] *Id.*

[160] *See* Rule DEIR at 4.1.

[161] Since at least March, 2015, CBE and other community, environmental, labor and academic groups have suggested other possible solutions that would also actually reduce refinery emissions should that refinery switch to refining increased quantities of lower quality oils. This is documented in the Attachments C and D.

[162] *See eg*., *Laurel Heights I*, 764 P.2d at 291.

environmentally superior alternative that will meet most of the project's objectives."[163] The analysis of a full range of alternatives is particularly important in this instance for two reasons. First, the Rule DEIR's inadequate project description already skews the public and decision-makers' eyes towards the ineffective and more harmful PTE scheme. Second, the Rule DEIR was prepared pursuant to CEQA Guidelines §15187, mandating a thorough consideration of a reasonable range of alternatives. Moreover, "the key to the selection of the range of alternatives is to identify alternatives that meet most of the project's objectives but have a reduced level of environmental impacts." As noted below, CBE's proposed alternative would meet the project objectives of an accurate project description for this rulemaking and at a reduced level of environmental impact.

The Rule DEIR failed to consider a reasonable range of alternatives, eliminating a meaningful choice between Rules 12-15 and 12-16 as proposed and any other potentially feasible, and environmentally superior, alternative.

Authority to Adopt the Community Worker Proposal: Facility-wide Emission Limits

In September 2015, CBE provided the Air District with its formal proposal for numeric limits on refinery-wide emissions to stop increasing GHG and PM air pollution.[164] These limits—which also include caps for GHG, SOx and NOx emissions—are equal to the maximum-year actual emissions of the refineries plus the threshold factors previously calculated by the Air District for Rules 12-15 and 12-15 as proposed.

CBE's proposal meets the requirements of Health and Safety Code § 40001(c), requiring: first, the demonstration of a need for the proposal; and second, the proposal is feasible and tailored to meet that need.

The underlying intent of Rules 12-15 and 12-16, to address increased pollution from the refining of a lower quality oil feedstock and subsequently maintain air quality in the Bay Area, establishes the need for our proposal that will stop harmful and climate disruptive emissions from increasing. Air District data document and forecast increasing Bay Area refinery GHG and PM emissions.[165] The same data shows that GHGs and PM co-emit from combustion sources in Bay Area refineries, exacerbating local pollution. Meanwhile, peer reviewed science shows that the use of lower quality oil increases emissions of GHGs, PM and PM precursors, triggering a need to directly and more stringently prevent emissions of those local and climate damaging pollutants from increasing. At the same time, data and historic to date industry practice evidences that the refinery industry is also targeting that lower quality oil for increased use at its Bay Area refineries, given the decline in traditional local supplies.[166] Examination of the Air District data even reveals its underestimation of this trend of increasing pollution, further underscoring the need for adequate regulation of the likely increase in emissions of these pollutants, and at least, a precautionary stop to their increase.[167]

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[163] *Watsonville Pilots Ass'n v. City of Watsonville* (2010) 108 Cal. Rptr. 3d 577, 601.
[164] *See* CBE September Comment, Part 1 (attached as Attachment A).
[165] *See* Karras Supplemental Comment 1.
[166] *Id.*
[167] *Id.*

CBE's proposed alternative is also feasible: it would not require refineries to install any additional monitoring equipment above and beyond what is proposed in by Rules 12-15 and 12-16. The proposal meets the true intent of this rulemaking, as noted in Part I of this comment, and it also does not suffer from the significant impacts outlined above plaguing rules 12-15 and 12-16 as proposed. Quite simply, CBE's proposed alternative to prevent emissions increases "would not require any change in current operations in any refinery."

Furthermore, CBE's proposal is a narrowly tailored means to meet the regulatory objective to target crude quality. CBE's proposal targets emissions from refineries alone, not only because they are the single largest source of GHGs in the Bay Area, but also because those refineries contribute significantly to PM emissions in the Bay Area and can be causally related to disparately impact low-income communities of color.[168]

CBE's alternative proposal, by establishing enforceable numeric limits, comes far closer compared than the current proposed rules to meeting the underlying goals that Rules 12-15 and 12-16 were intended to reach. CBE's alternative would require refineries to not only determine their emissions with accuracy and consistency, but also to bring their emissions of TACs and other hazardous pollutants within established numerical limits that comport with air quality standards for SO_2, $PM_{2.5}$ and UFPM. By establishing clear, straightforward standards, this alternative makes it easier for the Air District to achieve an accurate characterization of the pollution profile of each facility; to ensure refineries comply with these bright-line standards; and to make information easily accessible to the public. Furthermore, because these standards are based both on pollutants that have already been determined to pose environmental and health risks *and* the actual historical emissions trajectories of the refineries, they are better tailored to, and an environmentally superior method of ensuring that "refinery toxic emissions do not pose an unacceptable health risk to the residents of their nearby communities."[169]

We note that parties objecting to the EIR are not responsible for formulating alternatives for consideration—the lead agency bears this burden.[170] Objecting parties will rarely have access to the same information that the lead agency does, and thus will be limited in their ability to suggest sufficiently detailed and specific alternatives.[171] The Air District bears the burden to include feasible, and environmentally superior, alternatives, such as our proposal, and also the burden to provide the necessary assessments related to those proposals, such as determinations of feasibility or other considerations of cost-effectiveness.

(ii) The DEIR Failed to Adequately Consider an Alternative Involving Renewable Resources

During this rulemaking process, CBE and others requested that the Air District consider developing and proposing requirements to partially re-power refineries with renewable electricity.[172] This alternative should be considered as a mitigation strategy when emissions increase from a facility from refining lower quality crude oils. The Concept Paper initially

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[168] *See* Karras Supplemental Comment 2.
[169] *See* Rule DEIR at 4.1.
[170] *See Laurel Heights I*, 47 Cal.3d at 406.
[171] *Id.*
[172] Supplemental comment—Petroleum Refinery Emissions Reduction Strategy; Act on Readily Available Renewable Re-power Emission Control Measure.2 October 2015 Letter to Greg Nudd, CBE et al.

dismissed this possibility as impractical: that refineries must operate on a continuous basis, likely rejecting solar and wind options as they are intermittent resources. That response, however, ignores the feasibility, coordination and current development and deployment of solar generation with electrical storage that ensures synergistic benefits, greater reliability and capacity. The Rule DEIR should be revised to further consider this feasible alternative.

VIII. CONCLUSION

For the reasons stated above, the Rule DEIR is inadequate under CEQA. The Air District must substantially revise and recirculate the document, including a more robust alternatives analysis that considers an actual emission reduction proposal, such as CBE's September 2015 proposal, an adequate project description and other requirements to comply with CEQA.

Additionally, it is important to note that the Rule DEIR does not provide a sufficient basis for the Board of Directors to make a statement of overriding considerations. In order to approve an EIR that identifies significant and unavoidable impacts, the lead agency must also make a statement of overriding considerations explaining why the benefits of the project would outweigh the significant environment impacts.[173] This statement must be supported by substantial evidence in the record.[174] Without an adequate project description and subsequent reasonable range of alternatives, it is impossible to undertake any meaningful balancing of interests. With the same non-disclosure issues as the Rule DEIR, the accompanying socio-economic analysis is also flawed: it does not include any mention of the increase in hazards presented by a refinery job as the industry shifts to a lower quality oil. It also fails to describe how these rules could lock the Bay Area economy into a dependence on the dirtiest crude on the market, forsaking other energy solutions, including renewable resources.

Finally, the information included in this document and the accompanying attachments constitute significant new information warranting recirculation of the Rule DEIR pursuant to CEQA Guidelines § 15088.5.

Respectfully submitted,

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(continued)

[173] CEQA Guidelines §§ 15092, 15093.
[174] *Id.* § 15093(b).

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Attachment A

COMMUNITIES FOR A BETTER ENVIRONMENT

18 September 2015
[Revised 21 Sep 2015]

Jack Broadbent
Air Pollution Control Officer
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Attention: Eric Stevenson (Estevenson@baaqmd.gov)

Re: **Proposal for enforceable numeric limits on refinery-wide emissions to stop increasing greenhouse gas and particulate matter air pollution [Rule 12-16]**

Mr. Broadbent,

The undersigned community, environment, labor and academic groups continue to seek enforceable numeric limits on refinery-wide emissions of greenhouse gas (GHG) and particulate matter air pollution that would prevent further increases in these emissions. These emission limits are needed now, in proposed Rule 12-16.

GHG and particulate matter (PM) are among the most harmful air pollutants known. GHG threatens climate catastrophe and PM kills thousands in the Bay Area each year. Oil refining is the largest industrial emitter of GHG and PM in the Bay Area, and yet refineries here have *no* facility-wide limits on these emissions, though other industries do. In the absence of such limits—and despite actions to cut emissions from some *parts* of refineries—Bay Area refinery emissions of GHG and PM have continued to increase. Worse, planned projects for low-quality oil could increase these emissions *even more*.

Keeping emissions from increasing would not require any change in current operations of any refinery. This is, therefore, clearly feasible. And it is urgent, as we outline above. We agree with the observation made by Board Member Gioia, at the 3 June 2015 Air District Board Meeting, that the Board's decision making process is frustrated by the absence of a specific proposal for such refinery-wide emission limits. We have identified specific examples of these limits in previous comments since at least 27 March 2015, however, District Staff has not yet proposed specific limits based on existing data.

Accordingly, we propose that the Air District consider, for adoption in Rule 12-16, enforceable numeric limits on refinery-wide emissions of GHG (as CO_2e), particulate matter (PM), and PM precursors (NO_x and SO_2) based on existing data, plus the additional allowance identified by the Air District in March 2015 (*see* § 12-16-301.1). Specifically, we propose enforceable numeric limits on mass emissions of each of these pollutants from each facility, set to require that emissions shall not exceed the facility's greatest annual emissions of each pollutant, as reported during 2011–2013, by an amount greater than +10,000 metric tons of GHG or +7% of PM, NO_x, or SO_2 emissions.

We urge the Air District to consider our proposal for Rule 12-16 favorably.

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Nazima El-Askari
Labor Occupational Health Center at UC Berkeley

Copy: John Gioia, Chair, Stationary Source Committee of the Board
Directors, Air District Board
Ken Alex, Senior Advisory, Office of Governor Brown
Interested individuals and groups

Proposal for Enforceable Numeric Limits on Refinery-wide Emissions to Stop Increasing Greenhouse Gas & Particulate Matter Air Pollution, Including Revision to Proposed Rule 12-16:

Technical Report; CBE September 2015 Comments Part 1

By
Greg Karras, Senior Scientist,
and Roger Lin, Staff Attorney,
Communities for a Better Environment (CBE)
Revised 21 September 2015

Contents

PURPOSE OF THE PROPOSED FACILITY EMISSION LIMITS

The purpose of the limits is to better protect air quality, health, and climate by prohibiting any substantial increase in facility-wide particulate matter (PM), PM precursor, or greenhouse gas (GHG) mass emission rate from petroleum refining facilities in the Air District's jurisdiction that are major emitters of these air pollutants.

Stopping increasing refinery-wide emissions is consistent with, complementary to, and necessary to achieve fully the benefits of, other separately proposed policies that seek source-specific reductions in emissions from selected parts of these facilities.

DESCRIPTION OF THE PROPOSED LIMITS

The proposed limits are shown in Table 1. A numeric limit on the annual mass emission rate of each air pollutant specified is applied to each facility specified in the table. The limit is equal to the maximum-year actual emissions reported in 2011–2013 ***plus*** the additional numeric allowance calculated previously by Air District Staff. (These additional allowances, or 'threshold factors,' are +10,000 metric tons for GHG, +7% for PM, and +7% for each of the PM precursors, NO_x and SO_2.)

Table 1. The enforceable numeric limits on refinery-wide emissions proposed[a]

Facility	GHG (metric tons/yr)	PM (tons/yr)	NO_x (tons/yr)	SO_2 (tons/yr)
Chevron Refinery, Plt. A-0010	4,473,000	529	974	400
Shell Refinery, Plt. A-0011	4,272,000	569	1,040	1,340
Phillips 66 Refinery, Plt. A-0016	1,512,000	56.0	275	433
Tesoro Refinery, Plt. B-2758/2759	2,456,000	180	1,080	707
Valero Refinery, Plt. B-2626	2,950,000	134	1,410	138
Martinez Cogen LP,[b] Plt. A-1820	431,000	18.8	119	2.30
Air Liquide H_2 Plant,[b] Plt. B-7419	855,000	17.3	12.9	2.48
Air Products H_2 Plant,[b] Plt. B-0295	281,000	10.4	3.40	2.31

[a] Annual facility-wide emission limits. **GHG:** greenhouse gas emissions (CO_2e) as reported under Air Resources Board Mandatory Reporting; **PM:** filterable and condensable particulate matter; **NO_x:** oxides of nitrogen; **SO_2:** sulfur dioxide. PM, NO_x and SO_2 as reported in the Facility's annual emission inventory.
[b] The Martinez Cogen and Air Products facilities support Tesoro; Air Liquide supports Phillips 66.

These limits are thus specific, numeric, transparent, and enforceable upon adoption.

Anticipated future improvements in monitoring are facilitated and addressed by providing for re-calibration of compliance demonstrations to account for potential differences in the emission quantities reported that are due solely to changes in monitoring methods.

DEVELOPMENT OF THE PROPOSED LIMITS

Selection of air pollutants: Air pollutants to be limited were screened based on severity of harm, emission source strength, emission trends and forecasts, and available facility emission data. PM is associated with the vast majority of the thousands of deaths caused by air pollution that are estimated to occur in the Bay Area each year,[1] and GHG is linked to increasingly severe climate disruption that poses an existential threat to human societies as we know them unless deep cuts in emissions are made quickly.[2] As to source strength, Air District[3, 4] and State Air Board[5] data indicate that oil refining is the largest industrial emitter of both PM and GHG in the region. *See* Chart 1.

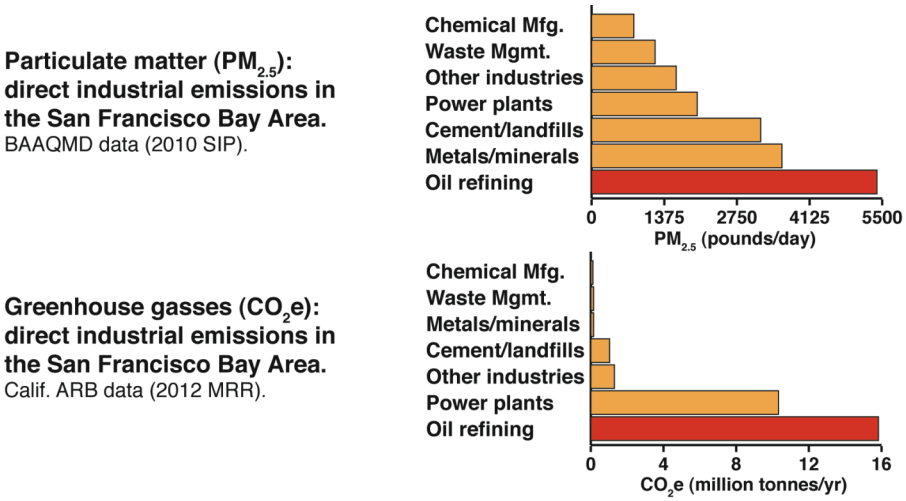

Chart 1. Direct industrial emissions of $PM_{2.5}$ and GHG in the Bay Area.

As to emission trends, Air District[4, 6] and Air Board[5] emission data indicate that over many years—and unlike some other monitored emissions—Bay Area refinery emissions of both PM and GHG increased steadily and substantially. *See* Chart 2.

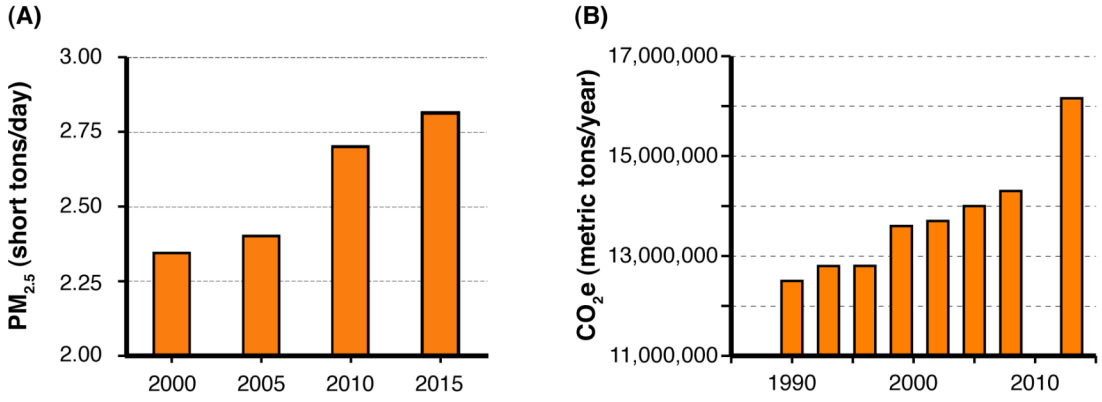

Chart 2. Bay Area oil refining (A) $PM_{2.5}$ and (B) GHG emission trends.
$PM_{2.5}$ emitted from 2000–2015[6] and GHG emitted from 1990–2008[4] and 2013.[5]

Forecasts strongly suggest that, in the absence of new policy intervention, this trend will continue and accelerate. Plans to replace dwindling current oil sources for Bay Area refineries with low-quality imports such as tar sands oils have been documented by community and worker experts and confirmed by industry statements to investors.[7–15] Meanwhile, the increasing use of imported crude to produce exported refinery products renders market-based policies, such as cap–and–trade and gasoline demand reduction in California, increasingly ineffective for curbing the resultant refinery emissions.[16, 17]

Low-quality oil can greatly increase refinery cracking process, fuel combustion, and hydrogen production emissions.[18–24] These are the major PM and GHG emission sources in refineries.[18, 24, 25] A substantial increase in refinery energy intensity for the increase in processing intensity required to maintain gasoline, diesel and jet fuel production from denser, more contaminated crude increases these emissions. This causal mechanism is well documented by peer reviewed work.[18–23] It is illustrated in the excerpt shown below.

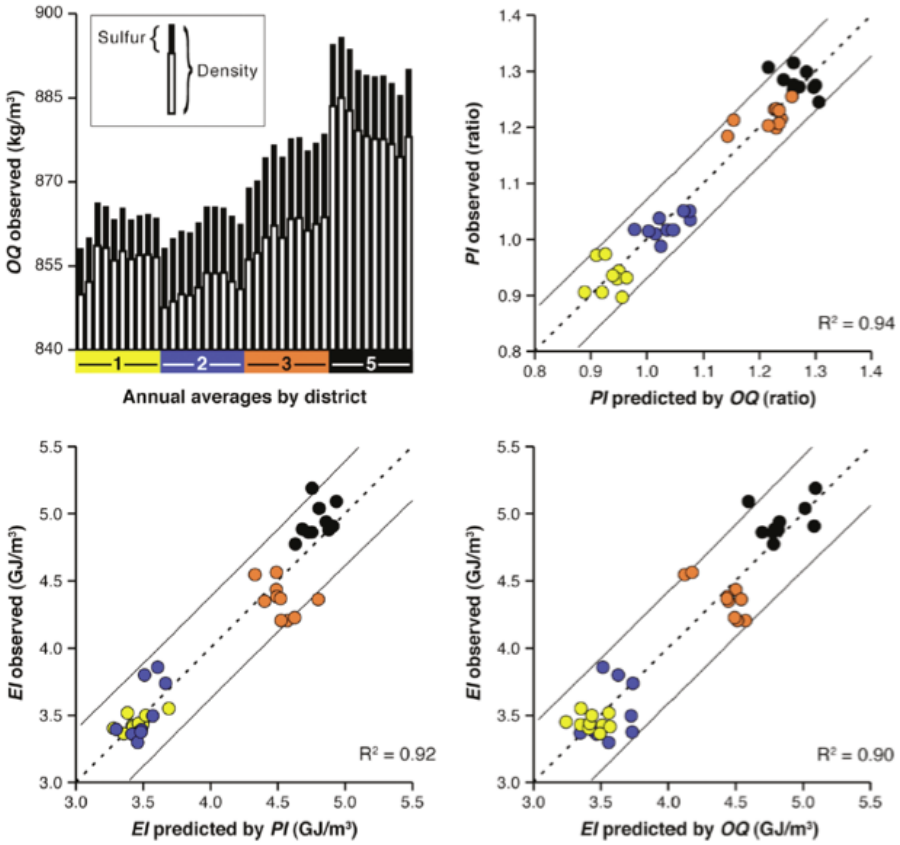

Figure 1 in Karras, 2010 (*Env Sci Technol.;* American Chemical Society):[18] Increasing crude processing intensity and energy intensity with worsening oil quality. ***OQ:*** Crude feed oil quality. ***PI:*** Crude processing intensity. ***EI:*** Refinery energy intensity. Observations are annual weighted averages for districts 1 (yellow), 2 (blue), 3 (orange), and 5 (black) in 1999–2008. Diagonal lines bound the 95% confidence of prediction for observations.

Thus, PM and GHG are the most harmful air pollutants known to our local health and our climate, respectively; more PM and GHG emit from oil refining than from any other industry in the Air District's jurisdiction; and, absent new action, a trend of substantially increasing refinery PM and GHG emissions is likely to continue and to accelerate. For these reasons, the proposed limits seek to stop increasing PM and GHG air pollution.

PM air pollution is caused by 'condensable' PM and the PM 'precursors' nitrogen oxides (NO_x) and sulfur dioxide (SO_2) as well as by 'filterable' PM emissions, and refineries are strong sources for each of these emissions.[3] Therefore, limits on PM (condensable and filterable PM), NO_x, SO_2, and GHG (measured as CO_2e, the 'carbon dioxide equivalents' of CO_2, methane, and nitrous oxide) are proposed.

With respect to air pollutants that are not limited directly in this proposal, this does not suggest any lack of harm from refinery emissions of those pollutants. Instead, for example, options for preventing or controlling carcinogenic refinery emissions are limited by the relatively poor—and for many pollutants nonexistent—reporting of monitored refinery-wide toxic air contaminant emissions.[25, 26]

Selection of facilities: Although it reports different ownership, emits under a different air permit and does not process crude oil directly, the Air Liquide Rodeo hydrogen plant, Plant B-7419, is used in functions that are necessary to the operation of the Phillips 66 refinery at Rodeo.[27] Similarly, though reporting different owners, emitting under different air permits and not refining crude directly, the Air Products hydrogen plant (Plant B-0295)[28] and Martinez Cogen LP (Plant A-1820)[29] are integral 'support facilities' for the Tesoro refinery.

Each of these three refinery support facilities is a major emitter of PM, NO_x, SO_2, GHG, or more than one of these pollutants.[25, 27–29] Further, the main sources of those emissions—hydrogen steam reforming, cogeneration, and the heaters and turbines associated with those operations—are ***not*** sources targeted specifically by the Air District for additional emission control at this time.[30] For these reasons the proposed facility emission limits would apply to each of the five major refineries in the region that are identified in Table 1 ***and*** to each of these three refinery support facilities.

Selection of current actual emissions 'baseline' period: The baseline period was chosen to most accurately and consistently represent current actual emissions, including variability due to normal short-term changes in business factors and random factors while excluding effects of past conditions that already have changed permanently.

Emissions before reporting year (RY) 2011 represent past conditions that have now changed.[4–6] PM and GHG emissions have increased (Chart 2), and the hypothesis that this was caused by normal short-term business cycles must be rejected given the more fundamental long-term changes in oil import volume refined, oil feed quality, and refined product export volume associated with these long-term emission trends.[16] Similarly, the idea that incident emissions solely reflect random variability must be rejected in light of recurrent major Bay Area refinery fires linked to those long-term crude feed changes[31–33]

(nevertheless, ***annual*** facility emissions reported[25] reflect little or no difference attributable to those ***episodic*** incident emissions). Permanent changes in emissions also include the pre-RY2011 regionwide reductions in refinery NO_x and SO_2 that Air District Staff has attributed to many control measures implemented before RY2011.[6]

Indeed, even post-RY2011, some permanent reductions in emissions occurred. The permanent shutdown of Heater B-401[10, 26] reduced Rodeo refinery NO_x emissions significantly after RY2012[25] and a scrubbing measure installed to control catalytic cracking and coking emissions[26, 30] reduced Valero refinery PM, NO_x and SO_2 emissions significantly after RY2011.[25] These permanent changes in the baseline are addressed further in the 'baseline data' discussion below.

Annual PM, NO_x, SO_2, and GHG mass emissions from each targeted facility are reported through RY2013.[5, 25] After accounting for the two permanent post-RY2011 changes identified above, year-to-year differences among the RY2011–2013 facility emissions[5, 25] were compared with quantitative allowances derived by statistical analysis of refinery emissions variability that were reported by Air District Staff in early 2015.[26, 34] This comparison showed that facility emissions variability during RY2011–2013 is similar to or greater than that estimated by Air District Staff, further supporting the RY2011–2013 data as reasonably representative of current emissions, for the targeted pollutants.

