COMMENTS

on

Draft Environmental Impact Report

for the

Phillips 66

Ultra Low Sulfur Diesel Project

Prepared

For

SAFER

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I. INTRODUCTION

I have reviewed the Draft Environmental Impact Report (DEIR) for the Ultra Low Sulfur Diesel Project (Project or ULSD Project) at the Phillips 66 Los Angeles Refinery (Refinery).[1] This DEIR was prepared in response to a decision of the California Supreme Court[2] that found deficiencies in previously prepared CEQA documents.

My review of this DEIR indicates that it fails to cure the deficiencies found by the California Supreme Court and raises new issues. The revised DEIR fails to adequately support its emission calculations, excluding key data, assumptions, and calculations used to estimate Project emission increases. Thus, it fails as an informational document under CEQA.

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Further, this DEIR improperly calculates both pre-project and post-project emissions. Pre-project emissions were calculated using the maximum daily emissions in 2002-2003 rather than average daily emissions. Post-project emissions were calculated using annual average emissions during 2006-2008, rather than "highest daily emissions", based on permit limits or physical constraints of the subject equipment.

Finally, the DEIR improperly modified certain key emission factors, without disclosing the changes. It further used superceded emission factors that significantly underestimate emissions.

These various flaws significantly understated NOx emissions. The increase in NOx emissions exceeds 80 lbs/day when these defects are cured. This exceeds the CEQA significance threshold of 55 lb/day. Thus, the increase in NOx emissions is a significant unmitigated air quality impact that was not disclosed in the DEIR.

My resume is attached as **Exhibit 1** to these comments. I have over 40 years of experience in the field of environmental engineering. I have M.S. and Ph.D. degrees in environmental engineering from the University of California at Berkeley. I am a licensed professional engineer (chemical, environmental) in five states, including California; a Board Certified Environmental Engineer, certified in Air Pollution Control by the American Academy of Environmental Engineers; and a Qualified Environmental Professional, certified by the Institute of Professional Environmental Practice.

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I have prepared comments, responses to comments and sections of EIRs for both proponents and opponents of projects on air quality, water supply, water quality, hazardous waste, public health, risk assessment, worker health and safety, odor, risk of upset, noise, land use and other areas for well over 100 CEQA documents, including for all California refineries.

[1] Environmental Audit, Inc., Phillips 66 Los Angeles Refinery Ultra Low Sulfur Diesel Project Draft Environmental Impact Report, Prepared for South Coast Air Quality Management District, SCH No. 2004011095, September 2014.
[2] *Communities for a Better Environment v. South Coast Air Quality Management Dist. (2010) 48 Cal.4th 310.*

I was a consultant to a former owner of the subject Refinery on CEQA and other environmental issues for over a decade. I also wrote the original comments on this Project in 2004, which led to the CBE v. SCAQMD California Supreme Court decision addressed in this DEIR. Those comments are attached as **Exhibits 2 and 3.**

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II. EMISSION ESTIMATING FRAMEWORK

The DEIR recalculates the increase in emissions from the Ultra Low Sulfur Diesel Project (Project or ULSD Project) at the Phillips 66 Los Angeles Refinery (Refinery) to address errors in the Project baseline found by the California Supreme Court in CBE v. SCAQMD. The purpose of this DEIR was to cure the original baseline error -- using permitted levels as the pre-project or baseline emissions. The revised DEIR introduces new errors that underestimate the increase in emissions. Further, the revised emissions are inadequately supported. When the errors and omissions described below are corrected, the Project results in significant air quality impacts due to NOx emissions.

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The DEIR estimated changes in emissions from: (1) fugitive components; (2) a replacement heater; (3) storage tank 331; (4) hydrogen production; (5) electricity demand; (6) truck transport; and (7) steam demand. DEIR, Table 3.3-7 and Appx. B. The DEIR used different methods to calculate the increase in emissions from each of these sources. Most of the methods used in the DEIR underestimate emission increases and are inconsistent with standard procedures and the selected significance thresholds, which are based on peak day increases.

The increase in emissions due to a project at an existing facility is the difference between post-project (future) and pre-project (baseline) emissions, expressed as:

Increase in Emissions = Post-Project Emissions – Pre-Project Emissions (1)

The post-project emissions are the maximum emissions that can be released as a result of the project. These are often called the maximum day or peak day emissions. If project emissions are limited by permit, the permit limits are used as the post-project emissions. In the absence of permit limits, the physical capacity of the subject equipment is used to estimate post-project emissions.

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The pre-project or baseline emissions are the actual emissions as they exist at the time environmental analysis is commenced, without the project. They are typically calculated as annual average emissions in the two years preceding the start of environmental review, unless there are unusual circumstances, such as a lull or spike that occurred during that period. In that case, a much longer period of record is examined and presented in the CEQA document to support the selection of a different baseline period or averaging convention, together with a discussion of the alternate choice.

The DEIR asserts that it estimated the increase in emissions from each project component using baseline emissions from 2002-2003 and post-project emissions from April 2006 through December 2008. DEIR, p. 3-33. However, a close examination of the supporting calculations in Appendix B indicates significant variations in this general procedure were followed for the various sources. In some cases, the methods used to estimate pre-project or post-project emissions result in underestimating the Project emission increases, including for: (1) the replacement heater, (2) hydrogen production, (3) electrical demand, and (4) steam production. The following methods were used:

Pre-Project

- Fugitives: pre-project component counts
- Heater: maximum day in 2002-2003
- Hydrogen production: 2002-2003
- Electrical demand: not stated
- Steam production: 2002-2003
- Vehicle emissions: not stated
- Tank: 0 as out of service

Post-Project

- Fugitive Emissions: as-built surveys
- Heater: Permit limits or SCAQMD default emission factors
- Hydrogen Production: 2006-2008
- Electricity Demand: new equipment design, no increase from existing sources; no year stated
- Steam production: 2006-2008
- Vehicle Emissions: 2004
- Tank 331: design capacity

The increase in emissions is compared with significance criteria. If the increase in emissions "equals or exceed" any significance criteria, air quality impacts are significant for that pollutant. DEIR, p. 3-31.

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The averaging convention used in equation (1) -- daily, quarterly, monthly, or annual – depends on the significance criteria selected to evaluate impacts. The DEIR selected the South Coast Air Quality Management District's (SCAQMD's) significance criteria published in the 1993 SCAQMD CEQA Handbook. DEIR, Table 3.3-6, note (a). These criteria were subsequently updated in 2006, but the DEIR fails to cite the update.[3] This is a significant

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[3] SCAQMD, Final – Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Threshold, October 2006, Available at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook.

omission, as the PM2.5 significance thresholds in the update are lower than the 55 lb/day threshold used in the DEIR.[4]

1-43 cont.