For these reasons the period RY2011–2013 was chosen as the baseline period.

Current actual emissions 'baseline' data: Emissions baseline data that are reported and analyzed herein for GHG (non-biogenic CO_2e) are from the State Air Resources Board and are freely available to the public for download from its website.[5] However, with the exception of limited summary data for RY2013 facility emissions[30] access to public data for recent refining facility emissions held by the Air District was more difficult.

CBE accessed the actual reported PM, NO_x, and SO_2 emissions baseline data reported and analyzed herein through a request to review Air District documents pursuant to the California Public Records Act that was filed in March 2015 (*see* Exhibit 1), to which the Air District completed its response in August 2015.

Exhibit 2 summarizes the scope of these Air District emissions data in some detail. When each set of equipment permitted to emit and the material fed to it is considered a unique source—different feed material causes different emissions—the eight facilities addressed in this comment combined reported emitting PM from 305–309 sources during RY2011–2013. For NO_x and SO_2, the eight facilities emitted from 380–382 sources and 291–299 sources, respectively. Total source counts were stable, changing by < 3% for PM, NO_x and SO_2 from RY2011–2013. Including any pollutant among the criteria pollutants and GHG, the eight facilities collectively reported emissions from more than a thousand (1,198–1,239) unique sources. The vast majority (99%) of emitting sources were in refineries; support facilities reported very few sources. However, some of these sources emit hundreds of times more than others, and some high GHG-emitting sources are in the support facilities.[25] The full data set provided by the Air District to CBE for each of these facilities is incorporated herein as Attachment 1.

Initial validation analysis discovered that some condensable PM emissions measured by FCC source testing[30] were inadvertently omitted from the Air District data provided to CBE,[25] and had to be added to the Shell facility emissions.[26] This inquiry also found that the Air District PM emission estimate for Tesoro[30] is based in part on that Shell FCC source testing instead of on Tesoro data.[26] Setting the Air District's uncertain Tesoro PM estimate aside, CBE's's separately-developed estimates of refinery and hydrogen plant PM, NO_x and SO_2 emissions in RY2013 are essentially identical to the Air District estimates in 19 of 20 comparisons—95% of the comparisons. *See* Table 2.

Table 2. RY2013 emissions (tons/y) from Bay Area refineries & 2 support facilities: Comparison of CBE estimate from public records[a] to Air District Staff estimate.[b]

	Chevron	Shell	Phillips	Tesoro	Valero	Air Liq.[c]	Air Prod[c]
PM							
CBE value	428	500[d]	52	159	123	16	10
District val.	428	507	53	171[d]	123	16	10
Difference	—	< 1%	< 2%	??[d]	—	—	—
NO_x							
CBE value	910	840	256	752	1,190	2	3
District val.	910	971	266	763	1,205	2	3
Difference	—	< 14%	< 4%	< 2%	< 2%	—	—
SO_2							
CBE value	339	1,080	405	572	111	2	2
District val.	339	1,084	409	572	111	2	2
Difference	—	< 1%	< 1%	—	—	—	—

(a) Baseline estimated from Public Records Act data[25] by this analysis. (b) Air District Staff estimate in its Sept. 2015 Workshop Draft.[30] (c) The Air Liquide and Air Products hydrogen plants support Phillips 66 and Tesoro, respectively; the Air District did not report estimated emissions from the Martinez Cogen LP support facility for Tesoro. (d) CBE estimate for Shell includes FCC source test emissions of condensable particulate inadvertently omitted from PRA response; Air District Tesoro estimate is based in part on the Shell FCC test instead of data from Tesoro.[26, 30]

Validation analysis also confirmed that reported data[25] reflect important source-specific changes in the baseline. Two separately-reported source-specific changes were addressed. First, Phillips 66 permanently shut down Heater B-401, eliminating a significant NO_x source at its refinery, by RY2012.[10, 26] The data show that NO_x emissions from this specific source were cut by roughly 42 tons in RY2013 versus RY2011–2012, confirming that the equal reduction in refinery-wide emissions[25] is a permanent change and not transient variability. Second, Valero installed a catalytic cracking and coking emissions scrubber before RY2012.[26, 30] The data show this cut annual PM, NO_x and SO_2 emissions, from the reconfigured set of specific sources, by approximately 127 tons, 555 tons, and 3,933 tons respectively after RY2011,[25] allowing these permanent changes in emissions to be reflected more accurately in the baseline.

GHG emissions, as reported by the Air Resources Board, were validated and certified by independent third-party auditors for these facilities and years,[5] and are included in the baseline as reported. Baseline emissions by year are shown in Table 3 along with the results of emission limit calculation analysis that is discussed directly below.

Maximum-year emissions and additional 'threshold' factors: One approach to account for residual short-term variability in these emissions proposes to set thresholds for compliance action higher than observed emissions by a pre-set, statistically derived factor "designed to take into account fluctuations that occur in refineries on a year to year basis."[34] Another proposes to allow the maximum observed emissions in the baseline, regardless of what other data in the baseline say. This proposal uses both approaches. That may seem generous to big polluters, but it addresses uncertainty transparently and further bolsters the enforceability of limits it is obviously feasible to meet now, consistent with the purpose to prohibit a substantial refinery-wide emission increase.

Calculation of proposed limits: Table 3 shows the calculation of the proposed limits. Each limit is calculated by adding the appropriate threshold factor designed by Air District Staff (+10,000 metric tons for GHG and +7% for PM, NO_x, and SO_2)[34] to the maximum-year emissions in the baseline for that particular facility and air pollutant.

For example:

(1) Chevron's PM baseline is 455 tons, 494 tons, and 428 tons of PM emitted in reporting years 2011, 2012, and 2013 respectively. *See* Table 3 at the upper left of the table.

(2) Thus, Chevron's maximum-year PM emission in the baseline is 494 tons.

(3) The applicable threshold factor is +7% of 494; 7% of 494 tons is 34.6 tons.

(4) The threshold factor is added to its maximum-year emission; 34.6 + 494 = 528.6.

(5) So the table shows Chevron's PM emission limit (rounded to 3 digits) is 529 tons.

Change of monitoring method allowance and demonstrations: This provision would better improve monitoring and air quality protection in concert by setting up the protocol for calibrating the emission limits to changes in compliance demonstration methods due to potential changes in emissions monitoring. Future improvement in emissions monitoring is likely, and such changes in the method of demonstrating compliance with a requirement would inevitably change the actual requirement itself. Thus, the need for such re-calibration is foreseeable. This provision would facilitate and encourage anticipated future improvements in monitoring that maintain and improve upon air quality and environmental health protection.

Table 3. Derivation of numeric facility emission limits to prevent increased emission.

	RY	PM (tons) [a]	NO_x (tons) [a]	SO_2 (tons)[a]	GHG (metric tons)[b]
A-0010	2011	455	835	367	4,463,000
Chevron	2012	494	877	374	3,946,000
Refinery	2013	428	910	339	3,915,000
Find maximum year		494	910	374	4,463,000
Add threshold factor[c]		+ 7.0 %	+ 7.0 %	+ 7.0 %	+ 10,000
Chevron refinery annual limits		**529**	**974**	**400**	**4,473,000**
A-0011	2011	532	974	1,160	4,262,000
Shell	2012	518	922	1,250	4,057,000
Refinery	2013	500	840	1,080	4,192,000
Find maximum year		532	974	1,250	4,262,000
Add threshold factor[c]		+ 7.0 %	+ 7.0 %	+ 7.0 %	+ 10,000
Shell refinery annual limits		**569**	**1,040**	**1,340**	**4,272,000**
A-0016	2011	50.6	256	360	1,502,000
Phillips 66	2012	51.2	257	342	1,321,000
Refinery	2013	52.3	256	405	1,364,000
Find maximum year		52.3	257	405	1,502,000
Add threshold factor[c]		+ 7.0 %	+ 7.0 %	+ 7.0 %	+ 10,000
Phillips refinery annual limits		**56.0**	**275**	**433**	**1,512,000**
B-2758/2759	2011	158	1,010	470	2,401,000
Tesoro	2012	168	820	661	2,090,000
Refinery	2013	159	752	572	2,446,000
Find maximum year		168	1,010	661	2,446,000
Add threshold factor[c]		+ 7.0 %	+ 7.0 %	+ 7.0 %	+ 10,000
Tesoro refinery annual limits		**180**	**1,080**	**707**	**2,456,000**
B-2626	2011	125	1,320	129	2,268,000
Valero	2012	120	1,030	115	2,940,000
Refinery	2013	123	1,190	111	2,738,000
Find maximum year		125	1,320	129	2,940,000
Add threshold factor[c]		+ 7.0 %	+ 7.0 %	+ 7.0 %	+ 10,000
Valero refinery annual limits		**134**	**1,410**	**138**	**2,950,000**
A-1820	2011	17.1	107	2.08	421,000
Martinez Cogen LP	2012	17.6	111	2.15	413,000
Cogen Plant	2013	17.3	109	2.12	386,000
Find maximum year		17.6	111	2.15	421,000
Add threshold factor[c]		+ 7.0 %	+ 7.0 %	+ 7.0 %	+ 10,000
Martinez Cogen annual limits		**18.8**	**119**	**2.30**	**431,000**
B-7419	2011	14.9	12.0	1.97	645,000
Air Liquide	2012	13.8	1.39	1.75	771,000
Hydrogen Plant	2013	16.2	1.59	2.32	845,000
Find maximum year		16.2	12.0	2.32	845,000
Add threshold factor[c]		+ 7.0 %	+ 7.0 %	+ 7.0 %	+ 10,000
Air Liquide annual limits		**17.3**	**12.9**	**2.48**	**855,000**
B-0295	2011	9.62	3.15	2.15	258,000
Air Products	2012	8.04	2.65	1.79	217,000
Hydrogen Plant	2013	9.69	3.18	2.16	271,000
Find maximum year		9.69	3.18	2.16	271,000
Add threshold factor[c]		+ 7.0 %	+ 7.0 %	+ 7.0 %	+ 10,000
Air Products annual limits		**10.4**	**3.40**	**2.31**	**281,000**

(a) AQMD data validated by CBE.[25] (b) ARB data for non-biogenic CO_se.[5] (c) From AQMD Staff.[34]

REVISION TO PROPOSED RULE 12-16: PROPOSED EMISSION LIMITS

Add the provisions as follows.

Under Part 12-16-200 DEFINITIONS, add:

§ 12-16-225 **Support Facility:** A facility that is not directly involved in the processing of petroleum but is used in functions that are necessary to the operation of a petroleum refinery and is permitted by the Air District separately from the petroleum refinery. For the purposes of §§ 304 and 305, support facilities include, but are not limited to, Plant No. B-7419, a hydrogen plant in Rodeo; Plant No. B-0295, a hydrogen plant in Martinez, and Plant No. A-1820, a cogeneration plant in Martinez.

Under Part 12-16-300 STANDARDS, add:[1]

§ 12-16-304 **Facility Emission Limits:** Annual emissions of air pollutants from a petroleum refinery or support facility shall not exceed the following emission limits:

Facility number	GHG[a] (metric tons)	PM[b] (short tons)	NO_x[b] (short tons)	SO_2[b] (short tons)
A-0010 [Chevron][c]	4,473,000	529	974	400
A-0011 [Shell]	4,272,000	569	1,040	1,340
A-0016 [Phillips 66]	1,512,000	56.0	275	433
B-2758/2759 [Tesoro]	2,456,000	180	1,080	707
B-2626 [Valero]	2,950,000	134	1,410	138
A-1820 [Martinez Cogen LP]	431,000	18.8	119	2.30
B-7419 [Air Liquide]	855,000	17.3	12.9	2.48
B-0295 [Air Products]	281,000	10.4	3.40	2.31

[a] Greenhouse gas (CO_2e) as reported under Air Resources Board Mandatory Reporting, or under § 12-16-305.
[b] PM (the sum of filterable and condensable particulate matter), NO_x (oxides of nitrogen), and SO_2 (sulfur dioxide) as reported in the Facility's annual emission inventory, except as provided in § 12-16-305.
[c] Facility owners or operators, as of September 2015, shown for information and context only.

§ 12-16-305 **Change in Monitoring:** An emission monitoring or estimation method that is used to demonstrate compliance with the limits in § 12-16-304 may be changed, provided that all of the following has been demonstrated:

(a) The new method will improve the accuracy and reliability of emission monitoring;

(b) Any difference in reported emissions caused by the change in method has been quantified accurately, reliably, and separately from any actual change in emissions; and

(c) The facility owner or operator has ensured that increased emissions will not be allowed as a result of the change by demonstrating that it has adjusted each affected limit in § 12-16-304 by the difference quantified in § 12-16-305 (b), that the adjusted emission limit will be in enforceable effect concurrently with the change in monitoring, and that it has applied for a permit revision to include the adjusted limit in its Title V permit along with the other applicable emission limits in § 12-16-304.

[1] Replaces Staff-proposed language in §§ 304, 305, 405 and 406.

CONCLUSION

As discussed more fully in our 27 March 2015 letter to the District,[35] it is well within the broad powers of the Board to adopt these proposed facility emission limits. It is further wholly appropriate to base those emission limits on the District's own emission inventories. The District already uses that data in two particular ways: first, it is required to do so by law[36] for emission control policy; and second, it uses this data quantitatively to yield substantial income through permitting fees based on the level of emissions.[37]

We ask the Air District to adopt these urgently needed limits in proposed Rule 12-16.

In Health,

Greg Karras
Senior Scientist

Roger Lin
Staff Attorney

End Notes

1 AQMD, 2012. *Understanding Particulate Matter;* Bay Area Air Quality Management District: San Francisco, CA. *See* esp. pp. 26–27 ("vast majority of premature deaths associated with air pollution—more than 90%—are related to exposure to fine particulate matter" and chart showing mortalities "now" approaching 3,000/year).

2 Fifth Assessment Report of the Intergovernmental Panel on Climate Change (AR-5).

3 AQMD, 2010. Emissions Inventory submitted to U.S. EPA for State Implementation Plan (SIP) requirements. *See* Table 1 therein ($PM_{2.5}$, NO_x and SO_2). Bay Area Air Quality Management District: San Francisco, CA.

4 AQMD, 2010. *Source Inventory of Bay Area Greenhouse Gas Emissions, Updated: February 2010;* Bay Area Air Quality Management District: San Francisco, CA.

5 ARB, various years. *Annual Summaries of Greenhouse Gas Emissions Data Reported to the California Air Resources Board;* data reported through 2013 pursuant to ARB's Mandatory GHG Reporting Rule. California Air Resources Board: Sacramento, CA. http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm

6 AQMD, 2015. *Regulations to Track and Mitigate Emissions from Petroleum Refineries, Regulation 12, Rules 15 and 16: Public Workshop March 2015;* Staff Report (Powerpoint). Bay Area Air Quality Management District: San Francisco, CA.

7 Fox, 2013. *Comments on Initial Study/Mitigated Negative Declaration (IS/MND) for the Valero Crude by Rail Project.* 1 July 2013. Use Permit Application 12PL-00063; City of Benicia: Benicia, CA.

8 Goodman and Rowan, 2013. *Comments on Initial Study/Mitigated Negative Declaration (IS/MND), Valero Crude by Rail Project, Benicia, California.* 1 July 2013. Use Permit Application 12PL-00063; City of Benicia: Benicia, CA.

9 Fox, 2013. *Comments on Environmental Impact Report for the Phillips 66 Propane Recovery Project, Rodeo, California;* Prepared on behalf of Rodeo Citizens Association. 15 November 2013. SCH #2012072046; County File #LP12-2073. Contra Costa County: CA.

10 Fox and Pless, 2015. *Comments on Recirculated Final Draft Environmental Impact Report for the Phillips 66 Propane Recovery Project, Rodeo, California;* 2 February 2015. SCH #2012072046; County File #LP12-2073. Contra Costa County: CA.

11 Karras, 2013. *Expert Report of Greg Karras, Communities for a Better Environment (CBE), Regarding the Phillips 66 Company Propane Recovery Project Draft Environmental Impact Report;* 4 September 2013. SCH #2012072046; County File #LP12-2073. Contra Costa County: CA.

12 Karras and Lin, 2013. *Comment on behalf of Communities for a Better Environment Regarding WesPac Pittsburg Energy Infrastructure Project, Recirculated Draft Environmental Impact Report (RDEIR), SCH #2011072053.* 12 September 2013. Planning Department; City of Pittsburg: CA.

13 Karras, 2014. *CBE RDEIR Comment–2, Refinery FCC Emissions Increase;* 2 May 2014. Submitted on behalf of Communities for a Better Environment, Regarding the Chevron Richmond Refinery–Proposed Revised Project. City of Richmond Planning File PLN11-089; Revised Draft Environmental Impact Report SCH #201106042. Richmond: CA.

14 Karras, 2014. *Expert Report of Greg Karras, Communities for a Better Environment (CBE), Regarding the Phillips 66 Company Propane Recovery Project Recirculated Draft*

Environmental Impact Report; 5 December 2014. SCH #2012072046; County File #LP12-2073. Contra Costa County: CA.; County File #LP12-2073. Contra Costa County: CA.

15 Karras, 2015. *Expert Report of Greg Karras, Communities for a Better Environment (CBE), Regarding the Phillips 66 Company Propane Recovery Project Recirculated Final Environmental Impact Report;* 2 February 2015. SCH #2012072046; County File #LP12-2073. Contra Costa County: CA.

16 Karras, 2015. *Emergency need for a moratorium on new infrastructure for extreme oil; followup information requested in our discussion on 13 April 2015;* 1 May 2015. Letter responding to a technical request by the Governor's Office on behalf of Communities for a Better Environment to Cliff Rechtschaffen and Ken Alex, Senior advisors, Office of the Governor, State of California.

17 Lin and Karras, 2015. *Emissions from the end-use of California refinery products that are exported are exempt from State Cap-and-Trade requirements: additional documentation;* 10 June 2015. Correspondence to Jack Broadbent, Air Pollution Control Officer, Bay Area Air Quality Management District: San Francisco, CA.

18 Karras, 2010. Combustion emissions from refining lower quality oil: What is the global warming potential? *Environmental Science & Technology* **44**(24):9584–9589. DOI:10.1021/es1019965.

19 Bredeson et al., 2010. Factors driving refinery CO_2 intensity, with allocation into products. *International Journal of Life Cycle Assessment* **15:** 817–826. DOI: 10.1007/s11367-010-0204-3.

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22 Abella and Bergerson, 2012. Model to investigate energy and greenhouse gas emissions implications of refining petroleum: Impacts of crude quality and refinery configuration. *Environmental Science & Technology*. DOI: 10.1021/es3018682.

23 Gordon et al., 2015. *Know Your Oil; Creating a Global Oil–Climate Index;* Carnegie Endowment for International Peace: Washington, DC.

24 Karras, 2015. *Toxic and fine particulate emissions from U.S. refinery cracking and coking of 'tar sands' oil.* Technical report on work conducted as part of a technical assistance contract with the Natural Resources Defense Council (NRDC). Author contact: G. Karras, Senior Scientist, Communities for a Better Environment: Oakland, CA.

25 AQMD, 2015. Facility- and source-specific oil refinery and refinery support facility emissions data for reporting years 2011–2013 provided in response to CBE's request to review Bay Area Air Quality Management District documents pursuant to the California Public Records Act that was filed in March 2015. *See* Exhibit 1 for CBE's request to review public records; and Attachment 1 for the complete data response.

26 Nudd and Stevenson, 2015. Personal Communication: G. Nudd, AQMD and E. Stevenson, AQMD with G. Karras at the Bay Area Air Quality Management District in San Francisco, CA on 25 August 2015.

27 Title V Permit and Statement of Basis, Air Liquide, Facility #B-7419, Contra Costa County, CA; www.baaqmd.gov/permits/major-facility-review-title-v/title-v-permits.

28 Title V Permit and Statement of Basis, Air Products, Facility #B-0295, Contra Costa County, CA; www.baaqmd.gov/permits/major-facility-review-title-v/title-v-permits.

29 Title V Permit and Statement of Basis, Martinez Cogen LP, #A-1820, Contra Costa County, CA; www.baaqmd.gov/permits/major-facility-review-title-v/title-v-permits.

30 BAAQMD, 2015. *Petroleum Refinery Emission Reduction Workshop Report;* September 2015. *See* esp.: Table 3 (emissions estimates and condensable particulate emission estimate based on source testing of Shell FCC); Table 4 (Phase I rule changes exclude any emission controls targeting hydrogen or cogeneration plants); and Appendix A at A:1 ("Valero refinery recently has retrofitted its FCCU with a wet scrubber and its FCCUs have lower $PM_{2.5}$ and SO_2 emissions than those at other refineries as a result").

31 U.S. Chemical Safety and Hazard Investigation Board, 2013. *Investigation Report, Refinery Fire Incident (4 Dead, 1 Critically Injured), Tosco Avon Refinery, Martinez, California, February 23, 1999;* (Switch to denser crude overwhelms desalter, downstream salt corrosion plugging in crude unit piping contributes to fatalities during unsafe hot work.) Chemical Safety Board: Washington, DC. www.CSB.gov.

32 Chevron, 2007. *Final Investigation Report of Fire That Occurred Monday January 15, 2007 in the Crude Unit at the Chevron Richmond Refinery;* Submitted to Contra Costa County Hazardous Materials Program Director by T. Lizarraga, Chevron. *See* esp. "Causes," page 1 ("the failed section of the [pipe] was thinned by high temperature sulfidation corrosion").

33 U.S. Chemical Safety and Hazard Investigation Board, 2013. *Interim Investigation Report, Chevron Richmond Refinery Fire, Chevron Richmond Refinery, Richmond, California, August 6, 2012;* Chemical Safety Board: Washington, DC. www.CSB.gov. *See* esp. "Operational Changes" (higher sulfur oil feed accelerated corrosion of pipe that failed catastrophically in this fire).

34 AQMD, 2015. *Workshop Report, Proposed Air District Regulation 12, Rule 15: Petroleum Refining Emissions Tracking and Regulation 12, Rule 16: Petroleum Refining Emissions Analysis, Thresholds and Mitigation;* Bay Area Air Quality Management District: San Francisco, CA. February 2015. *See* esp. page 22 ("The trigger levels for criteria pollutant levels described in Section 12-16-301.1 were designed to take into account fluctuations that occur in refineries on a year to year basis, such as the reduced efficiency of heat exchanges, which may be the result of process changes and degradation of processes … . Emissions variations like these are considered to be in the 'noise' of emissions inventories and the ability of the inventory calculations to provide accurate, repeatable results. By allowing these thresholds, staff believes ERPs will be able to better identify and address equipment that can produce effective and lasting emission reductions.") District Staff's 'threshold trigger levels' that it proposed in February 2015 (then-proposed § 12-16-301.1) are +7% of baseline emissions and +10,000 metric tons as CO_2e, for criteria pollutants and GHGs, respectively.

35 *Comment on the Authority of the Bay Area Air Quality Management District to Adopt Regulations to Decrease Air Emissions from Petroleum Refineries;* 27 March 2015 letter from CBE to Jack Broadbent, Air Pollution Control Officer.

36 *See e.g.,* Cal. Health and Safety Code § 40913.

37 *See* BAAQMD Budget, Fiscal Year Ending 2016, Appendix D: *Sources of Revenue Trends;* and BAAQMD Regulation 3, Fees, Schedules M and T.

Attachments List

The attachments listed below are facility- and source-specific oil refinery and refinery support facility emissions data for reporting years 2011–2013 provided in response to CBE's request to review Bay Area Air Quality Management District documents pursuant to the California Public Records Act that was filed in March 2015. (*See* Exhibit 1 for CBE's request to review public records.) CBE provides these attachments electronically (by Email) as downloaded from the electronic (Email) transmittals to CBE responding to that request; no change has been made by CBE to the information originally provided in any of the attachments. As provided to CBE, data for each facility is included in a separate Excel file. Each file is listed below by its Attachment number followed by the facility identification code in the file name as transmitted to CBE, followed by that facility's ID code as listed in its Title V Air permit and in this comment.

1. Original Facility Code Label: Plant 10; Title V Permit Facility Code: A0010.
2. Original Facility Code Label: Plant 11; Title V Permit Facility Code: A0011.
3. Original Facility Code Label: Plant 21359; Title V Permit Facility Code: A-0016.
4. Original Facility Code Label: Plant 14628; Title V Permit Code: B-2758/2759.
5. Original Facility Code Label: Plant 12626; Title V Permit Facility Code: B-2626.
6. Original Facility Code Label: Plant 1820; Title V Permit Facility Code: A-1820.
7. Original Facility Code Label: Plant 17419; Title V Permit Facility Code: B-7419.
8. Original Facility Code Label: Plant 10295; Title V Permit Facility Code: B-0295.

EXHIBIT 1

Public Records Act Request to BAAQMD dated 16 March 2015

BY ELECTRONIC MAIL

16 March 2015

Rochelle Henderson-Reed
Public Information Officer
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

(Publicrecords@baaqmd.gov; 415-749-4784)

COMMUNITIES FOR A BETTER ENVIRONMENT

Re: **Public Records Act Requests for information on emissions from the:**

- **Chevron Richmond Refinery (AQMD Site # A0010)**
- **General Chemical West LLC (AQMD Site # A0023)**
- **Shell Martinez Refinery (AQMD Site # A0011)**
- **Equilon Enterprises LLC (AQMD Site # B1956)**
- **Phillips 66 San Francisco Refinery (AQMD Site # A0016)**
- **Air Liquide Large Industries US LP (AQMD Site # B7419)**
- **Phillips 66 Carbon Plant (AQMD Site # A0022)**
- **Tesoro Refining and Marketing Company (Site #s B2758 and B2759)**
- **Tesoro Logistics Operations (AQMD Site # E1200)**
- **Martinez Cogen Limited Partnership (AQMD Site # A1820)**
- **Pacific Plains Products Terminals LLC (AQMD Site # A7034)**
- **Valero Refining Company California (AQMD Site # B2626)**
- **NuStar Logistics LP (AQMD Site # B5574)**
- **Valero Benicia Asphalt Plant (AQMD Site # A0901)**

Dear Ms. Henderson-Reed,

Pursuant to the California Public Records Act, for each facility identified above, CBE requests the opportunity to review all records in the District's possession that include information about each criteria, toxic, and greenhouse gas pollutant emitted during each of the years 2011, 2012, 2013, and 2014. The emissions records for each facility that CBE requests the opportunity to review are described more specifically below.

We note that emissions information is not confidential, so the information CBE seeks should be available for public review, and that these records should be in the District's possession. For example, the District reports criteria air pollutant, toxic air contaminant, and greenhouse gas emissions from facilities, and sources within them, in its Emissions Inventory annually. It also requires facilities to submit "Annual Source" or "Annual Data" updates. In another example, District Staff has reported trends in annual refining industry ROG, NOx, $PM_{2.5}$ and SO_2 emissions from 1980–2015 (based on its estimates from emissions data for each individual plant) in its March 2015 "workshop presentation" for proposed rules 12-15 and 12-16. The District also supplied the information on criteria pollutant, toxic air contaminant, and greenhouse gas emissions from the Chevron

Richmond refinery and its wharf, rail and truck loading terminals that the City of Richmond and the District relied upon in their recent approvals of the EIR and permits for Chevron's "Modernization" project.

The specific records CBE seeks to review include, as reported separately for each facility identified above, any and all records that include any or all of the following information:

(1) For each facility included among those summarized in the chart entitled "Refinery Emission Trends 1980–2015 and Main Causes of Reductions" and each year from 2011–2014, where available, the emission estimates that supported the basis for the District Staff's refining industry-wide estimates of ROG, NOx, $PM_{2.5}$ and SO_2 emissions presented at the March 2015 workshops on rules 12-15 and 12-16.

(2) Facility- and source-specific emissions of each criteria air pollutant, toxic air contaminant, and greenhouse gas included in the District's Emissions Inventory for each year from 2011–2014, inclusive.[1]

(3) Annual "Source" or "Data" update reports that include any criteria, toxic, or greenhouse pollutant emissions information for each year from 2011–2014, inclusive.

(4) Facility- and source-specific emissions of each criteria, toxic, and greenhouse gas air pollutant included in files associated with any and all Authority to Construct and Permit to Operate applications submitted from 1 Jan. 2011 through 17 Apr. 2015.

(5) Facility- and source-specific emissions of each criteria air pollutant, toxic air contaminant, and greenhouse gas provided to a CEQA Lead Agency or its CEQA consultant(s) from 1 Jan. 2011 through 17 Apr. 2015.

(6) For each refinery and for each year from 2011–2014, any and all estimated or reported criteria, toxic, and greenhouse pollutant emissions that are not included in responses 1–5 from auxiliary facilities (e.g., separately owned hydrogen plants) and/or cargo carriers that load or unload at the refinery (e.g., ships and trains), including their sources (e.g., site and source #). "Auxiliary facilities" and "cargo carrier" emissions are as defined in rule 12-15 as now proposed (§§ 207, 212, 216).

(7) Revisions or corrections to any of the data or estimates reported in 1–6 above, if any.

As stated, CBE seeks to review this information for emissions from each such facility separately. Accordingly, and in the spirit of cooperation in the efficient disclosure of public records, we ask that a unique identifier be assigned to our request for each individual facility. We understand that the District normally assigns such unique numerical codes to each public records request it receives and look forward to being informed of the code assigned to our request for each facility identified above.

[1] For Air Liquide (Site # B7419) only, CBE acknowledges receiving this Emission Inventory information (PRRN 2015-01-0220). We appreciate this information, and also appreciate that you alerted us to the need to re-assert our request for accurate Emission Inventory information for Phillips 66 (*see* your 13 Nov. 2014 Response to CBE's PRRN 2014-10-0176).

CBE hopes to review the requested records in electronic form (as tabulated Excel files where this formatting is feasible) that may be transmitted either by email or via a disk that we could arrange to collect at your offices. We understand that, to the extent this is possible, such a 'paperless' approach may also be more efficient and help to conserve limited resources.

CBE is a small community-based nonprofit public interest organization and requests this information for public education purposes. We seek to minimize any costs associated with responding to these requests via the paperless, photocopy-free sharing of this public information proposed. Moreover, this emissions information is an essential basis for development of the District's currently proposed refinery emission rules 12-15 and 12-16. As such, disclosure of this information is essential to meaningful public participation in the development of these public health policies. Thus—and independently from its duties under the Public Records Act—the District should disclose this information to the public in the course of its ongoing public policy development duties. For these reasons, CBE respectfully requests that any fees or charges associated with these requests be waived.

Thank you, in advance, for your attention to these requests for important public records. Please contact me if you have a question about them, and please note that, previously, I had discussed these information-sharing requests, in general terms, with the Air Pollution Control Officer, Jack Broadbent, and am copying him at his request.

In Health,

Greg Karras, Senior Scientist
Communities for a Better Environment (CBE)
(415) 902-2666 // gkatcbe@gmail.com

Copy: Jack Broadbent, APCO
Stationary Source Committee members
Interested organizations and individuals

Exhibit 2. Counts of Emitting Sources[a] by Facility, Year and Pollutant.[b]

Facility	Reporting year	Sources[a] reporting emissions greater than zero			
		PM	NO_x	SO_2	Any Pollutant
A-0010	2011	69	83	65	349
Chevron	2012	73	87	68	349
Refinery	2013	73	86	69	351
A-0011	2011	84	87	84	321
Shell	2012	82	91	85	304
Refinery	2013	83	88	81	299
A-0016	2011	49	76	43	192
Phillips 66	2012	49	74	42	183
Refinery	2013	49	73	42	183
B-2758/2759	2011	53	73	56	204
Tesoro	2012	49	69	52	184
Refinery	2013	50	72	54	192
B-2626	2011	44	49	44	159
Valero	2012	40	48	40	150
Refinery	2013	39	48	39	158
A-1820	2011	3	5	2	5
Martinez Cogen LP	2012	4	5	2	5
Cogen Plant	2013	3	5	2	5
B-7419	2011	5	5	3	6
Air Liquide	2012	6	6	2	7
Hydrogen Plant	2013	6	6	2	7
B-0295	2011	2	2	2	3
Air Products	2012	2	2	2	3
Hydrogen Plant	2013	2	2	2	3
Total (8 facilities)	2011	309	380	299	1,239
Total (8 facilities)	2012	305	382	293	1,185
Total (8 facilities)	2013	305	380	291	1,198

[a] Each combination of source equipment and feed material reported is counted here as a separate source.
[b] See Attachment 1 for the complete data sets summarized in this table.

Supplemental Comments of Communities for a Better Environment Including Revisions to Proposed Rules 12-15 and 12-16:

Technical Report; CBE September 2015 Comments Part 2

By
Greg Karras, Senior Scientist,
and Roger Lin, Staff Attorney,
Communities for a Better Environment (CBE)

Submitted 25 September 2015
Revised 30 September 2015

CONTENTS

Continued next page

CONTENTS *continued*

COMMENT 2-1. Additional Purpose to Limit GHG for Regional Health.

Revise proposed Section 12-16-101 in Rule 12-16 as follows:

§ 12-16-101 **Description:** The purpose of this rule is to ensure that the emissions of any criteria air pollutant, toxic air contaminant, or greenhouse gas from the operation of Bay Area Refineries does not pose an unacceptable health risk ~~on~~ in nearby communities, the Bay Area Air Basin, or other air basins affected by those emissions ~~and do not result in exceedance of the National Ambient Air Quality Standards for SO_2 and $PM_{2.5}$~~.

Rationale. District Staff's proposal to allow unlimited increases in refinery greenhouse gas (GHG) emissions and its omission of public health protection for all people in the region from the Rule's purpose are linked together by a fallacy: the claim that GHG emissions cannot harm our health. In fact, increasing refinery GHG emissions could worsen serious, widespread health impacts. Those health impacts would be caused by, among other things, drought, flooding, food supply disruption, heat stress, and local air pollution worsened by changes in atmospheric vapor pressure, heating and stagnation[1, 2] as well as by direct emissions of unregulated GHG co-pollutants from refineries.

Staff's proposed policy on increasing refinery GHG emissions—to wait for others to take actions it supposes might be more 'cost effective' elsewhere (this is the meaning, here, of proposing to wait for and 'monitor' future results from cap-and-trade)—is inappropriate. Prioritizing only cost-effectiveness *for oil companies,* it creates environmental injustice *for the people of the region.* It is the race-to-the-bottom policy, pushed by polluters who insist that we must "wait for cleanup somewhere else," that imperils everyone's climate. It ***must*** be rejected.

COMMENT 2-2. Emissions Monitoring Demonstration Required for New Permit.

Add section 12-15-301 to Rule 12-15 as follows:

§ 12-15-301 **Moratorium on Expanded Potential to Emit:** A permit to construct or permit to operate a new source or modified source at a petroleum refinery may not be issued if the petroleum refinery has not demonstrated adequately complete and accurate monitoring and reporting of facility emissions and oil feedstock-related emissions to comply with all applicable requirements of sections 401, 402, 403, 405, and 413.

Rationale. Before the Air District can compare existing emissions with proposed future potential to emit from refineries seeking permits for new or modified sources adequately, improved facility and oil feedstock emissions monitoring and reporting will be necessary. This need is demonstrated by District Staff's statements of basis for proposed Rule 12-15, proposed Rule 12-16, and its proposal admitting it needs oil feedstock information (including from Rule 12-15) to fix permitting under Regulation 2. This need also is demonstrated by direct observation and data. *See,* for example, Table 2-1.

Table 2-1 shows missing emission data (shaded in yellow) for each toxic air contaminant (TAC) with an Office of Environmental Health Hazard Assessment toxicity factor, and

each of eight oil refining plants (five refineries and three refinery support facilities). Air District reporting-year 2013 data[3] are shown. RY2011–2012 data show similar gaps.[3]

Table 2-1. Gaps in refining facility toxic air contaminant emissions data, reporting yr 2013[a]

Shading shows missing data	Was emission of the contaminant by the plant[b] reported?							
Toxic Air Contaminant[c]	**Plt. A**	**Plt. B**	**Plt. C**	**Plt. D**	**Plt. E**	**Plt. F**	**Plt. G**	**Plt. H**
1,3-Butadiene	Y	N*	N	Y	N*	N	N	N*
Acetaldehyde	Y	Y	N	Y	Y	N	N	Y
Acrolein	N	N	N	N	N	N	N	N
Ammonia	Y	Y	Y	Y	Y	N	N	Y
Arsenic	Y	Y	N	Y	Y	Y	N	Y
Benzene	Y	Y	Y	Y	Y	Y	Y	Y
Benzo[a]anthracene	N**	N**	N	N**	N**	N**	N	N**
Benzo[a]pyrene	N**	N**	N	N**	N**	N**	N	N**
Benzo[b]fluoranthene	N**	N**	N	N**	N**	N**	N	N**
Benzo[k]fluoranthene	N**	N**	N	N**	N**	N**	N	N**
Beryllium	Y	Y	N	Y	Y	Y	N	Y
Cadmium	Y	Y	N	Y	Y	Y	N	Y
Carbon disulfide	N	N	N	N*	N	N	N	N
Chlorine	N	N	N	N	N	N	N	N
Chlorobenzene	N	N	N	N	N	N	N	N
Chloroform	N	Y	N	N	N	N	N	N
Chromium (hexavalent)	Y	Y	N	Y	Y	Y	N	Y
Chrysene	N**	N**	N	N**	N**	N**	N	N**
Copper	Y	N	N	Y	N	N	N	Y
Cresols	Y	Y	N	N	Y	N	N	Y
Cyanide	N	N	N	N	N	N	N	N
Cyanide compounds	N	N	N	N	N	N	N	N
Dibenzo[a,h]anthracene	N**	N**	N**	N**	N**	N**	N	N**
Diesel particulate matter	Y	Y	N	Y	Y	Y	N	Y
Diethanolamine	Y	N	N	Y	Y	N	N	N
Ethylbenzene	Y	Y	N	Y	Y	N	N	Y
Ethylene dibromide	Y	N	N	N	Y	N	N	Y
Ethylene dichloride	Y	N	N	N	Y	N	N	Y
Formaldehyde	Y	Y	Y	Y	Y	Y	Y	Y
Hexane	Y	N	N	Y	N	N	N	Y
Hydrogen chloride	N	N	N	N	N	N	N	Y
Hydrogen sulfide	Y	N*	N	Y	Y	N	N	Y
Indeno[1,2,3-cd]pyrene	N**	N**	N	N**	N**	N**	N	N**
Lead	Y	Y	N	Y	Y	Y	N	Y
Manganese	Y	Y	N	Y	Y	Y	N	Y
Mercury	Y	Y	N	Y	Y	Y	N	Y
Methanol	Y	Y	N	N	Y	N	N	Y
Methyl Ethyl Ketone	Y	N	N	Y	N	N	N	N
Methyl tert-Butyl Ether	Y	Y	N	Y	Y	N	N	Y
m-Xylene	N**	N	N	N**	N	N	N	N

Continued next page

Table 2-1. Gaps in refining facility toxic emissions data, reporting yr 2013[a] *continued.*

Shading shows missing data	Was emission of the contaminant by the plant[b] reported?							
Toxic Air Contaminant[c]	**Plt. A**	**Plt. B**	**Plt. C**	**Plt. D**	**Plt. E**	**Plt. F**	**Plt. G**	**Plt. H**
Naphthalene	N**	Y	N	Y	N**	N**	N	N**
Nickel	Y	Y	N	Y	Y	Y	N	Y
o-Xylene	N**	N	N	N**	N	N	N	N
Perchloroethylene	Y	N	N	Y	Y	N	N	Y
Phenol	Y	Y	N	Y	Y	N	N	Y
Polychlorinated dioxins	N	N	N	N	N	N	N	N
Propylene	Y	N	N	Y	Y	N	N	Y
Propylene glycol (monomethyl)	Y	N	N	N	N	N	N	N
Selenium	N	Y	N	Y	Y	N	N	Y
Silicon	N	N	N	N	N	N	N	N
Styrene	N	N	N	N	N	N	N	N
Sulfate	N	N	N	N	N	N	N	N
Sulfuric acid	N*	N	N	Y	N	N	N	N
Toluene	Y	N	N	Y	N	N	Y	N
Vanadium	N	N	N	Y	N	N	N	N
Xylenes	Y	N	N	Y	N	N	N	N

(a) Data from AQMD response to request for all emission data for these plants and years pursuant to the California Public Records Act.[3] (b) Plant codes are **A:** Chevron Richmond refinery; **B:** Phillips 66 Rodeo refinery; **C:** Air Liquide hydrogen plant supporting Phillips refinery; **D:** Shell Martinez refinery; **E:** Tesoro Golden Eagle refinery; **F:** Martinez Cogen LP supporting Tesoro refinery; **G:** Air Products hydrogen plant supporting Tesoro refinery; **H:** Valero Benicia refinery. (c) Toxic air contaminants that have OEHHA toxicity factors, from Chevron Modernization Project EIR SCH #2011062042 (Table A4.3-HRA-1).

N** Emission not reported or quantifiable from lump-sum of emissions reported for larger chemical class.

N* An emission rate of zero that is not credible for this pollutant and plant was reported.

When CBE, seeking the omitted TAC data, showed a draft of this table to the Air District's technical staff (that draft included three-years of data from RY2011–2013), we were informed that those toxics are not monitored at these facilities.[4]

Thus, as reported by the Air District and shown in Table 2-1, data on each facility's emissions are missing for many or most of the 56 TACs identified in the table. Across the eight facilities combined, emissions data are missing for ***two-thirds*** (66%) of TACs.

Health Risk Assessment (HRA) estimates the total health hazard of the specific mix of TACs emitted. Bay Area refiners plan and propose projects to refine new, inherently higher-emitting oil feedstock now,[5] and HRAs are required in Air District permitting of those new and modified emission sources. Thus, the lack of reported emissions data for so many TACs, though only part of the problem, is by itself clear evidence that the information needed to properly complete permitting this proposed expanded potential to emit is not yet available.

For all of these reasons, the revision above is needed to ensure that refinery emissions will not cause unacceptable harm to communities, climate stability and public health.

COMMENT 2-3. Compliance Demonstration Required for New Permit.

Add section 12-16-306 to Rule 12-16 as follows:

§ 12-16-306 **Moratorium on Expanded Potential to Emit:** A permit to construct or a permit to operate a new source or modified source at a petroleum refinery may not be issued if the petroleum refinery has not demonstrated compliance with all applicable Facility Emission Limits in Section 12-16-304 or if the petroleum refinery emissions cause or contribute to a cumulative health risk established in accordance with Section 12-16-302 that exceeds the Significant Risk Threshold in Section 12-16-301.

Rationale: Please see Comment 2-2 above. In addition to asserting it needs information to evaluate potential to emit from planned new and modified refinery sources, including those enabling changing crude slates, District Staff has documented its assertions that it does not have and needs time to gather the information needed to fully evaluate health impacts associated current and potential refinery emissions. *See* Staff-proposed §§ 12-15-405, 12-15-406, 12-16-405 and 12-16-406. The District does not have the information needed to ensure that issuing a permit for a new or modified refinery source that could increase emissions will not result in unacceptable health impacts.

Furthermore, any substantial increase in emissions documented to support the Facility Emission Limits can be expected to contribute to unacceptable health impacts because GHG and particulate matter (PM) air pollution are causing severe impacts now.[5]

Thus, permits for new or modified refinery emission sources may not properly be issued unless it can be demonstrated that GHG, PM and PM precursors will not increase and TAC emissions (which HRAs attempt to evaluate) will not cause significant local health impact. Requiring these demonstrations before such permits may be issued is therefore necessary and appropriate.

COMMENT 2-4. Independent Air Pollutant Monitoring Assessment.

Revise sections 401, 402, 405, 407, 412 and 413 of Rule 12-15 as follows:

§ 12-15-401 **On-going Annual Petroleum Refinery Emission Inventory and Monthly Crude Slate Reports:** ~~A refinery owner/operator shall obtain and maintain APCO approval of~~ The APCO shall develop, certify, and publish on the District Web Site an On-going Annual Petroleum Refinery Emissions Inventory and Monthly Crude Slate Report for each petroleum refinery. …

§ 12-15-402 **Petroleum Refinery Emissions Profile Report:** ~~A refinery owner/operator shall obtain and maintain APCO approval of~~ The APCO shall develop, certify, and publish on the District Web Site a PREP report for each petroleum refinery. …

§ 12-15-405 ~~**Submittal of**~~ **Health Risk Assessment Modeling Protocol and Health Risk Assessment:** ~~A refinery owner/operator shall obtain and maintain APCO approval of~~ The APCO shall develop, certify, and publish on the District Web

Site a HRA Modeling Protocol and HRA and, if required pursuant to 12-16-401, an Updated HRA Modeling Protocol and HRA for each petroleum refinery …

§ 12-15-407 **Air Monitoring Plans:** ~~A refinery owner/operator shall obtain APCO approval of a plan for establishing and operating~~ The APCO shall establish and operate a fence-line monitoring system and community air monitoring system and shall report monitoring results from these systems on the District Web Site, in real-time to the maximum extent practicable, according to the schedule set forth in this Section. …

§ 12-15-412 **Energy Utilization Analyses:** The APCO shall develop, certify, and publish on the District Web Site an Energy Utilization Analysis for each petroleum refinery annually. The Energy Utilization Analysis shall include, but shall not be limited to, annual refinery energy use for each fuel consumed, as defined by the U.S. Energy Administration in its "Fuels Consumed at Refineries" reports (in millions of British Thermal Units), total annual refinery energy use (in millions of Btu), and annual refinery energy intensity measured as total energy use divided by total petroleum feedstock processed (in Btu per barrel). …

§ 12-15-413 **Monthly Crude Slate Reports for Calendar Years 2010, 2011, 2012, 2013, and 2014:** ~~A refinery owner/operator shall obtain APCO approval of~~ The APCO shall develop, certify, and publish on the District Web Site historical documentation of Monthly Crude Slate Reports covering the calendar years 2010, 2011, 2012, 2013, and 2014 ~~in an APCO-approved format~~ on or before September 1, 2016. …

Rationale: Polluter self-monitoring is like the fox guarding the chickens—inappropriate. CBE and others have objected to this approach many times during the long process for development of this Rule. At the outset, CBE joined with the refinery workers union United Steelworkers (USW) International and USW Local 5, the Asian Pacific Environmental Network, BlueGreen Alliance, Natural Resources Defense Council and Labor Occupational Health Center at UC Berkeley in comments[6] stating:

> "Research has shown that self-reported data is less accurate, and that regulators should engage in direct monitoring and oversight of emissions at stationary sources.[7] Industry has a strong financial incentive to underreport emissions, especially when oversight and enforcement are lacking.[8] *27 February 2013 Collaborative Comments.*[6]

Self-monitoring has intruded ominously into public environmental policy for many years. Yet Rule 12-15 as proposed would give away much more of the public right to analyze raw emission data, monitor the resultant pollution of our air, and assess the resultant health hazard—and would give it away to the highest-emitting and most powerful companies in its jurisdiction. That dangerous error risks monitoring and surveillance failure. The revision above avoids this unreasonable risk.

Please note that the extent of the historical crude slate reporting period is addressed along with other substantive problems in that reporting in separate comments to follow herein.

COMMENT 2-5. Independent Development of Compliance Obligation Details.

Strike sections 305 and 406; revise sections 302 and 401 of Rule 12-16 as follows:

§ 12-16-302 **Risk Reduction Audit and Plan:** A refinery owner/operator shall obtain and maintain an APCO-approval of a Risk Reduction Plan (RRAP) in accordance with Sections 12-16-403 and 404 if the APCO-~~approved~~certified HRA required pursuant to Section 12-15-405 or 12-16-401 establishes that a ~~Refinery-Wide~~ Cumulative Health Risk exceeds a Significant Risk Threshold set forth in Subsection 12-16-301.2 and emissions from the petroleum refinery contribute to that Cumulative Health Risk.

§ 12-16-401 **Updated Health Risk Assessment Requirement:** ~~A refinery owner/operator shall submit to the APCO for approval~~ The APCO shall develop, certify, and publish on the District Web Site an updated health risk assessment (HRA) ~~within 150 days of notification by the APCO that an updated HRA is required. The refinery owner/operator shall follow the procedures in Section 12-15-405.3 and 405.4 regarding the timely submittal of the modeling protocol~~ each three years, or more often as the APCO may determine necessary in order to ensure the protection of air quality and public health.

Rationale: As now proposed, the "significant risk" (§ 301.2) and locally-designed "NAAQS Compliance" (§ 305) thresholds in Rule 12-16 would not be enforceable as adopted by the District's elected Board. Instead, refiners would be "required" to develop the specific relationships of their emissions to the health protection goals implied by the Rule before a specific, enforceable requirement to limit or control emissions could result from those provisions. (*See* §§ 12-15-401, 12-15-405, 12-16-406 and 12-16-407.) Further, as now proposed, that development of specific requirements would be a complex technical analysis, rife with judgment calls. Refiners' "strong financial incentive"[8] could bias this analysis—and they might use overly-broad claims of confidential information to shield those biased results from independent public verification. As proposed, this is polluter self-regulation, or at best a radical step in that dangerously wrong and prone-to-failure direction for our environmental health. The revisions above, with those in Comment 2-4, would avoid ceding the District's role in public oversight of air quality.

Please note that comments to follow also address sections 12-16-302, 305 and 406.

COMMENT 2-6. Oil Feedstock Data Public Reporting Safeguard.

Add the following language to Section 411 of Rule 12-15, to be inserted following the last sentence in Section 12-15-411:

§ 12-15-411 **Designation of Confidential Information:** … A facility-wide average Monthly Crude Slate Report data element identified in sections 401.7 or 413 shall not be exempt from public disclosure unless the refinery owner/operator has demonstrated to the satisfaction of the APCO, and the Air District Board of Directors has certified in a public hearing, all of the following:

(a) That the data element has not been disclosed to any competitor or to the public and has not been made available to the public by any other means; and

(b) That the data element cannot be estimated independently from available public data and information; and

(c) That disclosure of the data element would cause harm to the owner/operator's business interests that outweighs the harm to public knowledge, air quality protection, climate protection and public health protection that may be caused by keeping the data element secret from public environmental review.