The SCAQMD significance criteria are expressed in pounds per day (lb/day) of nitrogen oxides (NOx: 55 lbs/day), volatile organic compounds (VOC: 55 lbs/day), particulate matter with an aerodynamic diameter less than 10 microns (PM10: 150 lbs/day), particulate matter with an aerodynamic diameter less than 2.5 microns (PM2.5: 55 lbs/day), carbon monoxide (CO: 550 lbs/day), and lead (Pb: 3 lbs/day). DEIR, Table 3.3-6.

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Lead emissions were not calculated in the DEIR, even though the heater, hydrogen production, electricity demand, steam production, and truck transport emit lead. Thus, the DEIR is deficient as an informational document.

The SCAQMD CEQA Handbook explains that "[i]n determining whether or not a project exceeds these thresholds, the project emissions should be calculated…using the highest daily emissions."[5] This confirms that post-project emissions should be the highest daily or peak day emissions, not the annual average day based on an annual average in the middle of a recession, as used in the DEIR for hydrogen and steam production.

Thus, if a permit limit or other metric is expressed as an annual average, it would not be sufficient to compare the average daily emissions, estimated by dividing the annual average emissions by 365 days per year, to the SCAQMD daily significance thresholds if operations fluctuate around the daily annual average. Rather, the maximum day emissions must be used to determine if the increase in project emissions is significant. This requires examination of several years of post-project daily emissions to select the maximum, or an engineering evaluation of the equipment to determine peak daily emissions. The DEIR fails as an informational document as none of this information is in the record.

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The DEIR did not conduct a peak daily analysis, or provide any of the data required for a reviewer to perform this analysis or check the DEIR's selection. In fact, the DEIR uses different pre-project and post-project periods and averaging conventions for each emission source. These appear to have been selected to underestimate the increase in emissions due to the Project. The various ways in which Project emissions are underestimated are discussed below for four of the emission sources: (1) replacement heater; (2) hydrogen production; (3) electricity demand; and (4) steam production.

[4] The PM2.5 update includes two PM2.5 significance thresholds, a regional threshold of 55 lb/day, as reported in the DEIR, and localized thresholds, reported in lookup tables as a function of location, receptor distance, and project size. 2006 SCAQMD Handbook Update, Table B-2. The DEIR's analysis ignores the localized thresholds. These thresholds indicate that the Project could result in significant localized PM2.5 impacts. To rebut this presumption, the applicant must conduct a more detailed modeling analysis. 2006 SCAQMD Handbook Update, p. 8.

[5] 1993 SCAQMD CEQA Handbook, p. 6-3.

III. GENERIC ERRORS AND OMISSIONS

A. Emissions From Downstream Supporting Processes Are Omitted

The DEIR estimated changes in emissions from: (1) new fugitive components; (2) a new replacement heater in Unit 90; (3) reactivation of existing storage tank 331; (4) increased hydrogen production; (5) electricity demand to support Unit 90; (6) truck transport; and (7) steam demand for Unit 90. DEIR, Table 3.3-7 and Appx. B. However, in these calculations, the DEIR narrowly focuses only on Unit 90 and new equipment, ignoring increases that occur at existing equipment required to support Unit 90. My previous comments discussed these omissions and are attached in **Exhibit 2.**

The Project would reduce the sulfur content of diesel from about 500 ppmw to 15 ppmw. This would require an increase in utilities to support Unit 90 as well as downstream units that support Unit 90. For example, in Unit 90, sulfur is removed from diesel by converting it to hydrogen sulfide. The hydrogen sulfide is separated from the diesel in a stripper and removed in downstream processing units. The sour gas stream is treated in an amine treatment unit to remove and recover H_2S. The H_2S stream from the amine treatment unit is fed to a sulfur recovery unit to recover elemental sulfur or manufacture sulfuric acid. Sour water is treated in a steam stripper. The removal of increased amounts of sulfur in these units requires additional steam, electricity and heat, which requires the combustion of additional fuel and releases more pollutants. The DEIR excluded these associated utility demands and related emissions from its calculations and all of the information required to independently estimate them. Thus, the DEIR fails as an informational document under CEQA. 1-46

B. Pre-Project (Baseline) Emissions

The DEIR selected 2002 to 2003 as the pre-project baseline years for the heater, hydrogen production and steam production, but does not disclose the assumed baseline years for other emission sources. DEIR, Appx. B. Thus, the DEIR is deficient as an information document. 1-47

The selection of 2002 to 2003 for the heater, steam production, and hydrogen production is unsupported. Usually, to support any given baseline, data over a much longer period of record is presented to demonstrate that the selected years are representative of actual conditions at the start of the CEQA review. The years 2002 to 2003 are the two years immediately preceding the start of CEQA review and thus are potentially a reasonable choice. However, other circumstances may be present that warrant review of a longer pre-project record. Sometimes, companies temporarily increase operations artificially to establish a higher baseline, which has the effect of reducing emission increases due to the Project. Thus, to support a selected baseline, one generally needs to supply a longer period of record, at least 10 years, to confirm routine actual operations in the baseline years. 1-48

The DEIR uses "peak" emissions during 2002 and 2003 to establish the pre-project baseline for heater B-201. DEIR, p. B-3. This is a fundamental flaw, as the SCAQMD significance criteria are based on the maximum increase. See, e.g., SCAQMD 1993, p. 6-3: "In determining whether or not a project exceeds these thresholds, the project emissions should be calculated…utilizing the highest daily emissions.." The "highest daily emissions" for the modification of an existing facility must be calculated from either the minimum or annual average pre-project daily emissions. Using the "peak" emissions in the pre-project period results in underestimating the "highest daily emissions". This error may also have been made for other emission sources. However, I cannot identify them as the DEIR does not support its assumptions, e.g., are the pre-project hydrogen, steam, and electricity demand emissions based on peak days? 1-49

The DEIR contains a table that summarizes reported emissions for CO, NOx, VOC, SOx, and PM10 for the entire refinery for the period 2000 to 2013. DEIR, Table 3.1-13. However, this is not adequate to support 2002 to 2003 as valid baseline years for individual process units because the modified units/operations emit only a tiny fraction of the total Refinery emissions. Emissions from a refinery are dominated by the fluidized catalytic cracking unit (FCCU), which emits the majority of the NOx, SOx, CO, and PM10. Any change in the operation of the FCCU (and other large emission sources) would mask changes in emissions from much smaller units such as heater 212 and unit 90. Thus, this table provides no useful information for supporting the 2002-2003 baseline. 1-50

IV. EMISSIONS ARE UNDERESTIMATED

My analysis of the emission calculations in Appendix B indicates emissions were significantly underestimated. Critical information, required to support the DEIR's emission calculations, is missing from the DEIR. Thus, the DEIR fails as an information document under CEQA. Further, incorrect methods were used to determine pre- and post-project emissions, which resulted in significant emission underestimates. When the errors and omissions are corrected, air quality impacts due to NOx emissions are significant. The increase in emissions of other pollutants may also be significant, but the DEIR does not contain sufficient information to identify and correct all of the DEIR's errors and omissions. 1-51

A. Hydrogen Production Emissions Are Underestimated

The Project requires increased amounts of hydrogen to remove increased amounts of sulfur from the feedstock to the diesel hydrotreater, Unit 90, to meet low sulfur diesel standards. DEIR, p. 3-34. The production of hydrogen generates emissions from boilers, heaters, flaring, and various indirect sources. Thus, the increased demand for hydrogen at Unit 90 increases emissions. 1-52

The DEIR estimated the increase in emissions from increased hydrogen production by subtracting average annual post-project emissions during a recession (2006-2008) from annual

average pre-Project emissions in the two years prior to start of CEQA review (2002-2003). The DEIR's analysis significantly underestimates the increase in emissions from increased hydrogen demand for four reasons: (1) used wrong post-project period; (2) used wrong measure of significance; (3) used annual averages rather than maximum potential to emit; (3) improperly adjusted emission factors to exclude flaring and indirect sources of emissions; (4) used combined hydrogen demand for Units 89 and 90.

Hydrogen production emissions were calculated by multiplying the increase in annual average hydrogen demand (511 mmscf/yr)[6] by emission factors in pounds per million standard cubic feet (lb/mmscf) based on the 1998 Hydrogen Plant FEIR.[7] The increase in hydrogen demand was calculated as the difference between post-project demand (4,197.50 mmscf/yr) in 2006-2008 and pre-project demand (3,686.50 mmscf/yr) in 2002-2003. DEIR, p. B-4.

1-52 cont.

1. Wrong Post-Project Period

The DEIR estimated the increase in hydrogen demand based on post-project demand in 2006-2008, the first three years after startup of the Project. DEIR, p. B-4. The DEIR does not state any basis for selecting 2006 to 2008 as the post-project period. Refinery-wide emissions in Table 3.1-3 indicate that emissions in 2007 were among the lowest reported over the period 2000 to 2012 for CO (next to lowest), NOx (lowest), VOC (lowest), and PM10 (third lowest). Further, this period corresponds to a severe recession, during which fuel demand, and thus refinery emissions, would have declined. Thus, there is ample reason to suspect that the DEIR's choice underestimates hydrogen production emissions.

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Further, there is no evidence in the record that this period encompasses the day on which maximum hydrogen demand could occur or what I refer to as the peak day. Refiners can adjust product yields in response to price and other market conditions by varying refinery processes and the types of crude oil that is refined. The DEIR fails to disclose the peak day hydrogen demand allowed by the design of Unit 90. This is a serious omission.

The selected post-project period corresponds to a recession, when the demand for fuels such as diesel was depressed. Thus, this period likely does not contain the peak day. Further, production of diesel has been trending up since 2008 due to significantly higher price margins for diesel relative to gasoline and growing diesel exports.[8]

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[6] mmscf/yr = million standard cubic feet per year.
[7] Environmental Audit, Inc., Air Products and Chemicals, Inc. Hydrogen Facility and Specialty Gas Facility, Final Environmental Impact Report, Prepared for the City of Carson, SCH No. 97071078, June 1998 (Hydrogen Plant FEIR).
[8] See: U.S. Becoming 'Refiner to the World' as Diesel Demand Grows, August 7, 2013, Available at: http://www.cnbc.com/id/100943620; U.S. Refinery Yield of Distillate Fuel Oil, Available at: http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MDIRYUS3&f=M and Distillate Yields at U.S. Refineries are Rising, Available at: http://www.eia.gov/todayinenergy/detail.cfm?id=4590.

The increase in hydrogen demand facilitated by the Project should have been based on permit limits, if any. Otherwise, the design throughput of Unit 90 in barrels per calendar day, as modified by the Project, should have been used to calculate the maximum increase in emissions. This amount of hydrogen must be used to calculate peak day emissions. This key metric, design hydrogen demand for Unit 90, is essential to estimate maximum day hydrogen production emissions. It is not disclosed in the record. Thus, the DEIR fails as an informational document under CEQA. 1-55

2. Improper Measure of Significance

As discussed above, the post-project emissions should be based on the maximum potential to emit, determined from either permit limits or the physical design of Unit 90, given Project modifications. This value is not disclosed in the DEIR.

In the alternative, if neither of these limits is available and actual post-project data must thus be used, daily average hydrogen production over the relevant period of record must be provided to support the peak day choice. In this case, daily hydrogen demand data should have been provided for the period 2000 to 2013. This would allow determining whether hydrogen use during the 2006-2008 recession, when diesel demand likely declined, is representative of the peak post-project day. Without actual, measured daily hydrogen use data, it is impossible to evaluate whether the post-project emissions represent the peak day. 1-56

I cannot revise the DEIR's estimate of hydrogen demand emissions because the DEIR does not include any daily hydrogen use for the period 2000 to 2013. However, the peak day hydrogen use is certain to be much higher than the annual average daily hydrogen demand during a recession that was used to estimate emissions.

3. Improper Use of Annual Average Day To Determine Maximum Daily Emissions

The increase in hydrogen demand in the DEIR is reported as a three year average. The daily average demand was estimated by dividing the annual average demand by 365 days. Thus, the daily annual average hydrogen demand was used to estimate emission increases. The CEQA significance criteria are based on peak day emissions. Thus, emissions on the maximum or peak day must be used, not the average annual day. The ratio of the peak day to the average day can vary by factors of 2 to 10. The DEIR does not contain any daily hydrogen demand data, which is required to identify the peak day and thus fails as an informational document under CEQA. 1-57

4. Improper Adjustment of Hydrogen Production Emission Factors

The Project changed the hydrogen distribution piping to enable exclusive use of high purity hydrogen at Unit 90 and the use of lower purity hydrogen currently produced at the Refinery at other units. DEIR, p. 1-9. The Project imports this high purity hydrogen from an off-site hydrogen plant, the Air Products Hydrogen Facility in Carson. The emission 1-58

calculations assume that 100% of the hydrogen is supplied by this off-site facility. DEIR, pp. 3-35, B-4.

The emission factors used to calculate the increase in emissions from increased use of hydrogen are cited to the FEIR for this Carson Hydrogen Plant, *viz*. "City of Carson, EIR for the Air Products Hydrogen Facility and Specialty Gas Facility (SCH#97071078), June 15, 1998." DEIR, p. B-4. This FEIR is called the "Hydrogen Plant FEIR" in these comments. The DEIR does not cite a specific page or table in the Hydrogen Plant FEIR. 1-58 cont.