Rationale: Average refinery crude slate data is not secret as it has been reported publicly, is known to competitors who buy, sell and trade crude supplies, or can be and has been estimated by using publicly available data and information. Furthermore, refinery crude slate data is used to express and measure compliance with refinery emissions limits and is uniquely important emissions-related information that is essential to disclose for independent verification of air quality and health protection measures and crucial to the development of public air quality and health policy.

COMMENT 2-7. Air District Information Custodian Safeguard.

Add the following language to Section 503 of Rule 12-15, to be inserted following the last sentence in Section 12-15-503:

§ 12-15-503 **Recordkeeping:** … A refinery owner/operator shall provide complete and accurate copies of all records kept pursuant to this Section to the APCO and the APCO shall keep and maintain those records at the Air District offices.

Rationale: The revision is needed to provide for reasonable public access to air quality, climate and health-related data and information. Refiner-kept records often require public (and public agency) review efforts so onerous and time consuming that the public is effectively denied access to information that is not legally exempt from public review.

COMMENT 2-8. Refinery Energy Intensity Public Reporting Safeguard.

Add the following language to Section 411 of Rule 12-15, to be inserted following the last sentence in Section 12-15-411, as revised in Comment 2-6:

§ 12-15-411 **Designation of Confidential Information:** … Annual average refinery-wide energy usage, energy usage by fuel type, and energy intensity data developed by the APCO pursuant to Section 12-15-412 shall not be deemed exempt from public disclosure.

Rationale: The revision is needed to provide for reasonable public access to air quality, climate and health-related data and information. Average annual refinery-wide energy usage and fuel usage data can be estimated from publicly available data and information by competent experts in the field and are, therefore, not secret from the public.

COMMENT 2-9. Monitoring Development Public Reporting Safeguard.

Add the following language to Section 411 of Rule 12-15, to be inserted following the last sentence in Section 12-15-411, as revised in comments 2-6 and 2-8:

§ 12-15-411 **Designation of Confidential Information:** … Emission data and ambient air quality data obtained, developed, or analyzed pursuant to this Rule shall not be deemed exempt from public disclosure.

Rationale: Emission and air quality data are public data. Timely public access to these data is necessary for meaningful and timely public participation in the implementation of the Rule as proposed. The revision is needed to ensure timely public access to that air quality, climate and health-related data and information.

COMMENT 2-10. Emission Control Development Public Reporting Safeguard.

Add new Section 307 to Rule 12-16, to read as follows:

§ 12-16-307 **Implementation To Be Based On Public Data:** All data and information that forms a basis for a determination by the APCO pursuant to the provisions of this Rule or a professional judgment made by the APCO in the implementation of this Rule shall not be deemed exempt from public disclosure unless the APCO, in a report that is timely and prominently posted with the other material related to this Rule on the District Web Site:

(a) Discloses the use of confidential information, each type of confidential information used, and each specific decision or judgment based on each type of confidential information used; and

(b) Provides a detailed and transparent explanation why the APCO believes that the data are confidential information exempt from public disclosure; and

(c) Demonstrates that no adequate alternative determination or implementation decision that would avoid reliance on confidential information has been identified.

Rationale: The provision is necessary and reasonable because overbroad trade secrecy claims that limit public oversight and undermine science are common in environmental policy analysis involving the oil industry. It is especially necessary and reasonable in this case, because as proposed, public review of the Rule's specific, enforceable requirements would be deferred to time-limited windows ***after*** the public hearing for adoption.

COMMENT 2-11. Petroleum Refinery Emissions Profile Requirements

Strike Section 103 of Rule 12-16 and revise §§ 215 and 216 of Rule 12-15 as follows:

~~§ 12-16-103 **Limited Exemption, Emissions from Flares:** Emissions from flaring events addressed in Regulation 12, Rules 11 and 12 shall not be included in requirements for demonstrating compliance with the NAAQS under this rule.~~

~~Specifically, emissions from flaring events shall be excluded from the requirements of Sections 12-16-404 through 12-16-408.~~

§ 12-15-215 **Petroleum Refinery Emissions Profile (PREP):** An emissions inventory for the Petroleum Refinery Emissions Profile (PREP) period that is used as a reference with which to compare emissions inventories for later periods of time (on-going annual emissions inventories) in order to determine changes in emissions that have occurred from a petroleum refinery. A PREP shall be the average emission rate, expressed in units of tons or pounds per year, based on actual emissions that occurred during the PREP period, except that a PREP shall not include emissions that exceeded regulatory or permitted limits, or emissions ~~from accidental air releases~~ that were eliminated before December 31, 2015 by a permanent or long-lasting change in conditions, such as the closure or addition of emission control to a source.

§ 12-15-216 **Petroleum Refinery Emissions Profile Period:** A period of 12 consecutive months, from January ~~2010~~ 2013 through December 2015, which is selected by ~~a refinery owner/operator~~ the APCO for establishing a PREP for a particular criteria pollutant, toxic air contaminant, or greenhouse gas. A different consecutive 12-month period may be used for each criteria pollutant, toxic air contaminant, or greenhouse gas.

Rationale: The revisions are necessary for accuracy and health protection. Flaring and other incidents cause acute exposure hazards from refinery air pollution in nearby communities. Excluding incident emissions also systematically biases the emissions baseline low due to emissions changes associated with downtime following incidents. Including past emissions from sources that no longer exist or have been permanently controlled also is inappropriate—and introduces even greater error (in annual emissions) than excluding incident emissions, based on actual recent data reviewed in part 1 of CBE's comments.[5] Looking back more than three years unnecessarily makes the emissions baseline, for these facilities, less accurate and reliable for the same reason (including past conditions that have changed)[5] and by relying upon older data. With respect to APCO Profile Period selection in the revision to § 12-15-216, this is consistent with Comment 2-4 and revised § 12-15-402 shown therein.

COMMENT 2-12. Source-specific Disclosure of Unmonitored Emissions.

Revise Subsection 401.2 of Rule 12-15 as follows:

§ 12-15-401.2 A summary of the total quantity of each criteria pollutant, TAC, and GHG that was emitted from the petroleum refinery during the on-going annual petroleum refinery emissions inventory period and a table listing, for each source and each pollutant, whether the emission or potential emission of the pollutant was (a) continuously monitored, (b) monitored by direct measurement that was not continuous, (c) not monitored directly and estimated to emit by other methods, or (d) not monitored and estimated not to emit above a rate of zero.

Rationale: Transparent, easy public access to this contextual information is important, especially because the public and public policy makers are being asked to rely on HRAs that have typically not disclosed missing emission data prominently. *See* Table 2-1.

COMMENT 2-13. Required Emissions Profile and Inventory Detail.

Revise Subsections 401.3 and 402.3 of Rule 12-15 as follows:

§ 12-15-401.3 A detailed listing of the annual emissions of each criteria pollutant, TAC, and GHG emitted from each source at the petroleum refinery, including the monitoring method and any change in the monitoring method applied to determine the emission rate of each pollutant and source, and a complete description of the methodology used for determining these emissions including documentation of the basis for any assumptions …

§ 12-15-402.3 A detailed listing of the emission rate of each criteria pollutant, TAC, and GHG that was emitted from the petroleum refinery during the PREP period, expressed in units of tons or pounds per year for criteria pollutant and TAC emissions and in units of metric tons per year for GHG emissions, a complete listing of the monitoring method applied to determine the emission rate of each pollutant from each source, and a complete description of the methodology used for determining these emissions including documentation of the basis for any assumptions …

Rationale: Monitoring and estimation method information is important to publicly verifiable results, and thus important to public reviews of analyses and mitigation requirements based on these data that are anticipated pursuant to rules 12-15 and 12-16. The revision is needed to help ensure that this important information will be easily accessible and transparent to the public. Monitoring issues documented in Table 2-1 and the associated discussion in Comment 2-2 demonstrate an example of this need.

COMMENT 2-14. Oil Feedstock: Need for Clear and Consistent Definition.

Revise Section 212 and Subsection 401.7 of Rule 12-15 as follows:

§ 12-15-212 **Monthly Crude Slate Report:** A summary of ~~crude slate~~ volumes and properties of petroleum, including whole crude, any distillation cut of crude that is not whole crude, and synthetic crude oil, processed by a petroleum refinery ~~crude unit(s)~~ each calendar month, reported annually for the calendar year.

§ 12-15-401.7 The Monthly Crude Slate Report shall include summaries of the ~~petroleum refinery's crude slate and other pre-processed feedstocks~~ petroleum processed by the petroleum refinery for each calendar month …

Rationale: As proposed, the definition of oil feedstock processed in § 212 is not consistent with the description of oil feedstock to be reported in § 401.7, and each (§ 212 and § 401.7) is too vague and subject to interpretation for any adequate assurance against inconsistent and incomplete reporting. This is a critical flaw. The revisions correct it.

COMMENT 2-15. Emissions-related Oil Feedstock Data Requirements.

Revise Section 413 of Rule 12-15 and add Subsections 401.7.10 through 401.7.14 and 413.2.10 through 413.2.14 (adding identical Subsections) to Rule 12-15 as follows:

§ 12-15-413 **Monthly Crude Slate Reports for Calendar Years 2010, 2011, 2012, 2013, and 2014:** ~~A refinery owner/operator shall obtain APCO approval of~~ The APCO shall develop, certify, and publish on the District Web Site historical documentation of Monthly Crude Slate Reports covering the calendar years 2010, 2011, 2012, 2013, and 2014 ~~in an APCO-approved format~~ on or before September 1, 2016. …

§ 401.7.10 & § 413.2.10 Average distillation characteristics by volume for total petroleum entering the refinery as whole crude, any cut of whole crude, and synthetic crude oil that is processed at the refinery, including the total volume (in millions of barrels) and cut points (in ºC) for each of the following cuts: vacuum residuum; atmospheric residuum; heavy gas oil; light gas oil; distillate; kerosene; naphtha; and light ends (gases), and

§ 401.7.11 & § 413.2.11 For each cut identified in Subsection 10 above, all of the information required in Subsections 2 (API gravity) through 9 (nickel, vanadium, and iron content), and

§ 401.7.12 & § 413.2.12 Average hydrogen content (percentage by weight) for total petroleum entering the refinery as whole crude, any cut of whole crude, and synthetic crude that is processed at the refinery, and

§ 401.7.13 & § 413.2.13 Average trace element content for total mercury and for selenium (parts per billion by weight), and

§ 401.7.14 & § 413.2.14 Any additional information regarding petroleum processed by the refinery which the APCO may determine that it is appropriate to report.

Rationale: The revision and additions are needed to ensure that when changing oil quality causes large changes in a refiners' emissions, the data supplied to the District are adequate to identify that cause. Distillation characteristics and hydrogen content are fundamental processing characteristics of crude that strongly affect refinery emission intensity. Though crude density (ºAPI) is related to both and predicts refinery energy and emission intensity across the industry well, these (and other) properties of crude should be considered in plant-specific assessments.[9, 10] Hydrogen addition to H_2-poor oil feeds can greatly boost refinery energy and emission intensities, and since different crude cuts go to different types of processing that have different emission profiles, the quality of the cuts matters. A refinery could not be designed and operated efficiently—and it is risky to assume that significant oil feed-driven changes in emissions from the refinery would be identified reliably—without knowing its oil feed in at least this level of detail.

Historical data acquisition is extended from 3–5 years based on the time scales of variability in US, and local, refiners' crude feeds. Crude mercury and selenium content varies dramatically among crude oils, and both contaminants have been linked to environmental toxicity hazards of refining more contaminated crude feeds.

COMMENT 2-16. Particulate Emissions Speciation Demonstrations.

Add new Section 414 to Rule 12-15, to read as follows:

§ 12-15-414 **Particulate Emissions Speciation Demonstrations:** The APCO shall establish, operate, and report results from a demonstration monitoring program to measure ultra-fine particulate matter emissions from the five largest currently known particulate matter (PM) emission sources at each petroleum refinery and the community air monitoring system near the refinery. Particulate matter measurements taken from these emission sources and ambient air monitors shall include, but not be limited to, particle counts and mass of PM that is less than 0.1 micron, 0.1–1.0 micron, 1–2.5 microns, 2.5–10 microns, and greater than 10 microns. The APCO shall plan and implement the program to begin reporting results on the District Web Site on or before July 1, 2017.

Rationale: The chemical composition, penetration into the lung and bloodstream, and thus the potential toxicity of aerosol (PM) are related to particle size. Refineries are strong emitters of the relatively more hazardous ultra-fine particlulate matter (UFPM), but the mass of an ultrafine particle can be orders of magnitude less than that of $PM_{2.5}$ or PM_{10}. Thus air quality monitoring, assessment, and protection based on PM mass measurements is structurally biased toward underestimation of PM health hazard in communities near refineries. Therefore, any reasonably comprehensive refinery emissions and health hazard tracking program—including the one the Rule could establish—should assess UFPM.

COMMENT 2-17. Volatile Emission Methods Demonstration Program.

Add new Section 415 to Rule 12-15, to read as follows:

§ 12-15-415 **Volatile Emission Methods Demonstration Program:** The APCO shall establish, implement, and report results from a program to monitor volatile air pollutant emissions from at each petroleum refinery using differential absorption light detection and ranging (DIAL) as a check on the accuracy and reliability of volatile air pollutant monitoring at the refineries. The DIAL monitoring surveys shall include, but not be limited to, measurements of facility-wide emissions and source-specific or source area emissions of volatile organic compounds, methane, and benzene. The APCO shall establish and implement the program such that comparisons of DIAL monitoring results with PREP and on-going annual petroleum refinery emissions inventory emission estimates will be reported on the District Web Site on or before October 1, 2017.

Rationale: Currently available emission monitoring technology, including differential absorption light detection and ranging (DIAL), is capable of measuring emissions of many volatile pollutants from sources in refineries that are difficult or unsafe to access for direct sampling by manual methods and are not otherwise monitored directly. Comparisons of DIAL with current or traditional estimation methods at refineries in other states and countries strongly suggest that these other methods may be underestimating volatile emissions from one or more Bay Area refineries substantially. Thus DIAL monitoring could serve as a check on existing monitoring that may underestimate some

important emissions, and resultant health impacts, from Bay Area refineries. Therefore, the revision to establish and implement this check is reasonable and appropriate.

COMMENT 2-18. Inclusion of Incident Potential To Emit Air Pollutants.

Add the following requirement to Section 407 of Rule 12-15:

§ 12-15-407 **Air Monitoring Plans:** … The APCO shall publish a list of air pollutants that have the potential to cause health impacts resulting from acute exposures in communities near petroleum refineries upon emission during the worst-case potential incident at refineries for the particular pollutant, and ensure that the fence-line and community monitoring systems monitor these pollutants.

Rationale: See the historic information regarding the monitoring failure in the aftermath of the 6 August 2012 crude unit fire at the Chevron Richmond refinery.

COMMENT 2-19. Comparison of Air Monitoring with Incident Plumes.

Add the following requirement to Section 407 of Rule 12-15 directly after the language to be added that is shown in Comment 2-18:

§ 12-15-407 **Air Monitoring Plans:** … The APCO shall determine the potential pathways of emission plumes that may occur in various combinations of weather conditions and potential incidents at each petroleum refinery, and publish a visual representation mapping the potential plumes in relation to the locations of fence-line and community air monitors in communities near each refinery on the district Web Site with results of fence-line and community air monitoring

Rationale: The physical limitations of fence-line and community air monitoring coverage during many foreseeable incident conditions, though well known, are not obvious or transparently accessible to all people in communities near refineries and in the public. The revision addresses this need for pubic information and transparency.

COMMENT 2-20. Requirement to identify limitations in HRA.

Add the following requirement to Section 405 of Rule 12-15:

§ 12-15-405 **Health Risk Assessment Modeling Protocol and Health Risk Assessment:** … The APCO shall identify all known limitations in the ability of each HRA to represent fully the health hazard of air pollutants in the area covered by the HRA, publish a concise and complete listing of each such known limitation in the HRA, and cause this listing to be disseminated with full reports and summary reports on the HRA.

Rationale: The limitations of HRA in fully representing the health hazard of air pollutants, though well known to experts in this field, are not obvious or transparently accessible to all people in communities near refineries and in the public. The revision addresses this need for pubic information and transparency.

COMMENT 2-21. Requirement for Prompt Reduction of Hazardous Emissions.

Revise the compliance schedule for reducing emissions shown to cause or contribute to a significant health hazard in Section 403 of Rule 12-16 as follows:

§ 12-16-403 **Risk Reduction Audit Plan Submission Requirements:** … reduce emissions or health risk from the refinery to a level below the Significant Risk Threshold as soon as feasible, but by no later than ~~five~~ three years from the date of submission:

403.1 The APCO may extend this time period up to ~~five~~ two additional years if the Refinery Owner/Operator demonstrates to the APCO that requiring implementation of the plan within ~~five~~ three years places an unreasonable economic burden on the facility operator or is not technically feasible;

403.2 The APCO may shorten the time period proposed by the Refinery Owner/Operator for RRAP implementation to less than ~~five~~ three years …

Rationale: Five years plus five more years for a total of ten years' ongoing significant toxic health risk is unreasonable, unnecessary, and underprotective of community health.

COMMENT 2-22. Protective Analysis of PTE for Unmonitored Emissions.

Add the following requirement to Section 405 of Rule 12-15:

§ 12-15-405 **Health Risk Assessment Modeling Protocol and Health Risk Assessment:** … The APCO shall determine the potential to emit each TAC that the petroleum refinery has not reported adequate emissions monitoring data to include in a HRA, and include the potential to emit for that TAC in the HRA.

Rationale: The revision is necessary to assure that HRAs will not underestimate health hazard due to non-reporting of emissions by oil refiners, and needed to avoid encouraging such non-reporting. Encouraging more complete and accurate TAC emissions monitoring is an additional benefit of this revision.

COMMENT 2-23. Significance Threshold is Underprotective of Health.

Revise the 'Health Risk Thresholds' in Section 301 of Rule 12-16 and the reference to them in Section 302 of Rule 12-16 as follows:

§ 12-16-301 **Health Risk Thresholds:** For each petroleum refinery, the health impact thresholds that trigger further action are established as the following values for cancer risks and non-cancer acute and chronic hazard indices:

	Health Risk Thresholds	~~Refinery-Wide~~ Cumulative Cancer Risk	~~Refinery-Wide~~ Cumulative Non-Cancer Acute and Chronic Hazard Indices
301.1	Notification Risk	10 in a million (10×10^{-6})	1.0
301.2	Significant Risk	~~25~~ 10 in a million (10×10^{-6})	2.5
301.3	Unreasonable Risk	100 in a million (10×10^{-6})	10

§ 12-16-302 **Risk Reduction Audit and Plan:** A refinery owner/operator shall obtain and maintain an APCO-approval of a Risk Reduction Plan (RRAP) in accordance with Sections 12-16-403 and 404 if the APCO-~~approved~~certified HRA required pursuant to Section 12-15-405 or 12-16-401 establishes that a ~~Refinery-Wide~~ Cumulative Health Risk a Significant Risk Threshold set forth in Subsection 12-16-301.2 and the petroleum refinery emissions contribute to that Cumulative Health Risk.

Rationale: The 25 in a million cancer threshold that District Staff now proposes is underprotective. It is 250% of the cancer risk trigger for action to cut toxic emissions that District Staff proposed at 10 in a million in February 2015.[11] Other air districts in California already implement the 10 in a million threshold, CBE is informed, strongly suggesting that it is feasible to implement this more protective threshold.

'Refinery-Wide Risk' may be much or most of the real, total ***cumulative*** toxic impact, but by definition, it is still only part of the impact. Degrading the health-based signal by piecemealing it artificially diminishes the impetus for stronger action at refineries and other emitters who can and should cut toxic emissions.

COMMENT 2-24. Revisions to District Staff-proposed Emission Limits.

Strike Sections 304, 305, 405 and 406 in the September 2015 draft of Rule 12-16.

Rationale: These provisions allow and may facilitate increasing refinery emissions.

District Staff's new proposed "Source-specific and Refinery-wide SO_2 and $PM_{2.5}$ emission limits" (§§ 304 and 405) do not limit GHG, NO_x, or any other refinery air pollutant emission. No specific limits that could be enforceable upon adoption are proposed, not even for SO_2 or $PM_{2.5}$. Instead § 405 would defer until at least mid-2017 and then establish refinery-wide SO_2 and $PM_{2.5}$ limits "equivalent to the sum of the PTE values for all sources" in each refinery. PTE is potential to emit:

> "The maximum capacity of a source or facility to emit a pollutant based on any physical or operational limitation on the capacity of the source or facility to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, or the capacity of any upstream or downstream process that acts as a bottleneck."
> § 12-16-216

Thus, these 'PTE limits' are really allowances for refineries to increase emissions up to their maximum capacity to emit. Worse, by waiting nearly two years before setting these 'limits' while it continues to permit a rush of permits for projects to expand the capacity for refining larger amounts of low-quality oil, such as tar sands oil, across the region, the limits would apparently allow—and lock in—all of that increased potential to further increase emissions even more. Completing the picture, § 405 provides that these 'limits' would be inserted into the Title V Air permit for each refinery, creating a 'permit shield.' Instead of 'limiting' emissions, §§ 304 and 405 allow them to continue increasing.

Sections 305 and 406, propose a program whereby each refiner would be required to demonstrate "NAAQS Compliance" for SO_2 and for $PM_{2.5}$. It provides for each refinery to either model its emissions into nearby air or monitor them at locations chosen via that local air dispersion modeling. NAAQS is the acronym for National Ambient Air Quality Standard. The Air District should already know whether it complies with national air quality standards—it says it does know, on its Web Site. In any case, it is clear that neither the Air District nor the refiners can demonstrate compliance with these standards that apply across the air basin by a few limited modeling-based studies of air around refineries that does not represent the air basin as a whole. The proposal may have another objective, like the PTE limits, to create and then permit emitting up to a new allowable limit, or it may just be misguided. Either way, it should not be adopted.

Conclusion

This is the second part of two-part comment on the September 2015 version of proposed regional facility-wide oil refinery emissions policy that CBE has engaged actively with Air District Board and Staff to improve since 2012.

We are disappointed and gravely concerned about the scope and severity of problems in this September 2015 proposal, for rules 12-15 and 12-16. Please consider our concerns and our positive solutions to them, and contact us if you have a question about them.

In Health

Greg Karras
Senior Scientist

Roger Lin
Staff Attorney

Copy: Interested individuals and groups

End Notes

1 Assessment Report 5 of the Intergovernmental Panel on Climate Change (IPCC AR-5).

2 *See* Jacobson, 2008. On the causal link between carbon dioxide and air pollution mortality. *Geophysical Research Letters* **35**(L03809). DOI: 10.1029/2007GL031101.

3 AQMD, 2015. Facility- and source-specific oil refinery and refinery support facility emissions data for reporting years 2011–2013 provided in response to CBE's request to review Bay Area Air Quality Management District documents pursuant to the California Public Records Act that was filed in March 2015. *See* Exhibit 1, and attachments, to Part 1 of these comments, for CBE's request to review records; and the complete data, respectively.

4 Nudd and Stevenson, 2015. Personal Communication: G. Nudd, AQMD and E. Stevenson, AQMD with G. Karras at the Bay Area Air Quality Management District in San Francisco, CA on 25 August 2015.

5 *See* Karras and Lin, 2015. *Proposal for Enforceable Numeric Limits on Refinery-wide Emissions to Stop Increasing Greenhouse Gas & Particulate Matter Air Pollution, Including Revision to Proposed Rule 12-16: Technical Report; CBE September 2015 Comments Part 1;* Revised 21 September 2015. Includes 37 references, 2 exhibits, and 8 attachments. Communities for a Better Environment: Richmond, CA.

6 Refinery Action Collaborative of Northern California, 2013. *Regarding the Regulatory Concept Paper, Petroleum Refining Emissions Tracking Rule, Bay Area Air Quality Management District Draft dated 15 October 2012;* Comments of newly-formed labor-community collaborative including the Asian Pacific Environmental Network, BlueGreen Alliance, Communities for a Better Environment, Natural Resources Defense Council, Labor Occupational Health Center at UC Berkely, United Steelworkers (USW) International Union, and USW Local 5. 27 February 2013.

7 As cited in (6): Stretsky & Lynch, 2009. Does self-policing reduce chemical emissions: A further test of the EPA self audit policy. *The Social Science Journal* **46:** 459–473.

8 As cited in (6): Waxman H., 1999. *Oil refineries fail to report millions of pounds of harmful emissions;* report prepared for Rep. Henry A. Waxman, 10 November 1999, by the U.S. House of Representatives Minority Staff, Special Investigations Division, Committee on Government Reform.