My review of the Hydrogen Plant FEIR indicates that the emission factors used in the DEIR to estimate hydrogen emissions are not presented in the Hydrogen Plant FEIR. Rather, they must be calculated from peak day operational emissions and the design hydrogen production of 96 million standard cubic feet per day (mmscfd). Hydrogen Plant FEIR, p. 3-12 and Table 5-8. When one assembles all the relevant data and makes this calculation, one discovers that the DEIR improperly reduced emissions reported in the Hydrogen Plant FEIR by excluding most emission sources.

a. Flaring and Indirect Emissions Were Improperly Excluded from Hydrogen Production Emission Factors

Emissions from hydrogen production arise from a boiler, a reformer heater, fugitive sources (valves, pumps, flanges, etc.), flaring events, and various indirect sources, including material delivery, truck transport of CO2, and worker travel. My analysis of the Hydrogen Plant FEIR indicates that the DEIR excluded most of the NOx emissions from hydrogen production without disclosing or justifying the deletions in the DEIR.

The emission factors that the DEIR used to estimate hydrogen production emissions are based only on the Hydrogen Plant boiler and reformer heater. All other sources of emissions required to produce hydrogen -- flaring emissions and all indirect emissions -- were inexplicably excluded. The Title V Permit for the Carson Hydrogen Plant[9] does not contain any limits that would prohibit or restrict flaring. Thus, these emissions should have been included in the emission calculations. My analysis of the Carson Hydrogen Plant emissions is summarized in Table 1. 1-59

[9] SCAQMD, Facility Permit to Operate, Air Prod & Chem Inc., 23300 S. Alameda St., Carson, CA, Facility ID: 003417, February 14, 2014 (Hydrogen Plant Title V Permit).

Table 1.
Carson Hydrogen Plant Emissions[10]

	Units	CO	VOC	NOx	SOx	PM10	PM2.5
1. DEIR Emission Factor	lb/mmscfd	**1.63**	**1.63**	**2.5**	**0.07**	**1.95**	**1.95**
2. Hydrogen Plant FEIR Emissions	lb/day	229	173	1437	10	198	198
3. Hydrogen Plant Emission Factor	lb/mmscfd	2.39	1.80	14.97	0.10	2.06	2.06
4. Boiler/Reformer Heater Emissions	lb/day	156	156	240	7	187	187
5. Boiler/Reformer Emission Factor	lb/mmscfd	**1.63**	**1.63**	**2.50**	**0.07**	**1.95**	**1.95**

Line 1 presents the emission factors used in the DEIR to estimate the increase in emissions from increased use of hydrogen. DEIR, p. B-4. Line 2 presents the emissions from producing hydrogen for the "peak day" from the Hydrogen Plant FEIR. The peak day, generally reported as the maximum potential to emit, is the correct metric to estimate post-project emissions. See Comment II. Line 3 presents the emission factors that I calculated from the Hydrogen Plant FEIR's peak day emissions and the design hydrogen production of 96 mmscfd. These emissions factors are shown in red.

1-59 Ccnt.

A comparison of Line 1 with Line 3 (red) shows that the DEIR underestimated the emissions of all pollutants by gerrymandering the emission data that it cites. The underestimate of NOx (2.5 vs. 15 lb/mmscf) is notable. The emission factors on Line 3 (red) should have been used in the DEIR to estimate the increase in emissions from increased use of hydrogen by the Project.

The only way to reproduce the emission factors used in the DEIR, p. B-4, is to calculate them from only the boiler/reformer heater emissions. Hydrogen Plant FEIR, Table 5-8. This calculation is shown in Table 1, line 5, which exactly reproduces the emission factors used in the DEIR, shown in line 1. Thus, the DEIR has significantly underestimated the increase in emissions from the increased use of 511 mmscf/yr of hydrogen by excluding the major sources of emissions required to produce the hydrogen, including flaring emissions and all indirect emissions. CEQA Guidelines Section 15378(a) requires that reasonably foreseeable indirect impacts must be analyzed as part of the project. The revised emissions, based on the emission factors in Table 1, line 3, are presented in Table 4.

The use of the proper NOx emission factor, 15 lb/mmscfd, would increase hydrogen production NOx emissions from 3.5 lb/day (DEIR, Table 3.3-7) to 21 lb/day.[11] This increases

[10] DEIR Emission Factor from DEIR, p. B-4; (2) Hydrogen Plant FEIR Emissions from Hydrogen Plant FEIR, Table 5-8, p. 5-27; (3) Hydrogen Plant Emission Factor = Hydrogen Plant FEIR Emissions (2)/H_2 production of 96 mmscfd from Hydrogen Plant FEIR, p. 3-12; (4) Boiler/Reformer Heater Emissions from Hydrogen Plant FEIR, Table 5-8, p. 5-27; (5) Boiler/Reformer Emission Factor = Boiler/Reformer Heater Emissions/96 mmscfd.

[11] Revised hydrogen production NOx emissions = 3.5 x 14.97/2.5=20.96 lb/day.

the total Project NOx emissions from 14.06 lb/day to 32 lb/day.[12] Other underestimates in NOx emissions, discussed elsewhere in these comments, result in peak day NOx emissions much greater than the significance threshold of 55 lb/day.[13] Thus, the increase in NOx emissions due to the Project is significant. The DEIR failed to disclose and mitigate this impact. 1-59 cont.

b. Flaring Emissions Are Higher than Otherwise Disclosed

The NOx flaring emissions reported in the 1998 Hydrogen Plant FEIR were based on an emission factor that the EPA has since determined underestimates flaring emissions. The Hydrogen Plant FEIR estimated flaring emissions using a NOx emission factor of 0.036 lb/mmbtu.[14] The U.S. EPA recently revisited flaring emission factors and now recommends raising the NOx factor to 2.9 lb/mmbtu based on substantial test data.[15] If this updated NOx flaring emission factor were used to calculate hydrogen demand flaring emissions, it would increase flaring emissions from 1,437 lb/day to 115,800 lb/day. This would increase total Project operational NOx emissions from 14 lb/day to 115,814 lb/day. This exceeds the NOx significance threshold of 55 lb/day by a huge amount, indicating a highly significant, unmitigated air quality NOx impact that was not disclosed in the DEIR. 1-60

5. Hydrogen Production Emission Factors Improperly Based on Combined Demand

The increase in hydrogen demand due to the USLD Project was calculated for Units 89 (jet hydrotreater) and 90 (diesel hydrotreater) combined as they reportedly are not separately measured. DEIR, p. 3-35. The Project would modify Unit 90, but not Unit 89. DEIR, p. 3-35. All of the increase at these two units was attributed to Unit 90 to reportedly ensure worst-case emissions. DEIR, p. 3-35, p. B-4.

Attributing 100% of the combined annual average hydrogen demand to Unit 90 does not ensure a worse case and may underestimate peak day emissions. If the hydrogen demand of unit 89 decreased, this decrease could offset increases at Unit 90, whose hydrogen production would increase due to the Project. A decrease in hydrogen demand at unit 89 is plausible, as the demand for jet fuel could decline while the demand for diesel is projected to increase.[16] Thus, combining these two units could mask a much larger increases in hydrogen production at Unit 90 than disclosed. The DEIR should separate these two units' operation using a different metric, 1-61

[12] Revised ULSD operational NOx emissions = 14.06 – 3.5 + 21 = 32 lb/day.
[13] Revised increase in NOx emissions (Table 3.3-7) = 19.5 (replacement heater) + 21 (hydrogen production) +24.9 (electricity demand) + 14.8 (truck transport) = **80.2 lb/day.**
[14] Emission factor used to estimate flaring emissions in the Hydrogen Plant FEIR is estimated from Appendix B, p. 10, "Ground Level Flare Flaring Emissions": 1140.5 lb/day/[(1.32 x 10^9 Btu/hr)(24 hr/day)(mmBtu/10^6 btu)] = **0.036 lb NOx/mmBtu**.
[15] U.S. EPA, Emissions Estimation Protocol for Petroleum Refineries, Draft, August 2014, Table 6-2.
[16] See: U.S. Diesel Fuel Demand to Peak in 2015 While World Demand Will Grow Through 2030, Available at: http://www.fuelsinstitute.org/news/PR102914.shtm. Short-term Energy and Winter Fuels Outlook, Available at: http://www.eia.gov/forecasts/steo/report/us_oil.cfm.

perhaps feed throughput, steam use or electricity use, which is separately measured, to assure a worst-case is analyzed. 1-61 cont.

B. Replacement Heater Emissions Are Underestimated

Heater B-201 was removed from service at Unit 90 and replaced with a new, "functionally identical" heater, B-401. NOx emissions from heater B-201 were controlled by low NOx burners, while NOx emissions from the new replacement heater B-401 are controlled by low NOx burners and selective catalytic reduction (SCR). DEIR, p. 3-34.

The DEIR explains that post-project emissions are based on the "maximum potential to emit" while pre-project emissions are based on "actual operating conditions for 2002 and 2003." DEIR, p. 3-34. However, a comparison of the emissions from these two "functionally identical" heaters (DEIR, Table 3.3-7) in Table 2 is not consistent with this explanation.

Table 2.
Comparison of Heater B-201 and B-401 Emissions (DEIR, Table 3.3-7) 1-62

	CO	VOC	NOx	SOx	PM10	PM2.5
Heater B-201	22.65	4.53	30.5	2.5	4.85	4.85
Heater B-401	6.04	5.44	4.96	4.19	5.83	5.83

This table indicates post-project (Heater B-401) emissions of VOC, PM10, and PM2.5 are consistently 20% higher than pre-project emissions (presumably in direct proportion to the assumed increase firing rate as they were estimated from emission factors expressed as lb/mmbtu), while CO and NOx emissions have both declined significantly. The NOx decline is consistent with the installation of SCR, which removes about 90% of the NOx (DEIR, p. 2-7), but the CO decline is not consistent with the project description and reveals a fundamental error in the method used to estimate Project emission increases. These anomalies are further discussed below.

1. Post-Project Emissions (Heater B-401)

The DEIR states that post-project emissions from new heater B-401 are based on the maximum potential to emit, assuming the heater operates at 34 mmBtu/hr, calculated from permit limits for SOx (0.0052 lb/mmBtu), NOx (0.21 lb/hr or 5 ppm), and CO (0.25 lb/hr or 10 ppm) and from "SCAQMD-approved emission factors" for other pollutants (VOC, PM10, PM2.5). DEIR, p. 3-34, B-3. However, the DEIR does not show the calculations. 1-63

a. Permit Limits Used To Estimate Post-Project Emissions Are Not Supported

We obtained the most recent Title V Permit from the SCAQMD for the Wilmington Refinery to verify these asserted emission limits, used to estimate post-post emissions.[17] The most recent Title V Permit for this facility was issued August 15, 2014, just prior to the release of the DEIR. This permit has not been updated to include new heater B-401. Rather, it still lists heater B-201 as the only Unit 90 charge heater.

The use of permit limits for SOx, NOx, and CO to determine post-project emissions is potentially reasonable, if supported by the Title V Permit. However, I cannot verify these limits as the SCAQMD has not updated the Refinery Title V Permit. Review of the actual permit limits is essential to evaluate their relevance for several reasons. 1-64

First, permits often contain exceptions to limits, such as during unit startups and shutdowns. These exceptions are allowed in the Refinery Title V Permit for other similar units.[18] These exceptions determine maximum daily emissions. In the case of NOx, for example, the SCR, typically designed to remove 90% of the NOx, would not operate during startups and shutdowns due to catalyst temperature limitations. Thus, NOx emissions could be substantially higher, ten times higher for a 90% efficient SCR, during startups and shutdowns. These startup/shutdown conditions would determine the maximum day for purposes of calculating maximum post-project emissions.

Second, permit limits are typically accompanied by an averaging time, such as daily, hourly, or annual average. These averaging times must be reviewed to assure that the emission increase calculated from the permit limit represents the maximum day, rather than an annual average or monthly average day. 1-65

Third, if the permit does not require adequate testing to assure permit limits are met, the permit limits cannot be used to establish maximum post-project emissions. The permit limits for heater B-201, for example, do not require any testing for NOx, PM10, or PM. Only periodic 1-66

[17] SCAQMD, Facility Permit to Operate, Phillips 66 CO/LA Refinery Wilmington PL, 1660 W Anaheim St, Wilmington, CA 90744, Facility ID 171107, August 15, 2014 (Refinery Title V Permit).
[18] See, e.g., Refinery Title V Permit, p. 3, Condition A99.1: "The 9 ppm NOx emission limit(s) shall not apply when the equipment is in startup, shutdown, or on-line fuel transfer periods (for NOx)."

stack tests are required for CO.[19] Compliance testing required for replacement heater B-401 is unknown as the Title V Permit has not yet been updated to include this change and the DEIR failed to report it. However, if compliance testing for new heater B-401 is similar to that for old heater B-201, the DEIR cannot rely on B-401 permit limits for NOx, PM10, PM2.5 or CO to estimate maximum potential to emit without requiring additional monitoring as conditions of approval, e.g., continuous emission monitoring (CEMS) for compliance with NOx and CO limits.

1-66 cont.