9 *See* Karras, 2010. Combustion emissions from refining lower quality oil: What is the global warming potential? *Environmental Science & Technology* **44**(24):9584–9589. DOI:10.1021/es1019965.

10 *See* Abella and Bergerson, 2012. Model to investigate energy and greenhouse gas emissions implications of refining petroleum: Impacts of crude quality and refinery configuration. *Environmental Science & Technology*. DOI: 10.1021/es3018682.

11. AQMD, 2015. Regulation 12, Miscellaneous Standards of Performance, Rule 16, Petroleum Refining Emissions Analysis, Thresholds and Mitigation. February 23, 2015 Draft. *See* esp. § 12-16-404.1 ("A Carcinogenic TAC Trigger Level shall be an increase in carcinogenic-weighted emissions for a source or group of sources that is projected to correspond to an increase in cancer risk at the maximally exposed individual of ***10 in a million cancer risk.***" ***Emphasis added.***

Changes to Comments Part 2 in this 30 September 2015 Revision

Page 2, line 25: Corrections to text in this 30 September Revision added to contents table.

Pages 2–20: Header revised to indicate CBE Comments Part 2 on rules 12-15 and 12-16.

Page 8, line 7: … Cumulative ~~Community~~ Health Risk exceeds a Significant Risk …

Page 8, line 9: … contribute to that Cumulative ~~Community~~ Health Risk.

Page 8, line 26: …bias this analysis—and they might use overly broad claims…

Page 9, line 2: …public data and information ~~by a competent expert in the field~~, and…

Page 9, line 22: …public (and public agency) review efforts so onerous…

Page 9, last line: …are, therefore, not secret from the public.

Page 13, line 10: …characteristics by volume for ~~all~~ total petroleum entering the…

Page 13, line 12: …processed at the refinery, including the total volume~~s~~ (in millions…

Page 13, line 18: …hydrogen content (percentage by weight) for ~~all~~ total petroleum…

Page 13, line 23: …regarding petroleum processed by the refinery ~~that~~ which…

Page 13, line 34: …A refinery could not be designed and operated efficiently…

Page 15, line 31: …and ~~shall~~ cause this listing to be disseminated with full reports…

Page 17, line 4: §12~~-15-405~~-16-301 **Health Risk Thresholds:** For each…

Page 18, line 8: …establish refinery-wide SO_2 ~~or~~ and $PM_{2.5}$ limits …

Page 18, last line: …Either way, it should not be adopted~~ either~~.

Attachment B

BY ELECTRONIC MAIL

21 October 2015

Greg Nudd
Eric Stevenson
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

COMMUNITIES FOR A BETTER ENVIRONMENT

Re: **Supplemental Comment on Air District Staff Proposal, Rules 12-15 and 12-16; Evidence of Increasing Bay Area Refinery GHG and $PM_{2.5}$ Emissions**

Dear Mssrs. Nudd and Stevenson,

CBE believes that the Air District Staff has improperly rejected enforceable limits set to current actual emission rates in part because the Staff has not considered adequately, and has not informed the public and its Board about, the following data and information:

1. Air District data document and forecast increasing Bay Area refinery greenhouse gas emissions.

Air District actual and forecast greenhouse gas (GHG) emissions data are reported in the Air District GHG Emission Inventory that is appended hereto as Attachment 1.[1] The most recent actual GHG emissions data reported by the Air District, its Emission Inventory data for reporting year 2013, were provided with CBE's September 2015 comments in this matter and are appended hereto as Attachment 2.[2] These data are given by year, indicating data sources specifically, in the table below.

BAAQMD refinery GHG emissions & forecasts from 1990–2029 (MM metric tons CO_2e/year)

Year	Data type & source	Refining processes	Make gas burning	Natural & other gas	Liquid fuel burning	Solid fuel burning	Total (5 refineries)
1990	actual[a]	3.3	3.8	4.5	0.1	0.8	12.5
1993	actual[a]	3.5	4.0	4.3	0.1	0.9	12.8
1996	actual[a]	3.6	3.7	4.5	0.1	0.9	12.8
1999	actual[a]	3.7	4.4	4.5	0.1	0.9	13.6
2002	actual[a]	3.5	4.5	4.6	0.1	1.0	13.7
2005	actual[a]	3.4	4.7	4.8	0.1	1.0	14.0
2008	actual[a]	3.5	4.8	4.9	0.1	1.0	14.3
2011	forecast[a]	3.6	5.0	5.1	0.1	1.0	14.8
2013	actual[b]	*Sum of all sources at 5 refineries and 3 support facilities*[c]					15.9
2014	forecast[a]	3.7	5.1	5.2	0.1	1.1	15.2
2017	forecast[a]	3.8	5.3	5.4	0.1	1.1	15.7
2020	forecast[a]	3.9	5.4	5.5	0.1	1.1	16.0
2023	forecast[a]	4.0	5.6	5.7	0.1	1.2	16.6
2026	forecast[a]	4.2	5.8	5.9	0.1	1.2	17.2
2029	forecast[a]	4.3	5.9	6.1	0.1	1.2	17.6

(a) BAAQMD, Attachment 1 Table U; (b) BAAQMD, Attachment 2; (c) Two hydrogen plants and a cogeneration plant are included as support facilities; see CBE Sept. 2015 comments.

These AQMD data indicate that refinery emissions increased from 12.5 million metric tons in 1990 to 15.9 million metric tons in 2013, the most recent year actual refinery GHG emissions are reported. For Bay Area refineries in the aggregate, the AQMD data for reporting year 2013 (15.9 MM MT) compares to Air Resources Board 2013 data (16.2 MM MT) reasonably well.

AQMD forecasts further increasing emissions, with Bay Area oil refining emissions reaching 17.6 MM MT in 2029. However, this AQMD forecast was reported in 2010, and actual emissions in 2013 (15.9 MM MT) exceed this forecast for the later years 2014 (15.2 MM MT) and 2017 (15.7 MM MT). This indicates that as of 2013, Bay Area refinery GHG emissions are rising faster than AQMD had forecast in 2010.

2. Air District data document and forecast increasing Bay Area refinery particulate matter ($PM_{2.5}$) emissions.

AQMD's 2010 $PM_{2.5}$ emission inventory is appended hereto as Attachment 3.[3] This document reports refinery emissions, broken into "processes" (a category that includes waste water, cooling and flare systems as well as fugitives), product "evaporation" in refineries, and "external combustion" categories. AQMD's 2012 report *Understanding Particulate Matter* is appended hereto as Attachment 4.[4] Appendix A of this document reports the same 2010 $PM_{2.5}$ emission rate, uses the same refinery emission categories, and forecasts emissions in five-year intervals through 2030. An excerpt from an AQMD Staff March 2015 Workshop Presentation is appended hereto as Attachment 5.[5] In this document AQMD reports the same refinery $PM_{2.5}$ emissions rates for 2010 and 2015 along with emissions in 2000 and 2005. These data are given by year in the table below.

BAAQMD direct emissions of $PM_{2.5}$ from refineries, emissions & forecasts: 2000–2030

Year	BAAQMD data source	$PM_{2.5}$ Emissions from Bay Area Oil Refineries	
		(short tons/day)	(short tons/year)
2000	a	2.3	839
2005	a	2.4	876
2010	a, b, c	2.7	985
2015	a, c	2.8	1,020
2020	c	3.0	1,090
2025	c	3.1	1,130
2030	c	3.2	1,170

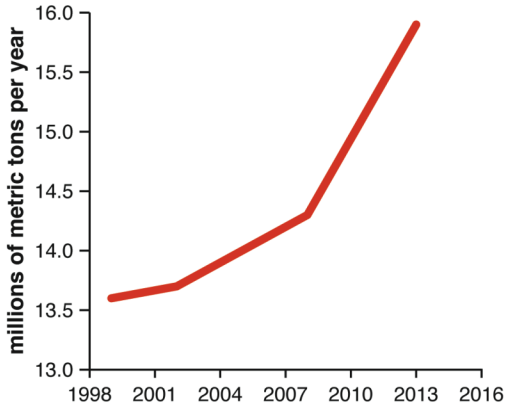
(a) BAAQMD, Attachment 5; (b) BAAQMD, Attachment 3; (c) BAAQMD, Appendix A in Attachment 4.

Emissions increased from 839 short tons in 2000 to 985 tons in 2010 and 1,020 tons in 2015. Emissions could continue to increase (in a 'business as usual' scenario) and could reach 1,170 tons emitted in 2030, according to the forecast reported by AQMD in 2012.

The AQMD Emissions Inventory (Attachment 2) provides a partial check on these data. It shows that the refineries emitted ≈1,300 tons of particulate matter in reporting year 2013. This value (1,300 tons PM) exceeds AQMD's 2015 refinery PM_{10} emissions reported in Attachment 4 (3.0 tons/d or 1,095 tons/y). Approximately 93% of this 1,300 tons (≈ 1,210 tons) was $PM_{2.5}$ based on the ratio of $PM_{2.5}$ to PM_{10} emitted by refineries in 2010 and 2015 from AQMD's data in Attachment 4, and this 2013 estimate (1,210 tons $PM_{2.5}$) exceeds the estimate for 2015 in attachments 4 and 5 (1,020 tons). Refinery emission measurements by Sánchez de la Campa and others, appended hereto as Attachment 6,[6] provide support for AQMD's high $PM_{2.5}$ to PM_{10} emission ratio. However, if the AQMD data in Attachment 4 overestimate the percentage of refinery PM emissions that are $PM_{2.5}$ then actual 2013 $PM_{2.5}$ emissions could be closer to 1,020 tons. These data indicate that refinery $PM_{2.5}$ emissions are increasing at least as fast as the AQMD forecast.

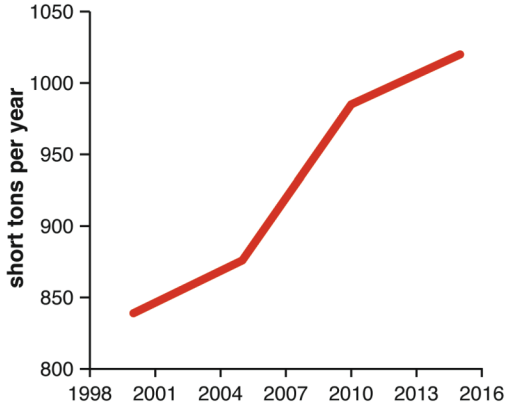
Greenhouse Gas (CO_2e) Emissions from Bay Area Oil Refineries, 1999–2013.

Data from Bay Area Air District: see attachments 1 and 2.



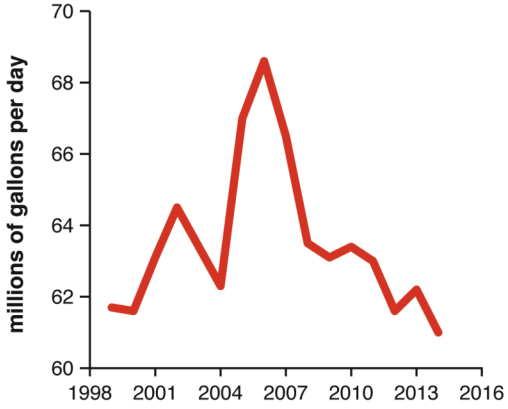
Particulate Matter ($PM_{2.5}$) Emissions from Bay Area Oil Refineries, 2000–2015.

Data from Bay Area Air District: see attachments 3–5.



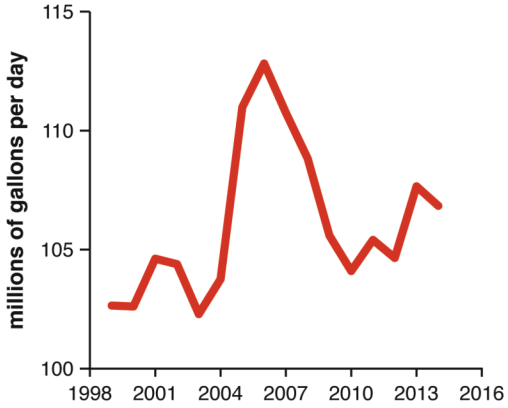
U.S. West Coast (PADD 5) Sales of Gasoline, 1999–2014.

Data from USDOE, Energy Information Information Administration (EIA): see Attachment 8.



U.S. West Coast (PADD 5) Sales *and* Exports of Gasoline, Distillate Oil (including diesel) & Kerosene Jet Fuel, 1999–2014.

Data from EIA: see attachments 8 & 9.



3. Air District data document increasing refinery emissions despite declining engine fuels demand in the markets served by the refineries.

US Energy Information Administration (EIA) data for refined product movements between US regions are appended hereto as Attachment 7.[7] These data indicate domestic markets for engine fuels refined in the Bay Area are limited to the West Coast (PADD 5). EIA data for West Coast refined product sales are appended hereto as Attachment 8.[8] These data show that West Coast gasoline demand has declined since 2006. EIA data for exports of refined product from the West Coast are appended hereto as Attachment 9.[9] These data show that although total refined product exports increased strongly, total West Coast sales plus exports of engine fuels (gasoline, distillate and diesel, and kerosene jet fuel) still declined after 2006. These data, shown with Bay Area refinery emissions of GHG and $PM_{2.5}$ in the charts above, demonstrate that changes in the demand for engine fuels cannot explain the increase in these Bay Area refinery emissions.

4. Air District data demonstrate that GHG and $PM_{2.5}$ co-emit from fossil fuel combustion sources in Bay Area refineries.

Source-specific data excerpted from the AQMD Emissions Inventory documents in Attachment 2 for reporting year 2013 are appended hereto as Attachment 10.[10] Sources in Attachment 10 are categorized as in the AQMD Inventory documents: equipment that is permitted to emit for each specific fuel or feed material fed to that equipment. These data show that PM, the PM precursor NO_x, the PM precursor SO_2, or more than one of these pollutants that cause $PM_{2.5}$ air pollution co-emit with GHG from at least 379 sources in the Bay Area refining industry.

Data in Attachment 6 further show that refinery PM emissions include environmentally significant amounts of metalliferous ultra-fine PM (UFPM). UFPM is not currently measured or controlled effectively by AQMD or other air officials. Thus, the $PM_{2.5}$ that co-emits with GHG from refineries includes otherwise unregulated air pollutants.

The AQMD data in Attachment 3 and in Appendix A of Attachment 4 indicate that combustion caused 89% (2.4 tons/day) of the total Bay Area refinery $PM_{2.5}$ emissions (2.7 tons/day) in 2010, and 89% (2.5 out of 2.8 tons/day) of these refinery emissions in 2015. Similarly, combustion of make gas, natural gas, other gases and liquid and solid fuels accounts for 75% of total refinery GHG (CO_2e) emissions based on the AQMD data in Table U of Attachment 1. Including process emissions from hydrogen plants, which burn and otherwise consume substantial amounts of fossil fuels, the use of fossil fuels for process energy causes more than 90% of refinery CO_2e emissions.

These data demonstrate that GHG and $PM_{2.5}$ co-emit from the same sources and proximate cause—fuel consumption—in Bay Area refineries. Consuming more fossil fuel in refineries would further increase refinery emissions of these co-pollutants.

5. Peer-reviewed science shows that severe processing needed to maintain engine fuels production from lower quality oil increases refinery energy intensity, thereby increasing refinery fuel combustion emissions.

A 2007 report on USEPA's study of mercury in refinery oil feedstock that was peer reviewed and published by the American Chemical Society in *Environmental Science & Technology* is appended hereto as Attachment 11.[11] This study found a wide range of mercury concentrations among individual crude streams, and it shows that USEPA has long recognized the need to monitor feedstock quality for environmentally significant differences in emission potential among industries and among individual facilities.

Robinson and Dolbear wrote a chapter in a technical reference book on heavy oils and residua, published in 2007, that is appended hereto as Attachment 12.[12] They state rapid changes in oil feed quality cause hydroprocessing upsets, and quantify the greater heat, pressure and hydrogen production requirements for hydroprocessing denser cuts of crude. This document examples the fact that the industry has long known making the same product slate from lower quality oil increases refinery fuel energy consumption.

A CBE report on combustion emissions from refining lower quality oil that was peer reviewed and published by the American Chemical Society in *Environmental Science & Technology* is appended hereto as Attachment 13.[13] It reports detailed quantitative analysis of data from operating refineries—data from actual, real-world operating conditions—across 97% of the U.S. industry. A peer-reviewed report on modeling of factors driving refinery CO_2 intensity, also published in 2010, is appended hereto as Attachment 14.[14] A peer reviewed 2011 report that built in part on the work in Attachment 13 and encompassed the full fuel cycle of Canadian tar sands oils is appended hereto as Attachment 15.[15] A report that built on the work in Attachment 13 and was peer reviewed and published by the Union of Concerned Scientists in 2011 is appended hereto as Attachment 16.[16] A peer reviewed report on detailed public data-based modeling of crude quality and process configuration impacts on refinery energy and GHG intensities that was published in 2012 is appended hereto as Attachment 17.[17] A report for the Natural Resources Defense Council on emissions of toxic and criteria air pollutants from delayed coking and catalytic cracking in scenarios where diluted bitumen oils replace 20–50% of the current US crude feed, published in 2015, is appended hereto as Attachment 18.[18] Also in 2015, the Carnegie Endowment built on the refinery energy and GHG emissions work in Attachment 17, and argued for public oil quality monitoring and to "think before building new infrastructure" for low-quality grades of oil, in a report that is appended hereto as Attachment 19.[19]

The data and information in attachments 12–19 demonstrate that making engine fuels from lower quality oil increases the energy intensity, fuel consumed for that energy, and emissions of oil refining. These impacts are driven by physical (e.g., volatility) and chemical (e.g., molecular structure; hydrogen and contaminants content) differences among crude oils and their fractional components that—for well mixed multi-plant blends of many crude oils—correlate with crude feed density and sulfur content.

Compared with so-called conventional or lighter crude, a larger portion of denser, more contaminated, lower quality oil refinery feedstock is very different from gasoline, diesel or jet fuel both physically and chemically. Making the same amounts of engine fuels from these very different oils requires more severe processing that requires more energy, requires more hydrogen, and creates dirtier-burning byproducts in greater amounts. Most of this hydrogen must be produced by steam reforming that consumes still more energy, and substantial portions of those dirtier byproducts are burned in-plant as part of the basic design of processes such as fuel gas recovery and catalytic cracking. The net result is consuming more and dirtier-burning fossil fuel for the energy needed to process each barrel of denser, more contaminated oil refined. Making engine fuels from denser, more contaminated oil feedstock increases refinery energy intensity, and thereby increases refinery fuel combustion emissions intensity—the refinery emissions of combustion products such as CO_2 and PM per barrel of crude refined.

6. Average oil feed quality is lower and average refinery emission intensity is higher in the Bay Area as compared with other parts of the US.

Attachment 13 documents the average refinery crude feed density and sulfur content, the energy and emission impacts explained by those feed properties, and actual emissions observed from refineries in the BayArea and other U.S. refining regions. Recent EIA data for average crude input qualities in the other regions are appended hereto as Attachment 20.[20] Comparison of attachments 13 and 20 shows the other regions' crude feed qualities that distinguish them from Bay Area refineries in Attachment 13 persist. The table below excerpts data from Table S8 in Attachment 13.

Average refinery crude feed oil quality (OQ) observed, refinery energy intensity (EI) predicted by OQ, and actual refinery CO_2 emission intensity observed in 2008 by region.

Region	Actual crude feed quality (OQ)		EI predicted by OQ	Actual emissions
	Density (kg/m^3)	Sulfur (kg/m^3)	(Gigajoule/m^3 oil)	(kg CO_2/m^3 oil)
East Coast PADD 1	864	7.08	3.35	296
Midwest PADD 2	863	11.7	3.51	289
Gulf Coast PADD 3	879	14.9	4.54	325
S.F. Bay Area	900	11.9	5.31	360

Data from CBE's peer reviewed work in Attachment 13. *See* Table S8.

As shown by the data in this table, on average, refineries in the Bay Area process denser crude, process lower quality crude as gauged by energy consumed per barrel refined, and emit more CO_2 per barrel refined than those in other major U.S. oil refining regions.

7. Refining greater amounts of bitumen-derived 'tar sands' oils would further lower the quality of the average Bay Area refinery crude feed.

A 2007 U.S. Geological Survey report on bitumen ('tar sands') oils and heavy oils is appended hereto as Attachment 21.[21] Data in attachments 13, 18 and 21 show that the average density and sulfur content of tar sands bitumen (1,04 kg/m^3 *d;* 45.5 kg/m^3 *S*) and those of Canadian tar sands diluted bitumen 'dilbit' (926 kg/m^3 *d;* 35.2 kg/m^3 *S*) are greater than those of the Bay Area refinery crude feed (900 kg/m^3 *d*; 11.9 kg/m^3 *S*). Thus, adding tar sands oil to the Bay Area refinery crude feed would increase its density and sulfur content.

A 2010 California Energy Commission report that forecasts continuation of the long-observed trend of replacing dwindling Californian and Alaskan oil with foreign oil inputs to refineries statewide is appended hereto as Attachment 22.[22] Comparison of data in attachments 16 and 21 shows that the average density and sulfur content of bitumen are greater than those of the Californian and Alaskan crude streams refined in the Bay Area. Thus, replacing declining Californian and Alaskan crude supplies with tar sands bitumen would increase the density and sulfur content of the Bay Area refinery crude feed.

Data in Attachment 21 show that compared with other types of crude, the hydrogen content and gasoline-range distillation yield is lower, the yield of 'residuum' that does not boil off in distillation is higher, and the concentrations of nitrogen, acids, aluminum, copper, iron, lead, nickel, titanium, and vanadium are higher, in tar sands bitumen. Data in Attachment 18 show that the yield of distillate oils (including kerosene and diesel) from Canadian tar sands dilbit is very low compared with the averages for the U.S. crude feed and Strategic Petroleum Reserve. Available data on the density and sulfur content of gas oil—the densest cut of crude that boils off in distillation—are appended hereto as Attachment 23.[23] Comparison of data in attachments 18 and 23 shows that the average gas oil distilled from tar sands dilbits (964 kg/m^3 *d*; 32.8 kg/m^3 *S*) is denser than 99% of all 404 gas oils reported from non-bitumen crude oils and higher in sulfur than 98% of those non-bitumen gas oils. Thus, data on many processing characteristics confirm the low quality of tar sands crude that is predicted by its extreme density and sulfur content.

8. The oil industry reports plans to refine more tar sands oil here.

A 2007 report in *Oil & Gas Journal* describing industry plans to expand the market for price-discounted oil produced in the Canadian oil sands by, among other things, sending large amounts of this oil to California refineries as a new potential growth market, is appended hereto as Attachment 24.[24]

Note that in industry jargon, the terms "oil sands" and "Canadian heavy crude" refer to bitumen-derived tar sands oils, and the term "cost-advantaged," in reference to North American crude, refers to tar sands oil, fracked shale oil, or both depending on context.

A paper published by the Society of Petroleum Engineers in 2009 concluding that the Canadian tar sands is "the most promising source for California refineries" to replace dwindling current crude supplies in the long term is appended hereto at Attachment 25.[25]

A 2013 Alberta Energy Resources Conservation Board report that describes projects to send tar sands oil to California if standards in this state allow the resultant emissions, and noting "90 per cent of its refinery capacity is able to process heavier crudes," is appended hereto as Attachment 26.[26] These "heavier" oils include tar sands bitumen and bitumen-derived dilbit; fracked shale oils such as North Dakota Bakken are very light oils.

Excerpts from a 2013 report to investors by Valero are appended hereto as Attachment 27.[27] In these excerpts Valero reports its "strategy" to refine "cost-advantaged crude oil" and its plan to bring that "cost advantaged" oil to its Benicia refinery by train. They also include a chart showing that Western Canadian Select (WCS), a tar sands dilbit, is the most price-discounted crude targeted, costing much less than shale oil from the Bakken.

A 2013 report to investors by Phillips 66 stating its plans for "moving Canadian crudes down into California … refineries" is appended hereto as Attachment 28.[28] A 2014 report to investors by Phillips 66 stating its plans to bring "advantaged crude into California" by train and ship via Ferndale, WA and by train to Santa Maria is appended hereto as Attachment 29.[29] This Santa Maria project would bring tar sands oil through the Bay Area by rail for processing at the Phillips 66 San Francisco Refinery (SFR) refining facilities at Nipomo and Rodeo. A map downloaded from a Phillips 66 website on 16 October 2015 showing crude oil delivery arrows pointing from the Canadian tar sands to the SFR is appended hereto as Attachment 30.[30]

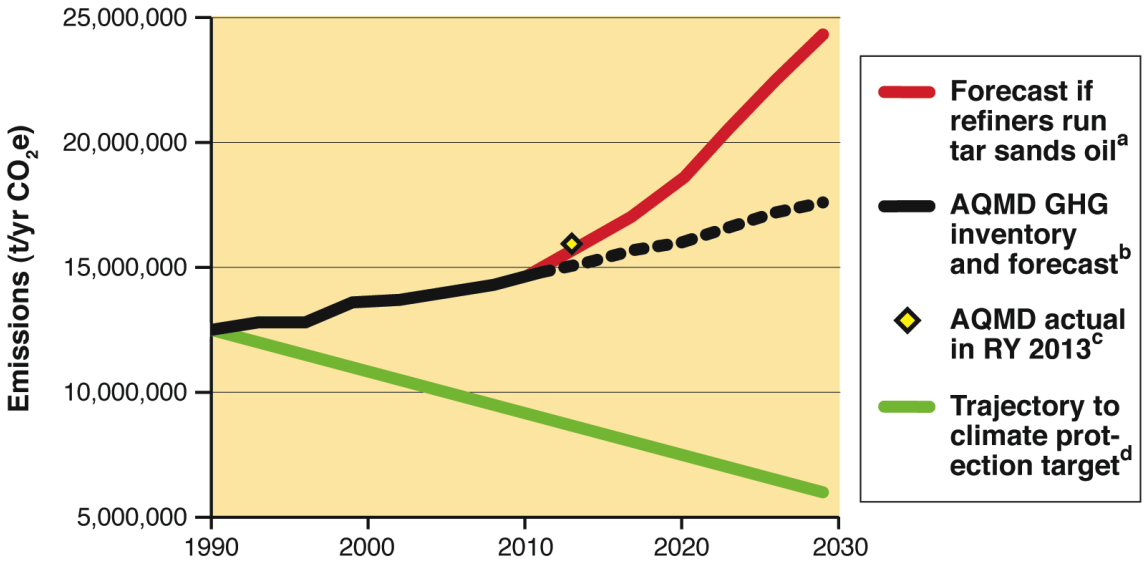
A 2014 presentation to investors by Tesoro is appended hereto as Attachment 31.[31] In Slide 12 of this document Tesoro reports projects to "strengthen refinery conversion capability" for "feedstock flexibility." In Slide 14 of this document Tesoro reports greater future crude production in the Canadian tar sands than any other "key Tesoro market." In Slide 17 of this document Tesoro reports that its rail-to-marine terminal project in Vancouver would be "competitive with direct rail cost to California."

A 2015 Canadian Association of Petroleum Producers crude oil forecast, markets, and transportation report is appended hereto as Attachment 32.[32] This report describes, among other things, plans for exporting more tar sands oil to California refineries via pipeline, ship, and rail. A 2015 report by CBE and ForestEthics that identifies oil industry projects which could potentially replace up to 40–50% of California refinery crude feed by rail alone is appended hereto as Attachment 33.[33]

The evidence in attachments 24–33 documents oil industry plans to refine more tar sands oil at Bay Area refineries.

9. The Air District-forecast increase in Bay Area refinery emissions underestimates potential emissions from oil feedstock switching.

The data and information in attachments 12–23 show that increasing the amount of bitumen-derived oil in the Bay Area refinery crude feed could further increase Bay Area refinery GHG and PM emissions. Data and information in attachments 16, 22, and 24–33 show that more than half of Bay Area refinery crude feed could potentially be replaced by bitumen-derived tar sands oil before 2030. Attachment 16 quantifies the potential GHG emissions from California refineries in this scenario based on data and information in attachments 13 and 16. Potential emissions from Bay Area refineries in this 'tar sands' scenario, based on Attachment 16, are compared with the Air District's reported and forecast refinery GHG emissions in the chart below.



Refinery greenhouse gas emissions and forecasts, S.F. Bay Area, 1990–2029
[a]CBE *after* UCS (2011). [b]BAAQMD *GHG Inventory* (2010). [c]BAAQMD 2013 Em. Inventory. [d]–80% from 1990 rate by 2050.

AQMD's forecast is illustrated by the dashed black line in this chart. As stated above, in 2010 the AQMD forecast that Bay Area refinery GHG emissions could increase to 17.6 million metric tons per year by 2029. But in the scenario where refiners replace declining Californian, Alaskan, and other crude supplies with bitumen oils, the forecast potential emissions rise more steeply, as illustrated by the solid red line in the chart, and approach 25 million metric tons/year by 2029. In RY2013, the most recent year for which AQMD reports emissions—illustrated by the yellow diamond in the chart—actual emissions exceed the AQMD forecast and are close to those in the tar sands scenario forecast.

This evidence indicates that the increase in Bay Area refinery emissions forecast by the Air District in 2010 underestimates the potential increase in Bay Area refinery emissions from a switch to tar sands oil feedstock.

10. Oil train traffic, emissions, and health and safety hazards could worsen if a further increase in Bay Area refinery emissions is allowed.

An image of the Bay Area excerpted from the State of California's Rail Risk and Response interactive map is appended hereto as Attachment 34.[34] Comparison of attachments 33 and 34 shows that many communites in the Northeast, East and South Bay could be impacted by nearby oil train traffic—including Fairfield, Benicia, Oakley, Antioch, Pittsburg, Vine Hill, Martinez, Port Costa, Crockett, Rodeo, Pinole, San Pablo, Richmond, El Cerrito, Albany, Berkeley, Emeryville, Oakland, San Leandro, Hayward, Livermore, Pleasanton, Union City, Fremont, Alviso, Milpitas, Santa Clara, San José, Morgan Hill, Gilroy, and others.

Attachment 33 summarizes and cites evidence that oil train operations and derailments cause serious health and safety hazards, including acute and chronic air pollution, and it documents disparately severe oil train hazards in communities of color, low-income communities and linguistically isolated communities.

A report for Shell Oil Co. showing that plant design configurations prevent Bay Area refineries from processing large amounts of light crude efficiently is appended hereto as Attachment 35.[35] Evidence in attachments 13–19, 24, and 25 strongly supports this finding. This inability to process large amounts of much lighter crude, such as fracked shale oils from the Bakken, is consistent with the industry's stated plans, documented above, for oil trains to deliver tar sands oils, which are denser, to Bay Area refineries. However, as Attachment 26 suggests, and as attachments 13–35 document, industry plans to greatly increase oil train delivery of tar sands oils to Bay Area refineries are contingent on whether environmental requirements allow the increased refinery emissions that would result from processing tar sands oil in the Bay Area. Thus, allowing Bay Area refinery emissions to further increase could worsen health and climate hazards from oil trains as well as those from direct refinery emissions.

Conclusion

Data the Air District reports elsewhere document a substantial long-term increase in Bay Area refinery emissions of GHG and $PM_{2.5}$ that co-emit from refinery fuel combustion. EIA data show that refined fuels demand cannot explain the reported emissions increase. Peer reviewed science shows that refining lower quality oil contributed to this emissions increase and could further increase emissions from Bay Area refineries if their current, declining, crude oil supply is replaced with bitumen-derived 'tar sands' oil.

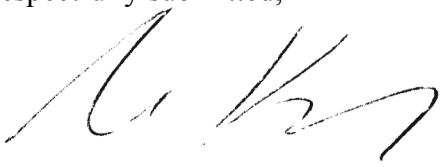
Forecasts the Air District reports elsewhere show that Bay Area refinery GHG and $PM_{2.5}$ emissions could further increase. The peer reviewed science shows that Bay Area refinery emissions could greatly exceed even these forecasts if the refiners replace their declining current oil supply with bitumen-derived tar sands oil. In fact, industry reports document plans to replace Bay Area (and California) refiners' declining current oil supplies with that tar sands oil—if the resultant emissions increase is allowed.

Moreover, those industry-reported plans include a major expansion of Bay Area oil train traffic that—since Bay Area refineries cannot process very large amounts of light shale oils efficiently—could be allowed here ***if*** the emissions increase from refining the large amounts of tar sands oil these trains would deliver is allowed.

CBE requests that the Air District revise and recirculate its environmental analysis of rules 12-15 and 12-16 to report the information documented here to the public and its Board transparently, consider and address this information properly, and address the health and climate impacts identified adequately.

A safeguard against further increasing refinery emissions is needed without further delay. The Air District, however, proposes no such safeguard that is specific, enforceable upon adoption, and would apply to refineries facility-wide. Therefore, given the absence of any other such safeguard proposal, CBE's September 2015 proposal for limits set to current facility emission rates, and the community-proposed moratorium on permits for projects to enable lower quality oil, should be considered favorably in your revisions.

Respectfully submitted,



Greg Karras
Senior Scientist

Copy: Ken Alex, Office of the Governor
John Gioia, Stationary Source Committee Chair
Air District Board members
Richard Corey, Air Resources Board
Jack Broadbent, Air Pollution Control Officer
Interested organizations and individuals

Attachments—*see* attachments list herein below.

Attachments List (four pages).

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[1] Attachment 1. *Source Inventory of Bay Area Greenhouse Gas Emissions;* Updated February 2010. Bay Area Air Quality Management District: San Francisco, CA.

[2] Attachment 2. *Bay Area Air Quality Management District Emissions Inventory;* includes facility- and source-specific oil refinery and refinery support facility emissions data for reporting year 2013. Files are attached as provided in response to CBE's request for review pursuant to the California Public Records Act. See CBE's September 2015 Comment-1 on Rule 12-16 for additional information. Eight tables in Excel format.

[3] Attachment 3. *Table 1. Bay Area Winter Emissions Inventory for Primary $PM_{2.5}$ and PM Precursors: Year 2010;* adopted by the BAAQMD Board for State Implementation Plan review by USEPA. Bay Area Air Quality Management District: San Francisco, CA.

[4] Attachment 4. *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area;* November 2012. Bay Area Air Quality Management District: San Francisco, CA. Includes Appendix A. Bay Area Winter Emissions Inventory for Primary PM + PM Precursors: 2010–2030.

[5] Attachment 5. *Regulations to Track and Mitigate Emissions from Petroleum Refineries Regulation 12, Rules 15 and 16: Refinery Emission Trends 1980–2015 and Main Causes of Reductions;* Excerpt from BAAQMD Staff's March 2015 Workshop Presentation for proposed rules 12-15 and 12-16. Includes an insert by CBE facilitating reference to scale. Bay Area Air Quality Management District: San Francisco, CA.

[6] Attachment 6. Sánchez de la Campa et al., 2011. Size Distribution and Chemical Composition of Metalliferous Stack Emissions in the San Roque Petroleum Refinery Complex, Southern Spain. *Journal of Hazardous Materials* **190:** 713-722. DOI: 10.1016/j.jhazmat.2011.03.104.

[7] Attachment 7. *Movements by Tanker, Pipeline, Barge and Rail between PAD Districts;* includes annual data on petroleum and petroleum project movements from West Coast PADD 5 to other US regions (PADDs 1–4); U.S. Energy Information Administration: Washington, D.C. Attachment includes four documents labeled 7A through 7D.

[8] Attachment 8. *PADD 5 Prime Supplier Sales Volumes of Petroleum Products;* U.S. Energy Information Administration: Washington, D.C.

[9] Attachment 9. *West Coast (PADD 5) Exports of Crude Oil and Petroleum Products;* U.S. Energy Information Administration: Washington, D.C.

[10] Attachment 10. *Data Excerpted from the BAAQMD Emission Inventory for 5 Refineries and 3 Refinery Support Facilities, Reporting Year 2013: Sources Reported as Emitting GHG along with PM, PM Precursors, or Both.* Excerpts from Attachment 2. *See* CBE's September 2015 Comment-1 in this matter for additional details.

[11] Attachment 11. Wilhelm et al., 2007. Mercury in Crude Oil Processed in the United States (2004). *Environmental Science & Technology* **41**(13): 4509–4514. DOI: 10.1021/es062742j.

[12] Attachment 12. Robinson and Dolbear, 2007. Commercial Hydrotreating and Hydrocracking. In *Hydroprocessing of Heavy Oils and Residua;* Ancheyta and Speight, Eds.; Chemical Industries; CRC Press, Taylor & Francis Group: Boca Raton, FL; Vol. 117, pp. 281–311.

[13] Attachment 13. Karras, 2010. Combustion Emissions from Refining Lower Quality Oil: What is the Global Warming Potential? *Environmental Science & Technology* **44**(24): 9584–9589. DOI: 10.1021/es1019965. Supporting Information is included.

[14] Attachment 14. Bredeson et al., 2010. Factors Driving Refinery CO_2 Intensity, with Allocation Into Products. *International Journal of Life Cycle Assessment* **15:** 817–826. DOI: 10.1007/s11367-010-0204-3.

[15] Attachment 15. Brandt, 2011. Variability and Uncertainty in Life Cycle Assessment Models for Greenhouse Gas Emissions from Canadian Oil Sands Production. *Environmental Science & Technology* **46**: 1253–1261. DOI: 10.1021/es202312p.

[16] Attachment 16. Karras, 2011. *Oil Refinery CO_2 Performance Measurement;* report peer reviewed and published by the Union of Concerned Scientists (UCS). Technical analysis prepared by Communities for a Better Environment (CBE) for UCS. Union of Concerned Scientists: Berkeley, CA. Supplemental Information is included.

[17] Attachment 17. Abella and Bergerson, 2012. Model to Investigate Energy and Greenhouse Gas Emissions Implications of Refining Petroleum: Impacts of Crude Quality and Refinery Configuration. *Environmental Science & Technology* DOI: 10.1021/es3018682.

[18] Attachment 18. Karras, 2015. *Toxic and Fine Particulate Emissions from U.S. Refinery Coking and Cracking of 'Tar Sands' Oils;* Report on work conducted for the Natural Resources Defense Council at part of a technical assistance contract. Natural Resources Defense Council: San Francisco, CA. Supplemental Information is included.

[19] Attachment 19. Gordon et al., 2015. *Know Your Oil: Creating a Global Oil-climate Index;* By Deborah Gordon, Adam Brandt, Joule Bergerson and Jonathon Koomey; Carnegie Endowment for International Peace: Washington, D.C. www.CarnegieEndowment.org/pubs.

[20] Attachment 20. *Refinery Crude Oil Input Qualities;* Data from US EIA for the years 2009–2014; table of data downloaded from www.eia.gov/petroleum/data.cfm on 14 October 2015. U.S. Energy Information Administration: Washington, D.C.

[21] Attachment 21. Meyer et al., 2007. *Heavy Oil and Natural Bitumen Resources in Geologic Basins of the World;* USGS Open-file Report 2007-1084, available at http://pubs.usgs.gov/of/2007/1084/. U.S. Geological Survey: Washington, D.C.

[22] Attachment 22. Schremp et al., 2010. *Transportation Energy Forecasts and Analyses for the 2009 Integrated Energy Policy Report;* Final Staff Report; CEC-600-2010-002-SF; California Energy Commission: Sacramento, CA. *See* pp. 134–142.

[23] Attachment 23. All publicly available data for gas oil density and sulfur content, compiled by CBE in April 2014, with selected crude oil assay data. Ten-page table.

[24] Attachment 24. *Canadian, US Processors Adding Capacity to Handle Additional Oil Sands Production;* Special report in: *Oil & Gas Journal;* **105**(26). 9 July 2007. www.ogj.com/articles.

[25] Attachment 25. Croft and Patzek, 2009. The Future of California's Oil Supply. Paper prepared for presentation at the 2009 Society of Petroleum Engineers Western Regional Meeting held in San Jose, California, USA, 24–26 March 2009. SPE-120174-PP.

[26] Attachment 26. *ST98-2013: Alberta's Energy Reserves 2012 and Supply/Demand Outlook 2013–2022;* ISSN 1910–4235. May 2013. Energy Resources Conservation Board: Calgary, Canada. www.ercb.ca. *See* esp. page 1-10.

[27] Attachment 27. *Valero Investor Presentation: November 2013;* excerpts from report at: http://www.sec.gov/Archives/edgar/containers/fix034/1035002/000119312513439300/d627324dex9901.htm downloaded October 2015.

[28] Attachment 28. *Phillips 66 2013 Barclays CEO Energy-Power Conference: Greg Garland, Chairman and CEO, Phillips 66;* 2013 Barclays CEO Energy-Power Conference, 12 September 2013, 11:05 a.m. ET. Nine pages.

[29] Attachment 29. *03-Sep-2014 Phillips 66 (PSX) Barclays CEO Energy-Power Conference;* September 2014. Corporate participants: Greg C. Garland, Chairman & Chief Executive Officer, Phillips 66; other participants: Paul Cheng, Analyst, Barclays Capital, Inc. Corrected Transcript. Eleven pages.

[30] Attachment 30. *Phillips 66 Advantaged Crude Activities: Updated May 2013;* Image from Phillips 66 info-graphic downloaded on 16 October 2015 from its Web Site: http://www.phillips66.com/EN/Advantaged%20Crude/index.htm.

[31] Attachment 31. *Tesoro: Transformation through Distinctive Performance;* Presentation including forward-looking statements within the meaining of the Private Securities Litigation Reform Act of 1995. Simmons Energy Conference. 27 February 2014.

[32] Attachment 32. *Crude Oil Forecast, Markets & Transportation;* Canadian Association of Petroleum Producers (CAPP); June 2015. Report by Canada's oil and natural gas producers. http://www.capp.ca/publications-and-statistics/publications/264673. *See* pages iii, iv, 20-22, and 29-34.

[33] Attachment 33. Krogh et al., 2015. *Crude Injustice on the Rails: Race and the Disparate Risk from Oil Trains in California;* report by Communities for a Better Environment and ForestEthics. June 2015. *See* esp. pp. 8, 12, 15, 18, and 21–26.

[34] Attachment 34. *Rail Risk and Response;* excerpt from the State of California interactive map entitled "Rail Risk and Response." The image copied shows BNSF and UPRR rail lines, major refineries, existing and proposed oil train terminals, hospitals and geologic faults near rail, active petroleum pipelines, rail-stream intersections, and place names, in the Bay Area. California Office of Emergency Services: Sacramento, CA. http://california.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=928033ed043148598f7e511a95072b89.

[35] Attachment 35. Vautrain, 1992. *Submission to the Regional Water Quality Control Board, San Francisco Bay Region, Prepared on Behalf of Shell Oil Company;* December 1992; report on technical considerations for crude substitution at Bay Area refineries in relation to selenium discharge prevention;13 pages; Purvin & Gertz: Los Angeles, CA.

Attachment C

REFINERY

ACTION COLLABORATIVE

SAN FRANCISCO BAY AREA

March 27, 2015

Jack Broadbent, Air Pollution Control Officer
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Attention: Eric Stevenson (Estevenson@baaqmd.gov)

Re: **Draft Regional Petroleum Refining Emissions Rules 12-15 and 12-16; Recommendation for Enforceable Numeric Emissions Caps**

Dear Mr. Broadbent,

The Refinery Action Collaborative of Northern California is a partnership of refinery worker, refinery community, environmental, and academic organizations[1] focused on critical environmental health and safety needs shared by refinery workers, communities and the broader public. The Collaborative has participated in this rulemaking since 2012. We have long sought a proactive approach to prevent commitments to new oil refinery emissions and to set limits that reduce harmful emissions of toxic, criteria and greenhouse pollutants.[2] We appreciate your Board's direction for rules that would require these emission cuts, to be developed later this year. By this letter we comment on the part of the policy meant to prevent increased emissions, your currently proposed Rule 12-16.

As proposed, Rule 12-16 would wait until after oil projects that commit capital to new emissions are built before considering 'cost-effective' mitigation,[3] and would exempt certain increases in refinery emissions explicitly.[4] We believe this proposal would go in the wrong direction and understand the outraged opposition to it that was expressed by our communities in Benicia, Richmond, and Martinez during your community workshops last week. Instead of adopting these exemptions and allowances of unnecessary long-term commitments to new emissions, the Collaborative recommends that Rule 12-16 include independently enforceable numeric emission caps.

---

[1] Collaborative member groups include the Asian Pacific Environmental Network (APEN), the BlueGreen Alliance, Communities for a Better Environment (CBE), the Labor Occupational Health Program at U.C. Berkeley (LOHP), the Natural Resources Defense Council (NRDC) the United Steelworkers Union (USW) International, USW Local 5 and USW Local 326.

[2] Our previous comments are incorporated herein by reference. Although individual Collaborative groups may not have the same position on every proposed refinery project, we are united in our position on this regional policy and our recommendation for the action described herein.

[3] Proposed Rule 12-16, § 401; *see* also §§ 301, 401.

[4] Proposed Rule 12-16 §§ 103–105.

BLUEGREEN ALLIANCE · UNITED STEELWORKERS USW OIL WORKERS LOCAL 5 · NRDC THE EARTH'S BEST DEFENSE · APEN ASIAN PACIFIC ENVIRONMENTAL NETWORK · COMMUNITIES FOR A BETTER ENVIRONMENT · LOHP LABOR OCCUPATIONAL HEALTH PROGRAM

Specifically, we recommend limits on each refiner's total facility-wide[5] toxic, criteria, and greenhouse pollutant emissions that are equal to the most recent calendar year or most recent three-year average emissions of each pollutant currently reported, whichever is greater, plus the threshold factor[6] in your current proposal. An example for greenhouse gas emissions using data reported by the Air Resources Board[7] is shown below.

Example calculation of enforceable numeric limits to cap refinery emissions for adoption during Spring 2015: GHG emissions, shown in millions of metric tons/year CO_2e.

Data (MM MTY CO_2e)	Year	Phillips 66 Rodeo	Valero Benicia	Chevron Richmond
Actual emissions reported[(7)]	2011	2.148	2.533	4.345
	2012	2.092	2.830	3.815
	2013	2.249	2.738	3.915
Calculation (MM MTY CO_2e)				
Most recent year emissions		2.249	2.738	3.915
Most recent three-year average		2.163	2.701	4.025
Find the greatest of these two values		2.249	2.738	4.025
Add the emission threshold factor		0.010	0.010	0.010
Enforceable limit to cap emissions (MM MTY CO_2e)		**2.259**	**2.748**	**4.035**

Based on your own data, air pollution contributes to thousands of premature deaths in the Bay Area each year and oil refining is the biggest industrial air polluter in the region. Keeping refinery emissions at current levels does not require any new action by the oil companies, and it is always more cost-effective to minimize emissions from their planned projects in the design phase, before those projects are built. Accordingly, the action we recommend is necessary to protect health, feasible, reasonable, and appropriate.

On behalf of the Collaborative,

Miya Yoshitani, Executive Director
Asian Pacific Environmental Network

Greg Karras, Senior Scientist
Communities for a Better Environment

Ross Nakasone
BlueGreen Alliance

Mike Smith, Local 5 Field Representative
United Steelworkers Union Local 5

Nazima El-Askari
Coordinator of Public Programs
Labor Occupational Health Program
at UC Berkeley

Ron Espinoza, District 12 Sub-Director
United Steelworkers International

Copy: Air District Board members
Interested organizations and individuals

[5] We support your stated approach to include emissions from all co-dependent operations such as third-party hydrogen (included in our example herein), wharf and rail operations.
[6] This factor is +10,000 metric tons/yr for GHG and +7% for other pollutants (*§ 12-16-301*).
[7] Data from CARB Mandatory GHG Reporting (includes emissions from Air Liquide hydrogen for Rodeo), http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm.

Attachment D

BY ELECTRONIC MAIL

COMMUNITIES FOR A BETTER ENVIRONMENT

27 March 2015

Jack Broadbent
Executive Officer, Air Pollution Control Officer
Bay Area Air Quality Management District (AQMD)
939 Ellis Street
San Francisco, CA 94109

Attention: Eric Stevenson (EStevenson@baaqmd.gov)

Re: **Proposed refinery emissions tracking and thresholds rules 12-15 and 12-16; Supplemental comments of CBE and the undersigned organizations**

Mr. Broadbent,

By this letter the undersigned groups comment on your latest refinery rules proposal. As a public agency that says it is dedicated to "protecting and improving public health, air quality, and the global climate" the Air District should be doing everything in its power to cut emissions, improve refinery safety, and avoid unnecessarily polluting feedstocks. We want to know why the Air District is giving oil companies permits to build projects that enable a switch to new oils, such as tar sands 'dilbits,' that cause the most extreme refinery emission impacts of any petroleum known, when it has no rules in place that are designed to limit emissions from changes in refinery oil feedstock.

We have a right to know because this threatens our health and climate, it could make the Air District's public promise of rules to limit and reduce refinery emissions impossible to fulfill, and it is being done in secret, violating community and worker rights to participate in decisions that disparately impact our environmental health.

Last Wednesday, between public workshops where communities across the region's oil belt rose up to demand protective emission rules before permitting new oil projects, you gave the Phillips 66 refinery a permit for the back end of a project to boost crude throughput on tar sands oil to be delivered via rail and tanker. It was issued in secret. So was the permit you gave Kinder Morgan for its crude-by-rail terminal in Richmond last year. Before that, you gave Chevron's project to refine denser, higher sulfur oil a permit based on a flawed and invalid Environmental Impact Report.

These projects, and others to enable changes in refinery feedstock in Benicia, Martinez, and Pittsburg, have moved along the Air District permits pipeline while these rules that are meant to ensure that those changes in feedstock will not increase refinery emissions were delayed repeatedly by District Staff's proposals to weaken them.

While we do not know why the Air District says it will protect our air, health, and climate while it acts to permit harmful and increasing emissions, we know what a rule that cuts through this transparency problem to stop refinery emissions from increasing looks like. It ***must*** set unambiguous, enforceable, numeric limits that cap each refinery's emissions. It ***must not*** allow those emissions to increase through exemptions or any pretense that this polluting, profit-driven industry will magically begin to regulate itself responsibly. The remainder of our comments address those needs.