Thus, the permit limits used to estimate post-project emissions of NOx, CO, and SOx are unsupported. Basing post-project emissions on these limits likely underestimate the maximum daily emission increase, especially if the limits include exceptions for startups and shutdowns.

b. Permit Limits Underestimate Post-Project NOx Emissions

The post-project NOx emissions from heater B-401 were calculated assuming the heater emits 0.21 lb/hr for 24 hours (0.21x24 hr/day = 5 lb/day), based on an unsupported permit limit. DEIR, p. 3-34, B-3. However, these are controlled emissions, assuming the SCR is on line and is removing 90% of the NOx. The uncontrolled emissions would be 50 lb/day or about 2 lb/hr. During startups and shutdowns of Unit 90, the SCR is offline. Assuming the SCR is offline during a Unit 90 startup or shutdown for only 4 hours, the NOx emissions would increase from 5 lb/day to 12 lb/day. In a worst case, assuming the SCR is offline for an entire day, the NOx emissions would increase from 5 lb/day to 50 lb/day. This is sufficient to offset the entire NOx decrease of 30.5 lb/day from shutting down heater B-201 (DEIR, p. B-3), resulting in a NOx increase of 19.5 lb/day (50-30.5 = 19.5) for heater replacement. As this is a plausible scenario, not prohibited by permit, this scenario must be considered in determining the maximum post-project NOx emissions.

1-67

This revision, to address periods when the SCR is offline, coupled with others reported elsewhere in these comments, would increase Project NOx emission increases to 80 lb/day.[20] Thus, the revised increase in NOx emissions due to the Project exceeds the CEQA significance threshold of 55 lb/day. If the additional NOx from updating the flaring emission factor is included, NOx emissions would increase to 115,880 lb/day on the peak day, exceeding the threshold by a factor of 21,000. This is a highly significant, unmitigated air quality impact that was not identified or mitigated in the DEIR.

[19] Refinery Title V Permit, Conditions for unifiner charge heater 79-B-201 at pdf 34: Conditions C1.23 (continuous monitoring of heat rate in mmbtu/hr), D232.1 (continuous monitoring of H2S as surrogate for SOx), and D328.1 (stack test for CO).

[20] Revised increase in NOx emissions as summarized in Table 4 = 19.5 (replacement heater) + 21 (hydrogen production) +24.9 (electricity demand) + 14.8 (truck transport) = **80.2 lb/day.**

c. Permit Limits Underestimate Increase In CO Emissions

Table 2 indicates that pre-project CO emissions (22.65 lb/day) are nearly four times higher than post-project CO emissions (6.04 lb/day) for a "functionally identical" heater with no CO controls. The DEIR attempts to explain this anomaly by noting that "CO emissions are also less because the SCAQMD established a reduced CO emission limit (10 ppm)…" DEIR, p. 3-34. As noted previously, the Title V Permit has not been updated so this claim cannot be verified. 1-68

However, an emission limit by itself without accompanying controls will not lower CO emissions. No CO controls are proposed for Heater B-401. Further, VOCs and CO are generally directly related to each other as both are combustion byproducts. The VOC pre-project emissions in Table 2 are less than the VOC post-project emissions. This further suggests that the very large decline in CO emissions is invalid.

The supporting emission calculations in Appendix B clarify that the pre-project emissions are based on "peak emissions during 2002 and 2003" rather than average emissions. DEIR, p. B-3. As explained in Comment II, "peak" emissions should not be used to determine "actual" pre-project emissions as the significance criteria are based on the maximum day. The maximum day cannot be determined by comparing maximum post-project emissions with maximum pre-project emissions.

The maximum day is the highest daily increase that is feasible. This should be determined relative to the pre-project average day or even the pre-project minimum day, but not the pre-project maximum day, as apparently done here. The anomalously high pre-project CO emissions of 22.65 lb/day is presumably based on the maximum day. Thus, it is not a reasonable CO baseline for the new heater and should be rejected. The maximum day CO emissions of 22.65 lb/day leads to the erroneous conclusion that the new heater would significantly reduce CO emissions relative to the old heater, which is unlikely as no CO controls are proposed. 1-69

Further, unless the Title V permit is modified to require continuous emission monitoring of CO emissions, there is no assurance that the post-project CO limit of 6.04 lb/day would be achieved. Thus, it is not a reasonable basis to establish maximum post-project emissions. I am unable to determine the correct value for either the pre-project or post-project CO emissions as the DEIR does not include daily heat rate, daily CO emission data for the pre-project period, and the actual permit condition assumed to control CO emissions. My revised CO emissions in Table 4 thus assume the same ratio of pre- to post-emissions as assumed for VOC, PM10, and PM2.5.[21]

[21] Revised CO emissions, summarized in Table 4: (22.6 lb/day)(1.2) = 27.1 lb/day. The factor of 1.2 is the ratio of VOC post- to pre-project emissions (5.4/4.5 = 1.2).

d. Revised SCAQMD Emission Factors Underestimate PM10 and PM2.5 Emissions

My analysis of emissions data in Table 2 indicates that the DEIR used the same "SCAQMD-approved emission factors" to calculate both the pre-project and post-project VOC, PM10, and PM2.5 emissions.[22] The record contains no evidence that "SCAQMD-approved emission factors" accurately represent post-project emissions on the peak day compared to pre-project emissions for VOC, PM10, and PM2.5. The DEIR should have provided stack tests to confirm that these emission factors are fair estimates of peak day emissions.

There is reason to believe that post-project emissions of PM10 and PM2.5 are underestimated by using the same emission factors for the pre- and post-project conditions. The Project would increase peak day PM10 and PM2.5 emissions from the use of SCR to control NOx. 1-70

An SCR injects ammonia into the flue gas stream. The SCR catalyst converts some of the SO2 into sulfur trioxide (SO3). The ammonia and sulfur trioxide react downstream from the SCR to form ammonium sulfates, which are components of PM10 and PM2.5. Thus, the SCR should have resulted in an increase in the emission factors used for both PM10 and PM2.5. This increase is not reflected in the emission estimates as the same emission factor was used to calculate both pre- and post-project PM10 and PM2.5 emissions. The small increase in PM10 and PM2.5 shown in Table 2 is due solely to an increase in firing rate from 28 mmBtu/hr to 34 mmBtu/hr.

2. Pre-Project Baseline Emissions (Heater B-201)

The pre-project baseline emissions for heater B-201 were based on "peak emissions during 2002 and 2003". DEIR, p. B-3, note (1). The basis for this approach is stated as: "During 2002 and 2003, B-201 did not operate at the maximum rated capacity on a daily basis. Therefore, the emissions for the peak operating day were used to evaluate the increase in emissions associated with the ULSD Project." DEIR, p. B-3, Approach. This method of calculating pre-project emissions is wrong.