1. Rescind your proposal to allow increased GHG emissions from oil refineries.

We maintain the critical need for this action as explained in previous comments:

> AQMD Staff's proposal would explicitly grant refiners an "exemption" allowing unmitigated increases in refinery GHG emissions. (*§12-16-104*.) As we believe you know, there is scientific consensus that deep cuts in GHG emissions are needed starting now in order to have a good chance of averting climate change so extreme that it could be incompatible with human societies as we know them; refineries are the biggest industrial GHG emitters in this region; and refinery GHG emissions have ***not*** been reduced here over recent decades. No other measure puts limits on refinery GHG emissions here. And as stated, there appears to be no rationale whatsoever for this GHG increase exemption. *(27 February 2015 comments of CBE et al. at 1.)*

Staff's Workshop Report (WR) states no valid rationale for this exemption. Its assertion that this exemption "avoids confusion and conflict with CARB's Cap-and-Trade rule" (WR at 25) is unsupported and specious. There is no refinery-specific emission limit in that CARB regulation, a fact Staff seems to admit (WR at 12), so there is no "confusion" that exempting refinery-specific emission requirements avoids. Similarly, there is no "conflict" to avoid. CARB has always implemented cap-and-trade with facility-specific GHG emission limits on covered sources, as shown by the limit of 0.5 tonnes CO_2/MWh that has been applied to power plants since 2007 under SB 1368.

We reassert the unrebutted critical need for rescinding this proposed exemption now.

2. Rescind your proposal to allow oil feedstock-driven increases in refinery CO, NOx, PM_{10}, $PM_{2.5}$, POC, SO_2, and GHG emissions.

We maintain the critical need for this action as explained in previous comments:

> AQMD Staff's proposal would explicitly grant an "exemption" allowing unmitigated increases in criteria pollutant and GHG emissions from refineries whenever a greater amount of crude is refined. (*§12-16-103*.) 'Criteria pollutants' include carbon monoxide (CO), oxides of nitrogen (NOx), respirable and fine particulate matter (PM_{10} and $PM_{2.5}$), precursor organic compounds (POC), and sulfur dioxide (SO_2). (*§12-16-210*.) The AQMD itself has estimated that these pollutants are associated with thousands of premature deaths in the Bay Area annually. Refineries dominate localized emissions of these pollutants, refiners here continue to build or plan capacity to process more oil, and their refined product exports are growing rapidly, so the amount of crude refined here could increase even if Californians use less gasoline.

> Further, the proposal's explicit 'crude volume' exemption opens an implicit, even bigger, loophole allowing increased emissions from refining lower ***quality*** oils such as tar sands 'dilbits,' especially since AQMD Staff provides no evidence it has ever successfully quantified the portion of a refinery emission increase caused by a change in oil quality versus that caused by a change in crude oil volume.
>
> Again, there appears to be no rationale whatsoever for this feedstock-related emissions increase exemption. *(27 February 2015 comments of CBE et al. at 2.)*

District Staff still gives no valid rationale for this exemption. Staff's assertion, on page 24 of its Workshop Report, that this exemption is "required" because refineries must "respond to demand by either market forces or reduced production of other California refineries" is unsupported and wrong because no such need exists in the state any more. Statewide gasoline sales fell by more than 5,200,000 gallons/day from 2006–2013[1] and are expected to fall further. Instead of stating any valid support for this 'crude volume' exemption, the Report admits that it opens the oil quality-driven emissions loophole we warn about. It admits that District Staff likely will not be able to distinguish emissions caused by changes in throughput from emissions caused by changes in oil feedstock quality without "significant errors and uncertainty." (WR at 24.)

We reassert the unrebutted critical need for rescinding this proposed exemption now.

3. Enact a moratorium on permitting air emissions from proposed and planned oil projects, at least until this policy that is needed to protect air quality, health, and climate from refinery emissions is properly revised, adopted and effective.

We maintain the critical need for this action that the agency's proposal for these rules forces the need to address in this rulemaking, as explained in previous comments:

> AQMD Staff's proposal omits ***any*** provision to stop oil companies from 'gaming' the rules by rushing higher-emitting capital projects before the policy is adopted, that then may be claimed 'infeasible' to un-build after the policy is in place. In its 2012 'concept papers' AQMD anticipated such 'dirtier' oil projects and admitted it needs a new policy to ensure that such projects will not increase refinery emissions. Since at least 2013, worker and community comments have warned AQMD that permitting such projects before the safeguards intended by this policy are in effect could result in commitments to increased and prolonged refinery emissions of pollutants that already cause harm.
>
> AQMD Staff is permitting such projects throughout the region ***before*** developing this needed policy, and Staff's proposal (*§12-16-401.3.3*) would allow such projects to increase emissions, even if this is preventable ***before*** projects are built, based on the cost of controlling the emissions ***after*** projects are built,[2] when it tends to cost far more. This is an implicit exemption allowing increased emissions from dirtier oil projects that succeed in rushing air permits. Again, there is no reason for this implicit

[1] US Energy Information Administration (www.eia.gov/dnav/pet/pet_cons_prim_dcu_sca_a.htm).
[2] AQMD Staff's proposal would not require cleanup feasibility assessments until the year 2018 (*§§ 12-16-401, 12-16-301, 12-15-404, 12-15-401*).

exemption allowing projects for 'dirtier' oil to increase refinery emissions, and none is presented. *(27 February 2015 comments of CBE et al. at 2.)*

District Staff still fails to provide any valid rationale for this loophole that allows potentially irreversible increases in refinery emissions. Instead, the Workshop Report and rules as proposed document in detail the District Staff's assertion that it still needs to collect and analyze more information before it will be able to determine exactly how, and even whether, it can mitigate the new emissions from the new oil projects. This admits Staff's plan to keep on granting permits to emit pollution Staff does not know how to control.

We reassert the unrebutted critical need for pausing this premature permitting now.

4. Establish enforceable numeric refinery emission caps, now, in Rule 12-16.

As stated, the unsupported exemptions for more emissions and polluter self-regulation now proposed could commit us to unacceptable new emissions—and this rulemaking record demonstrates the lack of transparency and accountability that has always allowed oil refinery pollution unless and until unambiguous, enforceable limits are in place. The District could easily develop limits on each refiner's total facility-wide emissions that are equal to the most recent calendar year or most recent three-year average emissions that are currently reported, whichever is greater, plus the threshold factor[3] currently proposed. An example for GHGs using Air Resources Board data[4] is shown below.

Example calculation of enforceable numeric limits to cap refinery emissions for adoption during Spring 2015: GHG emissions, shown in millions of metric tons/year CO_2e.

Data (MM MTY CO_2e)	Year	Phillips 66 Rodeo	Valero Benicia	Chevron Richmond
Actual emissions reported[(4)]	2011	2.148	2.533	4.345
	2012	2.092	2.830	3.815
	2013	2.249	2.738	3.915
Calculation (MM MTY CO_2e)				
Most recent year emissions		2.249	2.738	3.915
Most recent three-year average		2.163	2.701	4.025
Find the greatest of these two values		2.249	2.738	4.025
Add the emission threshold factor		0.010	0.010	0.010
Enforceable limit to cap emissions (MM MTY CO_2e)		**2.259**	**2.748**	**4.035**

Keeping refinery emissions at current levels does not require any new action by the oil companies, and it is always more cost-effective to minimize emissions from their planned projects during the design phase, before those projects are built. Enforceable numeric emission caps are feasible, reasonable, and necessary to prevent even more serious air quality-related health impacts than Air District reports admit are allowed now.

[3] This factor is +10,000 metric tons/yr for GHGs and +7% for other pollutants (*§ 12-16-301*).
[4] Data from CARB Mandatory GHG Reporting, including emissions from Air Liquide to make hydrogen used at Rodeo (www/arb/ca/gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm).

For these reasons, we **demand** that instead of the unsupported and unacceptable air pollution exemptions and polluter self-regulation now proposed, the Air District must act to protect our health and climate by establishing enforceable numeric limits to cap toxic, smog-forming and climate-destroying air pollution from refineries.

Communities for a Better Environment (CBE)
Greg Karras

California Nurses Association (CNA)

Asian Pacific Environmental Network (APEN)
Sandy Saeteurn

Crockett-Rodeo United to Defend the Environment
Nancy Cimarron Rieser

Martinez Environmental Group
Aimee Durfee

Benicians for a Safe and Healthy Community (BSHC)
Katherine Black

Good Neighbor Steering Committee (Benicia)
Marilyn Bardet

Pittsburg Defense Council
Kalli Graham

Sunflower Alliance
Steven Nadel

Idle No More SF Bay
Pennie Opal Plant

Bay Area Refinery Corridor Coalition
Tamhas Griffith

Richmond Progressive Alliance (RPA)
Mike Parker

Global Community Monitor (GCM)
Denny Larson

West Oakland Environmental Indicators Project
Brian Beveridge

continued...

Greenaction for Health and Environmental Justice
Bradley Angel

350 Bay Area
Carla West

ForestEthics
Ross Hammond

Sierra Club San Francisco Bay Chapter
David McCoard and Luis Amezcua

Copy: Board of Directors, Bay Area Air Quality Management
Interested organizations and individuals

BY ELECTRONIC MAIL

23 November 2015

Greg Nudd
Eric Stevenson
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

COMMUNITIES FOR A BETTER ENVIRONMENT

Re: **Supplemental Comment on Air District Staff Proposal, Rules 12-15 and 12-16; Evidence of Localized Bay Area Refinery GHG and $PM_{2.5}$ Emission Impact**

Dear Mssrs. Nudd and Stevenson,

Data the Air District reports elsewhere document a substantial long-term increase in Bay Area refinery emissions of GHG and $PM_{2.5}$ that co-emit from refinery fuel combustion. EIA data show that refined fuels demand cannot explain the reported emissions increase. Peer reviewed science shows that refining lower quality oil contributed to this emissions increase and could further increase emissions from Bay Area refineries if their current, declining, crude oil supply is replaced with bitumen-derived 'tar sands' oil.

Forecasts the Air District reports elsewhere show that Bay Area refinery GHG and $PM_{2.5}$ emissions could further increase. The peer reviewed science shows that Bay Area refinery emissions could greatly exceed even these forecasts if the refiners replace their declining current oil supply with bitumen-derived tar sands oil. In fact, industry reports document plans to replace Bay Area (and California) refiners' declining current oil supplies with that tar sands oil—if the resultant emissions increase is allowed.

Moreover, those industry-reported plans include a major expansion of Bay Area oil train traffic that—since Bay Area refineries cannot process very large amounts of light shale oils efficiently—could be allowed here ***if*** the emissions increase from refining the large amounts of tar sands oil these trains would deliver is allowed.

The foregoing is summarized from CBE's 21 October 2015 comments 1–10.

CBE believes that the Air District Staff has improperly rejected enforceable limits set to current actual emission rates in part because the Staff has not considered adequately, and has not informed the public and its Board about, the data and information summarized above, and the following data and information:

11. Bay Area oil refineries contribute to serious PM air pollution impacts.

Analysis the Air District reports elsewhere estimates that air pollution kills ≈ 2,000 to 3,000 Bay Area residents each year, $PM_{2.5}$ causes the "vast majority" of these premature deaths, and health impacts from air pollution cost the region's economy "multiple billions of dollars" each year. (Attachment 4 to CBE's 21 Oct. Comment at pp. 26–27.)

A table from the Air District web site indicating that the region does not attain State ambient air quality standards for $PM_{2.5}$, PM_{10} and ozone, and also remains designated as in "nonattainment" of national ambient air quality standards (NAAQS) for $PM_{2.5}$ and ozone, is appended hereto as Attachment 36.[36] A World Health Organization (WHO) summary of its health-based ambient air PM criteria is appended as Attachment 37.[37] Attachments 36 and 37 show that WHO's health-based ambient air criteria for $PM_{2.5}$ (10 $\mu g/m^3$ annual mean; 25 $\mu g/m^3$ 24-hour mean) are more protective than the NAAQS (12 $\mu g/m^3$ annual mean; 35 $\mu g/m^3$ 24-hour mean).

California Air Resources Board (ARB) data for 24-hour $PM_{2.5}$ air concentrations that exceeded NAAQS and WHO criteria during May 2012–April 2015 at the five nearest $PM_{2.5}$ NAAQS monitors to Bay Area refineries are appended hereto as Attachment 38.[38] The table below summarizes these data. $PM_{2.5}$ exceeded one or both health criteria a total of 156 times at these five monitoring stations collectively on 66 days in this period. $PM_{2.5}$ exceeded the WHO health criterion more frequently than once each 17 days, on average over these three years. On most of these days (40 of 66), criteria were exceeded at multiple locations, and the vast majority of these days (61 of 66), were in winter. These observations are consistent with the accumulation of local emissions in nearby air that the Air District reports elsewhere. Atmospheric conditions that Air District Staff describe in Attachment 4 as "stagnation," which occur most frequently in the Bay Area in winter, trap air pollution close to emission sources, thereby increasing the effect of strong local emission sources that elevates $PM_{2.5}$ air concentrations near these sources.

This evidence demonstrates that the refinery emissions documented in CBE's 21 October 2015 comments 1–10 contribute to a serious air pollution and health problem.

Ambient air $PM_{2.5}$ concentrations that exceeded the 25 μg/m^3 World Health Organization (WHO) and 35 μg/m^3 National Ambient Air Quality Standard (NAAQS) criteria for 24–hour exposures at NAAQS $PM_{2.5}$ monitors nearest to Bay Area refineries, May 2012–Apr 2015.[a]

		24-hour average $PM_{2.5}$ ambient air data	
Date	NAAQS Monitoring Station	(μg/m^3)	(health criteria exceeded)
16 November 2012	Concord–Treat Blvd.	32.2	WHO
16 November 2012	San Rafael	25.9	WHO
5 January 2013	Concord–Treat Blvd.	27.6	WHO
5 January 2013	San Rafael	28.5	WHO
5 January 2013	Vallejo–Tuolumne St.	28.6	WHO
15 January 2013	Vallejo–Tuolumne St.	26.7	WHO
16 January 2013	Oakland–West	33.2	WHO
16 January 2013	San Rafael	26.3	WHO
16 January 2013	Vallejo–Tuolumne St.	32.8	WHO
17 January 2013	Oakland–West	29.8	WHO
17 January 2013	San Rafael	25.5	WHO
17 January 2013	Vallejo–Tuolumne St.	25.2	WHO
22 January 2013	Oakland–West	28.1	WHO
22 January 2013	San Rafael	26.5	WHO
23 January 2013	Concord–Treat Blvd.	36.2	WHO and NAAQS
23 January 2013	Oakland–West	37.4	WHO and NAAQS
23 January 2013	San Pablo–Rumrill Blvd.	38.7	WHO and NAAQS
23 January 2013	San Rafael	31.5	WHO
1 February 2013	Oakland–West	28.5	WHO
1 May 2013	Oakland–West	27.3	WHO
1 June 2013	Oakland–West	25.1	WHO
4 July 2013	Oakland–West	29.2	WHO
29 July 2013	Oakland–West	29.0	WHO
30 July 2013	Oakland–West	25.9	WHO
30 July 2013	San Pablo–Rumrill Blvd.	31.1	WHO
30 July 2013	San Rafael	26.1	WHO
30 July 2013	Vallejo–Tuolumne St.	26.0	WHO
24 November 2013	Vallejo–Tuolumne St.	31.7	WHO
25 November 2013	Oakland–West	25.7	WHO
25 November 2013	San Pablo–Rumrill Blvd.	25.2	WHO
25 November 2013	Vallejo–Tuolumne St.	29.9	WHO
27 November 2013	Oakland–West	29.1	WHO
27 November 2013	San Pablo–Rumrill Blvd.	25.8	WHO
5 December 2013	Vallejo–Tuolumne St.	26.2	WHO
12 December 2013	Oakland–West	25.7	WHO
12 December 2013	San Pablo–Rumrill Blvd.	25.7	WHO
13 December 2013	Oakland–West	26.9	WHO
13 December 2013	Vallejo–Tuolumne St.	25.2	WHO
14 December 2013	Vallejo–Tuolumne St.	38.0	WHO and NAAQS
15 December 2013	Oakland–West	31.8	WHO
15 December 2013	San Pablo–Rumrill Blvd.	29.8	WHO
15 December 2013	San Rafael	26.5	WHO
15 December 2013	Vallejo–Tuolumne St.	33.7	WHO

Ambient air $PM_{2.5}$ concentrations that exceeded the 25 μg/m^3 World Health Organization (WHO) and 35 μg/m^3 National Ambient Air Quality Standard (NAAQS) criteria for 24–hour exposures at NAAQS $PM_{2.5}$ monitors nearest to Bay Area refineries, May 2012–Apr 2015.[a]
Continued.

Date	NAAQS Monitoring Station	24-hour average $PM_{2.5}$ ambient air data (μg/m^3)	(health criteria exceeded)
16 December 2013	Oakland–West	25.7	WHO
16 December 2013	Vallejo–Tuolumne St.	28.8	WHO
17 December 2013	Concord–Treat Blvd.	29.5	WHO
17 December 2013	Oakland–West	42.7	WHO and NAAQS
17 December 2013	San Pablo–Rumrill Blvd.	41.2	WHO and NAAQS
17 December 2013	San Rafael	44.9	WHO and NAAQS
17 December 2013	Vallejo–Tuolumne St.	38.7	WHO and NAAQS
22 December 2013	Oakland–West	25.1	WHO
22 December 2013	Vallejo–Tuolumne St.	31.9	WHO
23 December 2013	Oakland–West	32.5	WHO
23 December 2013	San Pablo–Rumrill Blvd.	31.0	WHO
23 December 2013	San Rafael	32.6	WHO
23 December 2013	Vallejo–Tuolumne St.	39.3	WHO and NAAQS
24 December 2013	Oakland–West	32.2	WHO
24 December 2013	San Rafael	29.0	WHO
24 December 2013	Vallejo–Tuolumne St.	31.3	WHO
25 December 2013	Oakland–West	30.0	WHO
25 December 2013	San Pablo–Rumrill Blvd.	27.4	WHO
25 December 2013	Vallejo–Tuolumne St.	36.5	WHO and NAAQS
26 December 2013	Oakland–West	26.1	WHO
27 December 2013	Oakland–West	29.6	WHO
30 December 2013	Concord–Treat Blvd.	26.3	WHO
30 December 2013	Oakland–West	26.2	WHO
30 December 2013	San Pablo–Rumrill Blvd.	33.3	WHO
30 December 2013	San Rafael	44.4	WHO and NAAQS
30 December 2013	Vallejo–Tuolumne St.	35.5	WHO
31 December 2013	Oakland–West	26.2	WHO
31 December 2013	San Pablo–Rumrill Blvd.	30.4	WHO
31 December 2013	San Rafael	25.7	WHO
31 December 2013	Vallejo–Tuolumne St.	42.6	WHO and NAAQS
1 January 2014	Oakland–West	38.8	WHO and NAAQS
1 January 2014	Vallejo–Tuolumne St.	39.6	WHO and NAAQS
2 January 2014	Oakland–West	25.7	WHO
3 January 2014	Oakland–West	25.7	WHO
3 January 2014	Vallejo–Tuolumne St.	30.7	WHO
6 January 2014	Oakland–West	25.8	WHO
6 January 2014	San Pablo–Rumrill Blvd.	26.4	WHO
7 January 2014	Oakland–West	25.2	WHO
17 January 2014	Oakland–West	33.8	WHO
17 January 2014	San Pablo–Rumrill Blvd.	29.6	WHO
17 January 2014	San Rafael	30.8	WHO
17 January 2014	Vallejo–Tuolumne St.	31.8	WHO

Ambient air $PM_{2.5}$ concentrations that exceeded the 25 μg/m^3 World Health Organization (WHO) and 35 μg/m^3 National Ambient Air Quality Standard (NAAQS) criteria for 24–hour exposures at NAAQS $PM_{2.5}$ monitors nearest to Bay Area refineries, May 2012–Apr 2015.[a]
Continued.

Date	NAAQS Monitoring Station	24-hour average $PM_{2.5}$ ambient air data (μg/m^3)	(health criteria exceeded)
19 January 2014	Oakland–West	27.2	WHO
19 January 2014	San Pablo–Rumrill Blvd.	25.6	WHO
20 January 2014	Oakland–West	25.5	WHO
24 January 2014	Concord–Treat Blvd.	30.6	WHO
24 January 2014	Oakland–West	30.9	WHO
24 January 2014	San Pablo–Rumrill Blvd.	38.2	WHO and NAAQS
24 January 2014	San Rafael	38.1	WHO and NAAQS
25 January 2014	Oakland–West	25.4	WHO
6 November 2014	Vallejo–Tuolumne St.	29.7	WHO
27 November 2014	Concord–Treat Blvd.	25.1	WHO
27 November 2014	Oakland–West	26.1	WHO
27 November 2014	San Pablo–Rumrill Blvd.	28.2	WHO
27 November 2014	San Rafael	26.8	WHO
27 November 2014	Vallejo–Tuolumne St.	30.9	WHO
9 December 2014	Vallejo–Tuolumne St.	29.5	WHO
28 December 2014	Vallejo–Tuolumne St.	26.9	WHO
2 January 2015	San Rafael	26.7	WHO
2 January 2015	Vallejo–Tuolumne St.	30.2	WHO
3 January 2015	Concord–Treat Blvd.	26.1	WHO
3 January 2015	Oakland–West	33.7	WHO
3 January 2015	San Pablo–Rumrill Blvd.	29.6	WHO
3 January 2015	San Rafael	30.2	WHO
3 January 2015	Vallejo–Tuolumne St.	38.0	WHO and NAAQS
4 January 2015	Concord–Treat Blvd.	27.4	WHO
4 January 2015	Oakland–West	34.8	WHO
4 January 2015	San Pablo–Rumrill Blvd.	32.1	WHO
4 January 2015	San Rafael	31.3	WHO
4 January 2015	Vallejo–Tuolumne St.	32.5	WHO
5 January 2015	Oakland–West	25.8	WHO
5 January 2015	San Pablo–Rumrill Blvd.	26.4	WHO
5 January 2015	Vallejo–Tuolumne St.	28.6	WHO
6 January 2015	Oakland–West	36.1	WHO and NAAQS
6 January 2015	San Pablo–Rumrill Blvd.	26.5	WHO
6 January 2015	San Rafael	27.7	WHO
6 January 2015	Vallejo–Tuolumne St.	28.9	WHO
7 January 2015	Oakland–West	25.2	WHO
8 January 2015	Concord–Treat Blvd.	31.0	WHO
8 January 2015	Oakland–West	38.7	WHO and NAAQS
8 January 2015	San Pablo–Rumrill Blvd.	31.8	WHO
8 January 2015	San Rafael	34.8	WHO
8 January 2015	Vallejo–Tuolumne St.	41.4	WHO and NAAQS
9 January 2015	Oakland–West	29.9	WHO

Ambient air $PM_{2.5}$ concentrations that exceeded the 25 $\mu g/m^3$ World Health Organization (WHO) and 35 $\mu g/m^3$ National Ambient Air Quality Standard (NAAQS) criteria for 24–hour exposures at NAAQS $PM_{2.5}$ monitors nearest to Bay Area refineries, May 2012–Apr 2015.[a]
Continued.

Date	NAAQS Monitoring Station	24-hour average $PM_{2.5}$ ambient air data ($\mu g/m^3$)	(health criteria exceeded)
9 January 2015	Vallejo–Tuolumne St.	29.5	WHO
10 January 2015	Vallejo–Tuolumne St.	29.7	WHO
11 January 2015	Vallejo–Tuolumne St.	27.0	WHO
14 January 2015	Concord–Treat Blvd.	28.3	WHO
14 January 2015	San Pablo–Rumrill Blvd.	31.7	WHO
14 January 2015	San Rafael	35.1	WHO
14 January 2015	Vallejo–Tuolumne St.	39.1	WHO and NAAQS
15 January 2015	Concord–Treat Blvd.	29.6	WHO
15 January 2015	Oakland–West	36.1	WHO and NAAQS
15 January 2015	San Pablo–Rumrill Blvd.	33.2	WHO
15 January 2015	San Rafael	36.3	WHO and NAAQS
15 January 2015	Vallejo–Tuolumne St.	31.9	WHO
16 January 2015	Concord–Treat Blvd.	28.1	WHO
16 January 2015	Oakland–West	32.9	WHO
16 January 2015	San Pablo–Rumrill Blvd.	31.6	WHO
16 January 2015	San Rafael	36.0	WHO and NAAQS
16 January 2015	Vallejo–Tuolumne St.	30.7	WHO
23 January 2015	Vallejo–Tuolumne St.	29.4	WHO
24 January 2015	San Rafael	30.5	WHO
24 January 2015	Vallejo–Tuolumne St.	28.2	WHO
26 January 2015	Vallejo–Tuolumne St.	25.1	WHO
28 January 2015	Vallejo–Tuolumne St.	26.1	WHO
1 February 2015	Vallejo–Tuolumne St.	32.6	WHO
2 February 2015	Oakland–West	26.7	WHO
2 February 2015	San Rafael	29.5	WHO
2 February 2015	Vallejo–Tuolumne St.	32.0	WHO
4 February 2015	Concord–Treat Blvd.	25.6	WHO
4 February 2015	San Pablo–Rumrill Blvd.	26.2	WHO
4 February 2015	San Rafael	31.0	WHO

[a] Data from California Air Resources Board; www.arb.ca.gov/adam/weekly/weekly2.php; *see* Attachment 38. San Pablo and W. Oakland stations began reporting data on December 12th and 18th, 2012, respectively.

12. Bay Area oil refineries cause disparately greater PM emissions locally.

As stated, strong local emission sources elevate $PM_{2.5}$ air concentrations locally, especially during stagnant atmospheric conditions that trap emissions near their sources. A report by former ARB advisors that found oil refineries are 11 of the worst 15 major industrial GHG co-pollutant emitters in California, as ranked by population-weighted PM emission burden at 2.5 miles from the facilities, is appended hereto as Attachment 39.[39]

Areal refinery source strength—emissions per area (e.g., mile^2) within a given boundary around the source—was calculated from Air District data for the same range of boundary distances assessed in Attachment 39, and compared with the average for *all* emission sources within the Bay Area as a whole, as detailed in Attachment 40.[40] The table below shows areal source strengths for $PM_{2.5}$ and the $PM_{2.5}$ precursors NO_x and SO_2. For example, the Bay Area average $PM_{2.5}$ source strength (3.19 annual t/mile^2) is based on 17,885 tons emitted by all sources in the Bay Area divided by its area (5,600 miles^2); the refineries source strength at the 0.5 miles boundary (250 t/mile^2) is based on 985 tons emitted by refineries divided by 3.93 miles^2, their collective 0.5-mile-radius area. These source strengths are averages: air emission plumes vary in direction and concentration.

Areal refinery emission source strength at 0.5–6 miles, in emissions per square mile and as a percentage of the regional average for all sources in the Bay Area Air District.[a]

Pollutant Emission	Bay Area Sources	Areal Boundary	Areal source strength at boundary (avg.)	
			Annual tons/mile^2	% of Bay Area avg.
$PM_{2.5}$	All sources	AQMD jurisdiction	3.19	—
$PM_{2.5}$	Oil refineries	0.5 miles radius	250	≈ 7,800%
$PM_{2.5}$	Oil refineries	2.5 miles radius	10.0	≈ 310%
$PM_{2.5}$	Oil refineries	6.0 miles radius	1.74	≈ 54%
NO_x	All sources	AQMD jurisdiction	22.6	—
NO_x	Oil refineries	0.5 miles radius	1,080	≈ 4,800%
NO_x	Oil refineries	2.5 miles radius	43.4	≈ 190%
NO_x	Oil refineries	6.0 miles radius	7.54	≈ 33%
SO_2	All sources	AQMD jurisdiction	1.89	—
SO_2	Oil refineries	0.5 miles radius	1,380	≈ 73,000%
SO_2	Oil refineries	2.5 miles radius	55.3	≈ 2,900%
SO_2	Oil refineries	6.0 miles radius	9.60	≈ 510%

[a] Based on reported emissions and area within boundary: Emissions from BAAQMD inventories; refinery boundary distances after Pastor et al., 2010; jurisdiction area from BAAQMD. *See* Attachment 40 for details.

Review of the table reveals substantial refinery source strength at all distances compared. This is true for $PM_{2.5}$, NO_x and SO_2. The areal source strength of Bay Area refineries for these pollutants ranges from ≈ 48–730 *times* the Bay Area average for all sources at 0.5 miles, to ≈ 2–29 *times* this average at 2.5 miles, to 33–510% of the Bay Area average at six miles away from refineries. Note that these values are roughly additive—for example, the 33% value for refineries in the table represents an average total source strength that is ≈ 133% of the Bay Area average. Thus, all the data shown in the table indicate that refineries contribute significantly to locally elevated emissions.

This evidence demonstrates that the refineries cause a disparately severe local $PM_{2.5}$ air pollution emission impact.

13. Bay Area refinery emissions contribute substantially to disparately greater PM pollution of the ambient air locally.

A 2012 paper showing that refineries affect the PM trace element chemistry of urban ambient PM 2–8 kilometers downwind is appended hereto as Attachment 41.[41] A 2010 paper showing that metalliferous ultra-fine particulate matter (UFPM) emissions from refineries and other industries can alter atmospheric chemistry over "whole towns and cities" is appended hereto as Attachment 42.[42] A 2012 paper showing that emissions from oil refining and other industries are the main cause of UFPM air pollution episodes in Huelva, Spain is appended hereto as Attachment 43.[43] The analyses of refinery air pollution outside the Bay Area that is reported in attachments 41–43 further support the chemical "fingerprinting" analysis linking locally elevated ambient $PM_{2.5}$ to a Bay Area refinery source that is reported below.

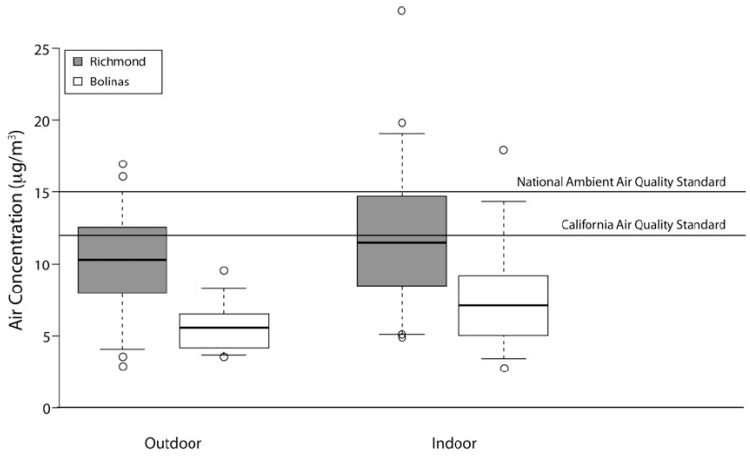
A 2009 paper that, among other things, documents locally elevated ambient air $PM_{2.5}$ levels in communities near the Chevron Richmond refinery, and shows by chemical "fingerprinting" that heavy oil combustion at the refinery and port account for this elevated air pollution, is appended hereto as Attachment 44.[44] A 2005 report that documents a statistically significant link between episodic emissions from Bay Area refineries and elevated SO_2 and H_2S ambient air levels at regional monitors, and even higher air levels at closer-in fence line monitors is appended hereto as Attachment 45.[45] A 2006 Air District Staff report documenting air dispersion modeling that corroborates the localized impacts shown in Attachment 45 is appended hereto as Attachment 46.[46] A 2013 report on the 6 August 2012 catastrophic pipe failure and refinery fire at Richmond indicating that ≈ 15,000 residents sought emergency medical care following exposures to the massive PM plume from this fire is appended hereto as Attachment 47.[47]

The evidence in attachments 36–47 strongly supports the conclusion that Bay Area refineries contribute substantially to disparately severe local $PM_{2.5}$ air pollution.

14. Ambient air data alone may underestimate the severity of refinery impacts because refinery emissions penetrate indoor environments.

The most uniquely important data and information reported in Attachment 44 is from intensive multi-pollutant monitoring of *indoor* household air at 50 Bay Area sites, including 40 sites near the Richmond refinery and ten control sites in Bolinas. Analysis of the resultant data showed that outdoor air pollution, including the elevated local air pollution that was caused by the refinery and port, penetrated indoors.

Moreover, some important air pollutants reached higher air concentrations indoors than outdoors—and reached higher indoor air concentrations in the refinery-impacted sites than in the control sites. This effect is illustrated for $PM_{2.5}$ in the chart entitled "Figure 1" in Attachment 44 that is excerpted below.



Note. Solid lines are medians; boxes are interquartile ranges; vertical lines are 5th and 95th percentiles; circles are extreme data points below the 5th percentile and above the 95th percentile; and horizontal dotted lines represent annual federal and state ambient air quality standards for $PM_{2.5}$.

FIGURE 1—Levels of fine particulate matter ($PM_{2.5}$) in homes in Richmond and Bolinas, CA: 2006.
Excerpted from Brody et al., Attachment 44. (NAAQS shown revised in 2012 to 12 μg/m³ per Att. 36.)

As shown in the chart, indoor air levels of $PM_{2.5}$ exceeded the State's ambient air quality standard at nearly half of the refinery-impacted sites, and exceeded 10 μg/m^3, the annual average health criterion set by WHO, at more than half of the refinery-impacted sites. This finding is based on the measurements reported in Attachment 44, which were taken in the summer months. Bay Area $PM_{2.5}$ levels are well known to be generally lower in summer and higher in winter, so these summertime data may underestimate actual indoor exposures. In any case, this evidence for indoor $PM_{2.5}$ air pollution levels even higher than the levels outdoors is especially important because people on average spend most (≈ 90%) of our time indoors. But ambient air, by definition, is outdoor air. Thus, this evidence of indoor $PM_{2.5}$ air concentrations that are higher than outdoor $PM_{2.5}$ air concentrations at refinery-impacted Bay Area sites indicates that ambient air data alone may underestimate the localized health impacts of refinery emissions here.

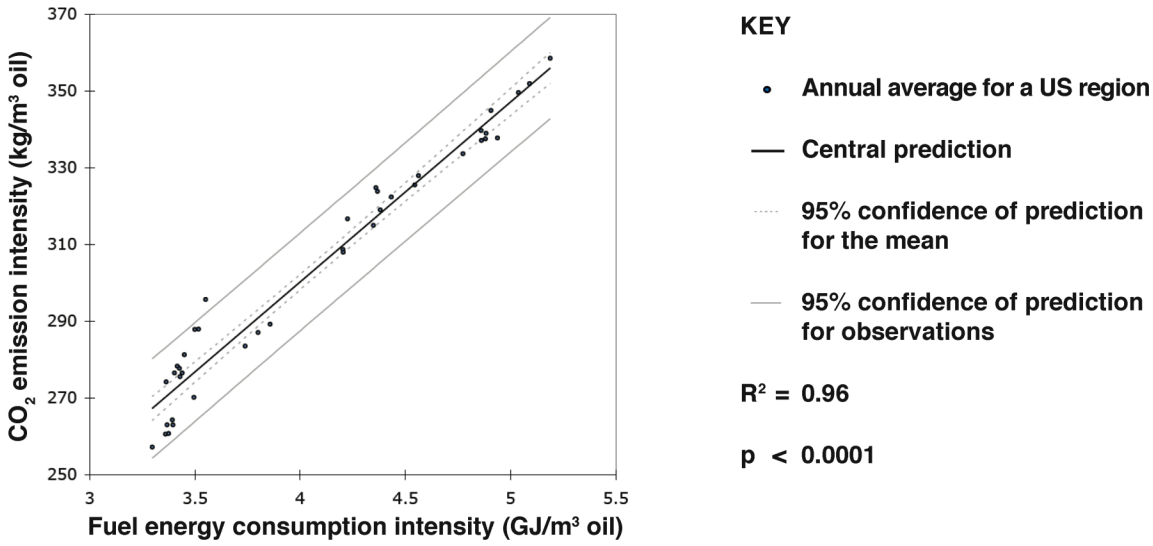
15. Increasing refinery GHG emissions would increase unregulated local health hazards from toxic GHG co-pollutant emissions.

Attachments 4, 6, 42, and 43 demonstrate that refineries emit environmentally significant amounts of UFPM that—compared with coarser PM—carries higher concentrations of toxins, penetrates deeper into the lungs, bloodstream, and cells to deliver those toxins, is more abundant and concentrated near its sources, and may in fact be even more toxic.

PM co-emits along with GHGs from Bay Area refinery combustion sources, and refinery PM emissions generally increase along with GHG emissions, as shown by comments 1–6 and attachments 1–20. Attachments 6, 42, and 43 further confirm the co-emission of UFPM with other PM from refineries. Indeed, basic engineering and combustion principles dictate that, like other ubiquitous fossil fuel combustion products, UFPM, $PM_{2.5}$, PM_{10} and CO_2 will co-emit from oil refinery combustion sources. Current

industry plans would increase those emissions through a switch to processing tar sands oil that would further increase the energy intensity and fuel combustion intensity of Bay Area refineries, as documented by comments 1–9 and attachments 1–33.

A statistical analysis report on a comparison of actual, observed fuel combustion energy intensity and GHG emission intensity data from operating refineries across 97% of the U.S. industry over ten years is appended hereto as Attachment 48.[48] The data analyzed are from Attachment 13. The analysis finds a strong, positive, quantitatively predictable relationship between CO_2 the emission intensities and fuel energy consumption intensities of refineries. This finding is illustrated in the chart below.



Increase in average refinery CO_2 emission intensity with increasing refinery fuel energy consumption intensity across four U.S. regions and ten years. *Source:* Attachment 48.

Bay Area refinery emissions of UFPM are unregulated because, as the Air District Staff admits, its industrial PM emission monitoring and control requirements are set up to "measure the mass of particles" only, and "UFPM is negligible on a mass basis." (*See* Attachment 4 at 104.) Moreover, "hot spot" impacts from other types of refinery PM emissions are unregulated. An appendix to the Office of Environmental Health Hazard Assessment's guidance showing that (except for PM from diesel and gasoline engines), the State Air Toxics Hot Spots Program does *not* require refinery PM emissions to be quantified for health risk assessment is appended hereto as Attachment 49.[49]

In sum, the evidence in attachments 1–49 shows that unregulated local toxicity hazards from $PM_{2.5}$ and UFPM emissions could increase if further increased refinery GHG emissions are allowed. Strong evidence supports the conclusion that enabling refinery GHG emissions to further increase could result in a worsening of disparately severe, localized toxic hazards from increased refinery emissions of GHG co-pollutants.

16. Additional evidence supports past increases in refinery emission rates.

On Friday 20 November 2015, one working day before the Monday 23 November 2015 deadline for this comment, the Air District Staff provided to CBE two pages of charts and tables that are appended hereto in their entirety as Attachment 50.[50] Attachment 50 suggests a continuing increase in PM emissions in 2014, and a slight decrease in GHG emissions from 2008–2014 (it estimates GHG emissions in 2008 that *exceed all estimated and forecast* annual refinery emissions the Air District had reported from through *2026* in Attachment 1). However, Attachment 50 provides no detailed supporting data, and, crucially, it omits *any* information on historic emissions before 2007.

Attachment 50 shows increased PM emissions from Chevron's Fluid Catalytic Cracking (FCC) Unit starting in 2009, and increased PM emissions from Shell and Tesoro cooling towers starting in 2014. Air District Staff indicated that these cooling tower emissions are estimated from unmonitored leaks in aging or inadequately leak-proofed equipment.[50] Such unmonitored leaks in aging or poorly maintained cooling towers may be expected to increase over time—and other evidence the Air District has reported elsewhere shows that the Chevron Richmond refinery FCC emissions have increased since 1999.

Excerpts from Air District Authority to Construct, Emission Inventory, and Annual Source Update files for the Chevron Richmond Refinery FCC Unit are appended hereto as Attachment 51.[51] Following Chevron's rebuild and expansion of the FCC, its oil feed and coke burn rates increased substantially, and its PM emissions increased by ≈ 28%, from 1999–2009. (Attachment 51.) These FCC oil feed, FCC coke burn, and FCC $PM_{2.5}$ emission increments are consistent with the impacts of switching to lower quality crude feeds in the U.S. refining industry that are described in Attachment 18.

A report showing that refinery process expansions to refine lower quality crude increased California refinery GHG emissions by ≈ 3 million metric tons/year from 1995–2007 is appended hereto as Attachment 52.[52] A table of refinery GHG emissions reported by the ARB, and separately, estimated from Petroleum Industry Information Act (PIIRA) fuel use data compiled for the analysis in Attachment 16 and the emission factors in Attachment 13, is appended hereto as Attachment 53.[53] These PIIRA data suggest that between the three-year periods 1990–1992 and 2007–2009, statewide refinery GHG emissions increased by ≈ 3.7 million metric tons/year; and the ARB data suggest that between 1990–1992 and 2011–2013, statewide refinery emissions increased by ≈ 2.1 million metric tons/year. (Absolute values of ARB estimates should not be compared to those of PIIRA estimates due to differences in estimation methods; *see* Attachment 53.)

Attachments 51–53 document additional evidence that processing and feedstock changes contributed to increased refinery GHG and PM emissions over the multi-decade period from the 1990s to the present, consistent with the Air District's formally reported data in attachments 1–5 and CBE's comments 1–2. However, omitting *any* information on historic emissions before 2007, the Air District Staff's newly disclosed Attachment 50 presents an incomplete and inaccurate view of historic refinery emission trends.

Conclusion

Data the Air District reports elsewhere document a substantial long-term increase in Bay Area refinery emissions of GHG and $PM_{2.5}$ that co-emit from refinery fuel combustion. (Additional evidence that is reported elsewhere by the Air District and others and is reviewed in Comment 16 directly above further supports this finding.) Peer reviewed science shows that refining lower quality oil contributed to this emissions increase and could further increase emissions from Bay Area refineries if their current, declining, crude oil supply is replaced with bitumen-derived 'tar sands' oil.

Forecasts the Air District reports elsewhere show that Bay Area refinery GHG and $PM_{2.5}$ emissions could further increase. The peer reviewed science shows that Bay Area refinery emissions could greatly exceed even these forecasts if the refiners replace their declining current oil supply with bitumen-derived tar sands oil. In fact, industry reports document plans to replace Bay Area (and California) refiners' declining current oil supplies with that tar sands oil—if the resultant emissions increase is allowed.

Moreover, those industry-reported plans include a major expansion of Bay Area oil train traffic that—since Bay Area refineries cannot process very large amounts of light shale oils efficiently—could be allowed here ***if*** the emissions increase from refining the large amounts of tar sands oil these trains would deliver is allowed.

Bay Area oil refineries cause serious PM air pollution impacts, disparately greater PM emissions locally, and disparately severe PM pollution of the ambient air locally. But ambient air data alone may underestimate the severity of these impacts since refinery emissions penetrate indoor environments. Increasing refinery GHG emissions would increase unregulated local health hazards from toxic GHG co-pollutant emissions.

A safeguard against further increasing refinery emissions is needed without further delay. The Air District, however, proposes no such safeguard that is specific, enforceable upon adoption, and would apply to refineries facility-wide. Therefore, given the absence of any other such safeguard proposal, CBE's September 2015 proposal for limits set to current facility emission rates, and the community-proposed moratorium on permits for projects to enable lower quality oil, should be considered favorably in your revisions.

Respectfully submitted,

Greg Karras
Senior Scientist

Copy: Ken Alex, Office of the Governor
John Gioia, Stationary Source Committee Chair
Air District Board members
Richard Corey, Air Resources Board
Jack Broadbent, Air Pollution Control Officer
Interested organizations and individuals

Attachments—*see* attachments list herein below.

Attachments List (*see CBE's 21 October comments for attachments 1–35*).

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[36] Attachment 36. *Air Quality Standards and Attainment Status;* annotated table accessed on 17 November 2015 from the BAAQMD web site; Bay Area Air Quality Management District: San Francisco, CA.

[37] Attachment 37. *WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide, Global Update 2005: Summary of Risk Assessment;* World Health Organization: Geneva, Switzerland. 2006.

[38] Attachment 38. *Weekly Listing: National 24-Hour PM2.5 Averages;* data reported by CARB for 24-hour average $PM_{2.5}$ concentrations in ambient air, during ten-week periods from May 2012 through April 2015 when a 24-hour average exceeded NAAQS and WHO criteria, at the five NAAQS monitors nearest to Bay Area oil refineries. California Air Resources Board: Sacramento, CA. Data accessed 16 November 2015 from: www.arb.ca.gov/adam/weekly/weekly2.php.

[39] Attachment 39. Pastor et al., 2010. *Minding the Climate Gap: What's at Stake if California's Climate Law isn't Done Right and Right Away;* USC Program for Environmental and Regional Equity: Los Angeles, CA.

[40] Attachment 40. *Areal Refinery Source Strength Calculation Details;* Annotated tables based on BAAQMD data for 2010 emissions and jurisdictional data and the range of refinery source boundary distances from Attachment 39. Includes calculation details and results for $PM_{2.5}$ and precursors (NOx and SO_2) emissions. CBE, 2015. One page.

[41] Attachment 41. Celo et al., 2012. Concentration and Source Origin of Lanthanoids in the Canadian Atmospheric Particulate Matter: A Case Study. *Atmospheric Pollution Research* **3:** 270–278. DOI: 10.5049/APR.2012.030.

[42] Attachment 42. Moreno et al., 2010. Variations in Vanadium, Nickel and Lanthanoid Element Concentrations in Urban Air. *Science of the Total Environment* **408:** 4569–4579. DOI: 10.1016/j.scitotenv.2010.06.016.

[43] Attachment 43. Fernández-Comacho et al., 2012. Ultrafine Particle and Fine Trace Metal (As, Cd, Cu, Pb and Zn) Pollution Episodes Induced by Industrial Emissions in Huelva, SW Spain. *Atmospheric Environment* **61:** 507–517; http://dx.doi.org/10.1016/j.atmosenv.2012.08.003.

[44] Attachment 44. Brody et al., 2009. Linking Exposure Assessment Science with Policy Objectives for Environmental Justice and Breast Cancer Advocacy: The Northern California Household Exposure Study. *American Journal of Public Health* **99**(S3): S600–S609. DOI: 10.2105/AJPH.2008.149088 (Attachment includes Errata corrections).

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[45] Attachment 45. Karras and Hernandez, 2005. *Flaring Hot Spots: Assessment of Episodic Local Air Pollution Associated with Oil Refinery Flaring Using Sulfur as a Tracer;* A CBE report. Communities for a Better Environment (CBE): Oakland and Huntington Park, CA. July 2005.

[46] Attachment 46. Ezersky and Walsh, 2006. *Staff Report, Proposed Amendments to Regulation 12, Miscellaneous Standards of Performance, Rule 12, Flares at Petroleum Refineries;* Bay Area Air Quality Management District: San Francisco, CA. *See* esp. "Current Flare Emission Estimate" section at pages 6–8.

[47] Attachment 47. *Interim Investigation Report, Chevron Richmond Refinery Fire: Chevron Richmond Refinery; Richmond, California, August 6, 2012;* U.S. Chemical Safety and Hazard Investigation Board: Washington, D.C. Adopted 19 April 2013.

[48] Attachment 48. *Statistical Analysis Report on Comparison of Actual Refinery Fuel Combustion Energy Intensity versus Actual Refinery CO_2 Emission Intensity Observed Across 975 of the U.S. Refining Industry: Annual Observations From 1999–2008;* Analysis of data from Attachment 13 (Karras, 2010) by Communities for a Better Environment (CBE). Excel file: includes data, regression, normality test results.

[49] Attachment 49. *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments Appendix A;* California Office of Environmental Health Hazard Assessment: Sacramento, CA. February 2015. Note that the only PM emissions included in Appendix A-I, the detailed list of substances required to be quantified for HRAs, are PM emissions from diesel engine (p. A-8) and gasoline engine (p. A-10) exhaust, and note 9 to the listings further confirms this limitation (p. A-34): refinery PM emissions, which are not diesel or gasoline exhaust emissions, are excluded. Section 3.1 of the OEHHA Guidance Manual states that the list of "emitted substances that are addressed in a health risk assessment (HRA) … is contained in … Appendix A of this document."

[50] Attachment 50. Unreferenced charts and tables labeled as summarizing matter emissions during 2007–2014 and GHG emissions during 2008–2014 from Bay Area refineries that CBE received on 20 November 2014 from the Bay Area Air Quality Management District in a meeting attended by G. Karras and R. Lin of CBE and G. Nudd and E. Stevenson of the Air District, among others. Two untitled pages.

[51] Attachment 51. *Excerpts from Bay Area Air Quality Management District Files regarding the Chevron Richmond Refinery Fluid Catalytic Cracking Unit (FCCU, S-4285);* excerpts include: (1) A summary of unit activity and emission changes from 1999–2009; (2) AQMD and Chevron reports on an FCC expansion; (3) Current FCC emission factor data; (4) Annual Source Update FCC data for 1999; and (5) Emission Inventory FCC data for 2009.

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[52] Attachment 52. Karras, May and Lee, 2008. *Increasing GHG Emissions from Dirty Crude, Analysis of publicly available data for one of the oil refining processes expanding for more contaminated oil in California: Hydrogen Steam Reforming;* A CBE Report. Communities for a Better Environment (CBE). 8 December 2008.

[53] Attachment 53. *Historic Refinery GHG Data Comparison: Preliminary Comparison of Estimates for Total CO_2e Emissions from Refining in California;* Compilation of Air Resources Board, Petroleum Industry Information Reporting Act, and Union of Concerned Scientists data. Data compiled by Communities for a Better Environment (CBE) for technical assistance analysis for the work presented in Attachment 16, and this comment. One-page table including data, calculations, references and notes.