The "approach" language in the DEIR assumes that the "maximum rated capacity on a daily basis" is the proper test for baseline emissions. However, the "maximum rated capacity" of 34 mmBtu/hr is the permitted capacity, which determines the post-project peak day, not the pre-project baseline. A long line of Court of Appeal decisions holds that impacts of a proposed project are compared to "actual" conditions at the time of CEQA analysis, not the level that could have or should have been present, e.g., "the maximum rated capacity." As heater B-201 apparently did not operate at the maximum rated level during the baseline period, the maximum rated level is not the "actual" rate. 1-71

[22] The ratio of pre-project to post-project emissions of VOCs, PM10, and PM2.5 is the same (0.84), indicating that these emissions were calculated using the same pre- and post-emission factor, varying only the firing rate. Thus, the DEIR assumed a baseline firing rate of 35 mmBtu/hr x 0.84 = 29 mmBtu/hr.

The correct baseline is "actual" average to assure an estimate of "highest daily emissions" to compare to the significance thresholds. I cannot correct this error as the DEIR does not contain any of the supporting data that was used to select the maximum pre-project daily emissions. 1-71 Ccnt.

The significance criteria determine how both the pre-project and post-project emissions are calculated. As discussed elsewhere in these comments, the SCAQMD significance criteria used to judge Project impacts are based on peak day emissions. If the increase in emissions on the peak day equals or exceeds the significance criteria, the impact is significant. Thus, pre-project and post-project emissions must be calculated to estimate the peak day, not the average or minimum day. The peak day should be calculated as the difference between actual emissions on the average day in the pre-project period and the maximum daily emissions in the post-project period, established by either permit conditions or equipment design. 1-72

The selection of 2002 and 2003 may be reasonable (if supported by actual daily data not currently in the record) for the pre-project period, but the use of the peak daily emissions during this period is not a valid baseline. While CBE v. SCAQMD concluded that "[i]n some circumstances, peak impacts or recurring periods of resource scarcity may be as important environmentally as average conditions..", here there is no demonstration that peak impacts in the baseline are as important environmentally as any other condition.

The DEIR does not contain any of the information used to select peak daily emissions of CO, VOC, NOx, SOx, PM10, or PM2.5 during 2002 and 2003. I would expect there would be continuous emission monitoring data, reported on at least an hourly basis, for heat rate (mmBtu/hr), NOx, and perhaps CO. Some subset of this data likely was used to determine the pre-project peak daily emissions. This data is critical to evaluating the reasonableness of the selected baseline emissions. It is critical, for example, to determine whether a spike in operations just happened to occur prior to environmental review. This essential data was not provided in the DEIR nor in responses to our PRAs. Without this data, one cannot determine actual emissions prior to the project or evaluate whether the peak values are outliers, occurring only once or very few times over the two year period, or whether they are representative of annual operating conditions over the two year period. Thus, there is no support for the heater B-201 baseline emissions and no support for the claimed total emission changes due to replacing heater B-201 with heater B-401. 1-73

C. Electricity Demand Emissions Are Underestimated

The method used to calculate the increase in electrical demand is not clearly explained in the DEIR. The text of the DEIR suggests the increase in electrical demand is just that due to certain new equipment, while Appendix B suggests it is the net increase of unspecified equipment, relative to unspecified pre- and post-project conditions. 1-74

First, the DEIR asserts that it estimated the increase in emissions from the increase in electricity use based only on the horsepower (hp) rating of certain new equipment totaling 1,035 hp, as follows (DEIR, p. 3-35):

- Pumps, fans, air coolers: 835 hp
- Recycle gas compressor: 200 hp

It is unclear if all new equipment is included in this estimate as it lumps all of the pumps, fans and air coolers together. The estimate should be supported with a list of each piece of equipment and its vendor specifications, required to verify the hp ratings. There are reasons to suspect the electrical demand may be underestimated. 1-74 cont.

First, the DEIR notes that the existing recycle gas compressor was modified to "double its capacity by replacing its internals with a larger rotor." DEIR, p. 2-7. Elsewhere, when the DEIR addresses the emission calculations, it only notes "Phillips reactivated a 200 hp recycle gas compressor" (DEIR, p. 3-35), without mentioning that the capacity was doubled, suggesting the increase should have been 400 hp, rather than 200 hp.

Second, the DEIR identifies a new ULSD shipping pump, two new pumps for handling jet and diesel blendstocks, and one new pump to create separate facilities for handling jet and diesel fuel. DEIR, p. 2-8. In addition, though not mentioned, a vaporization unit (air heater and air blower) would be required to supply ammonia vapor to the SCR system. These could easily exceed 835 hp total. There is no way to determine whether all of this new equipment is included in the 835 lumped "pumps, fans, and air coolers" electrical demand as the DEIR does not list the equipment and provide vendor specifications. 1-75

These two items (835 + 200=1035) sum to a total increase in electricity demand of 1,035 hp or about 18,623 kilowatt-hours per day (kwh/day). This kwh/day increase was converted into an emission increase using SCAQMD emission factors. DEIR, p. B-5.

In the supporting emission calculation in Appendix B, the DEIR presents this information differently. There, it reports pre-project power of 640 hp and post-project power of 1,675 hp, resulting in a net increase of 1,675-640 = 1,035 hp. DEIR, p. B-5. This suggests the 1,035 hp estimate is not just "new equipment".

1. Electricity Demand Is Unsupported

The increase in electricity demand is not supported in the record. The DEIR does not explain how the pre-project baseline electricity demand of 640 hp was selected. It is simply stated with no support. Is it the average day demand in 2002-2003, or some other period, based on actual measurements? Or is it the peak day demand, as used to determine the baseline for heater emissions? Or is it some other metric, such as the sum of the pre-project design basis horsepower ratings of all electrical equipment in Unit 90? What equipment is present in the 640 1-76

hp lump sum estimate for pre-project demand? Without answers to these questions, it is impossible to evaluate whether reported emission increases from increased electricity demand are correctly calculated. Thus, the Project description is inadequate to support the conclusions reached in the DEIR.

1-76 cont.

The DEIR also fails to support the post-project electrical demand. It simply states the horsepower rating of groups of equipment without providing a process and instrument (P&ID) diagram or other process diagram to show how the electrical equipment fits into the overall process. It also fails to supply the vendor specification sheets for the new equipment, required to confirm the claimed horsepower rating. Thus, the DEIR fails as an information document.

2. Electricity Demand Is Underestimated

The DEIR underestimates the increase in electricity demand as it narrowly includes only the demand for select new or newly activated equipment and none of the increase in electricity use by existing equipment required to otherwise support the Project.

The Project would increase electricity demand by all electrical equipment required to operate Unit 90 itself, both new and existing, plus electrical equipment required to operate supporting equipment, such as sulfur removal and cooling water demand. This was explained in detail in my initial comments on the Project, attached here as **Exhibit 2.**

The Project was designed to reduce the sulfur content of diesel from 500 ppmw to 15 ppmw. Phillips 66 reported the "charge capacity" for desulfurization of diesel (presumably in Unit 90) at its Wilmington Refinery as 32,000 bbl/day in 2014.[23] Thus, Unit 90 would have to remove about 4,700 lb/day of additional sulfur.[24]

1-77

The removal of 4,700 lb/day of sulfur would require an increase in hydrotreating, which is partially addressed by the acknowledged changes to Unit 90. However, these changes affect other components within Unit 90 and supporting downstream units. In hydrotreating, which occurs in Unit 90, the sulfur in the feed is reacted with hydrogen in the presence of a catalyst at elevated temperature and pressure. The Title V Permit indicates sulfur is converted to hydrogen sulfide, which is separated from the product (diesel) in a stripper, recovered in the Sulfur Recovery Units, and residuals combusted in Scot Tail Gas Units.

The DEIR does not include any increase in emissions from indirect sources of electrical demand nor from cooling water, but rather only includes the increase in electrical demand due to new equipment required to support Unit 90. Thus, electrical demand emissions reported in the DEIR in Table 3.3-7 and at p. B-5 are underestimated. The DEIR also does not contain any of the information required to estimate these emissions. Thus, the DEIR is deficient as an information document under CEQA.

[23] EIA Form 840, Available at: http://www.eia.gov/petroleum/refinerycapacity/.
[24] Sulfur in current diesel: (32,000 bbl/day)(304 lb/bbl)(500 lb-S/10^{-6} lb) = **4,864 lb-S/day**.

In my 2004 comments on this Project, I estimated 34,287 kwh/day of electricity would be required to remove an additional 7,400 lb/day of sulfur. Adjusting this to the revised estimate of 4,700 lb/day of additional sulfur removal, yields an increase in electrical demand of 21,800 kwh/day to support both direct and indirect electrical demand compared to the DEIR's estimate of 18,623 kwh/day. Thus, the emission increases reported in the DEIR for increased electrical demand are underestimated by at least 20%. The revised electrical demand emissions, based on this correction, are summarized in Table 3. 1-77 cont.

Table 3.
Revised DEIR Table 3.3-7
Electrical Demand Emissions

	CO	VOC	NOx	SOx	PM10	PM2.5
DEIR	3.7	0.2	21.3	2.2	0.7	0.7
Revised	4.3	0.2	24.9	2.6	0.8	0.8

D. Steam Production Emissions Are Underestimated

The DEIR asserts no increase in steam production emissions based on a new theory that deviates substantially from the original Project description. In the Addendum to the Negative Declaration, the SCAQMD estimated that the Project would increase NOx emissions by 420 lb/day from steam generation in boilers. These emissions were reported to arise from the steam demand of the new recycle gas compressor, reported as 119,283 lb/hr by the vendor. **Exhibit 3.** The DEIR continues to identify this new compressor and states its capacity would double. DEIR, p. 2-7.

However, the DEIR now claims this substantial increase in steam demand would not result in an increase in steam production and emissions as the Refinery has an "integrated steam system" that reallocates the same amount of 400 psi and 150 psi steam. DEIR, p. 3-39. As support for this new theory, the DEIR presents pre-project (2002-2003) steam demand of 147.9 Mmbtu per 1,000 bbl feed compared to post-project (2006-2008) steam demand of 147.7 Mmbtu per 1000 bbl feed. DEIR, p. 3-39. 1-78

First, the DEIR does not contain any information to support this new theory, such as material balances and process flow diagrams that show how the "integrated steam system" works. Further, it does not contain any data to support the pre- and post-project steam demands, such as daily fuel use, higher heating values, and/or steam production data over the period 2000 to 2013 and permit limits for the subject steam generation equipment. Thus, the DEIR fails as an informational document.

Second, the choice of 2006 to 2008 as the post-project period has all the problems previously discussed for hydrogen production in Comment IV.A.1. This period corresponds to a severe recession and includes the year of lowest refinery-wide emissions, thus underestimating 1-79

post-project steam emissions. Therefore, the comparison of 2002-2003 steam production to 2006-2008 steam production proves nothing. The post-project emissions should be based on vendor-reported steam demand of 119,283 lb/hr for the new compressor, not actual steam production during a recession. 1-79 Ccnt.

Third, the steam demand data is for the entire refinery, rather than the equipment modified by the Project. It combines all steam generating equipment (four boilers, gas turbine and heat recovery boiler). DEIR, p. 3-40. This lump sum data could hide increases due to the Project if temporary decreases occurred elsewhere at the Refinery. See Comment IV.A.5 on combined demand. Further, each steam source emits different amounts of pollutants per unit of steam generated. **Exhibit 3**. Thus, combining them and comparing only steam demand, rather than emissions, could hide emission increases due to the Project. 1-80

Finally, the DEIR proposes a mitigation measure to demonstrate that the Project does not cause steam demand to increase. DEIR, p. 3-40. This mitigation measure will not assure that the Project does not increase emissions from steam production for three reasons. First, the duration of the mitigation measures is only five years. Second, the mitigation measure is based on refinery-wide fuel use for steam production rather than Project steam production. Third, it does not report emissions, the metric of interest. 1-81

V. SUMMARY

In sum, the DEIR underestimated emissions by improperly calculating both pre-project and post-project emissions. Pre-project emissions were calculated using maximum daily emissions in 2002-2003 rather average daily emissions. Post-project emissions were calculated using annual average emissions during 2006-2008, rather than "highest daily emissions", based on permit limits or physical constraints of the subject equipment. Finally, the DEIR improperly modified certain key emission factors to exclude flaring and indirect emissions, without disclosing the changes. These various flaws significantly underestimated NOx emissions. The increase in NOx emissions, 80 lb/day, exceeds the significance threshold of 55 lb/day and is a significant, undisclosed, and unmitigated impact of the Project. 1-82

My revised emissions, based on Comments II through IV, are summarized in Table 4. The changes, relative to the DEIR (Table 3.3-7) are shown in bold. I cannot correct all of the errors in the DEIR's analysis as its calculations are largely unsupported. Thus, a failure to show a change does not indicate agreement, but rather lack of adequate information to evaluate the DEIR, which fails as an informational document.

Table 4
Revised Emissions (lb/day)

Project Component	CO	VOC	NOx	SOx	PM10	PM2.5
Fugitives	0	5.2	0	0	0	0
Replacement Heater	**27.2**	5.4	**19.5**	1.7	1.0	1.0
Hydrogen Production	**3.3**	**2.5**	**21.0**	**0.2**	**2.9**	**2.9**
Storage Tank 331	0	0.2	0	0	0	0
Electricity Demand	**4.3**	**0.2**	**24.9**	**2.6**	**0.8**	**0.8**
Truck Transport	11.6	1.6	14.8	0.1	0.3	0.3
Steam Production	>0	>0	>0	>0	>0	>0
Total	46.4	9.9	**80.2**	4.6	4.9	4.9
Sig. Threshold	550	55	55	150	150	55

1-82
cont.

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