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March 19, 2008

Lamont Thompson, Senior Planner
City of Richmond
Planning and Building Regulations Department
1401 Marina Way South
Richmond, CA 94804

RE: Chevron Energy and Hydrogen Renewal Project, Application to the Planning Commission

Dear Mr. Thompson:

We have completed an initial review of the City's Agenda, Staff Report, Findings, Resolutions, Recommended Conditions, Mitigation Monitoring and Reporting Program for the Chevron Energy and Hydrogen Renewal Project ("Project"). We note that the substantial and detailed materials were made available for public review at 6:30 p.m., Friday evening, just days before the public hearing on the project permit, thereby precluding a full review.

The City has made some positive changes addressing many of the concerns we raised in our previous comments. For example, the City has taken a number of steps to eliminate and/or reduce operational emissions. The City appears to have committed Chevron to no net increase in VOC emissions for storage tanks. This is accomplished by Mitigation Measure 4.3-2(a) (requiring installation of domes on two tanks which emit the most VOCs) and Conditional Use Permit, Condition C-1 and C-2, which require additional domes as necessary to hold Project storage tank VOC's emissions to net zero. The City has also imposed Condition C-3, which requires that within a five year period, certain pressure relief valves stop releasing VOC emissions directly to the atmosphere.

This letter highlights areas where we continue to believe the Project and FEIR do not comply with CEQA and could be improved.

The FEIR Must Make a Finding of Significance

Although the Attorney General repeatedly has stressed in previous correspondence that

CEQA requires the City to make a finding of significance[1], the City has not done so, continuing to assert that it is premature to evaluate the significance of the Project's greenhouse gas emissions. The City has addressed some of the practical impacts which would otherwise result from the lack of significance finding. As we have stated, we are pleased that the City has agreed to mitigate the entirety of the Project's anticipated greenhouse gas emissions. We are also pleased that the City has committed to completing a mitigation monitoring and reporting program, a requirement otherwise triggered by a finding that a project has a significant environmental effect. Notwithstanding these changes, the FEIR is legally deficient for failing to make the most fundamental determination required under CEQA.

The City's conclusion that making a significance determination for the greenhouse gas-related impacts of the Project would be too "speculative" (see FEIR at p. 2-26) is not supported by the evidence. In the FEIR, the City acknowledges that global warming is caused by greenhouse gas emissions, and that this Project will contribute at least an additional 898,000 metric tons of greenhouse gases per year to the atmosphere. Rather than determining whether the Project's contribution is cumulatively considerable, the City points out that there are currently no regulatory thresholds for significance relating to global warming impacts.[2] As we have stated before, even without regulatory decrees, under CEQA, the City must determine whether or not the Project's impacts are significant.

In a recent letter to the City in response to our comment letter, Chevron similarly contends that the 898,000 metric tons of greenhouse gas emissions from the Project are inconsequential standing alone when viewed against city, State and global emissions levels. But

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[1](Pub. Res. Code, § 21002.1, subd. (b).) "For each significant effect identified in the EIR, the agency must make one or more of the following findings: (1) that changes or alterations have been required in, or incorporated into, the project that avoid or substantially lessen the effect; (2) that the lead agency lacks jurisdiction to make the change, but that another agency does have such authority; and/or (3) that specific economic, social, or other considerations make infeasible the mitigation measures or project alternatives identified in the final EIR." (~~(~~*Sacramento Old City Assn. v. City Council* (1991) 229 Cal.App.3d 1011, 1034 [citing Pub. Res. Code, § 21081]; see also *County of San Diego v. Grossmont-Cuyamaca Community College Dist.* (2006) 141 Cal.App.4th 86, 100.)

[2]The FEIR states that there are no "applicable standards" to assist the City in determining the significant of this Project's contribution to global warming. In fact, AB 32 requires reduction of the State's overall greenhouse gas emissions by 30 percent by 2020, which provides the background for all emission decisions in the State. In addition, the City may want to consult a white paper entitled "CEQA and Climate Change." Although Chevron contends that the white paper is not a "guidance" document, among other things, the document discusses different approaches for analyzing the significance of global warming related impacts of projects. CAPCOA's white paper is available at http://www.capcoa.org/.

courts have squarely rejected the argument that a project has no cumulatively considerable impacts simply because it is contributing only a relatively small percentage to a larger environmental problem.[3] The contribution must be viewed in the context of the existing problem, and the more serious the problem, the more likely it is that a contribution to that problem will be cumulatively considerable.[4]

It is indisputable that global warming is a serious problem – for the world, this nation, and California. In 2004, California emitted .497 billion tons of greenhouse gases, approximately five percent of U.S. emissions. If California were a country it would be the 16th largest emitter of greenhouse gases in the world.[5] The science tells us that we must stabilize atmospheric concentrations of greenhouse gases at 450 part per million to avoid dangerous climate change, which means reducing greenhouse gas level to 1990 levels in the near terms, and to at least 80% below 1990 levels in the longer term. Consistent with the science, AB 32 requires that greenhouse gas emissions in California be reduced to 1990 levels by 2020. This represents a reduction of approximately 30% as compared to business as usual.

While the City must make significance determination under CEQA, we note that there are objective measures, set forth in law and policy and informed by science, that strongly suggest that the proposed Project's 898,000 additional metric tons of greenhouse gas emissions per year would cumulatively considerable. As we pointed out in prior letters, many of the "early action measures" for reducing greenhouse gases identified by the California Air Resources Board ("CARB") are in the range of, or substantially less than, 500,000 metric tons.[6] If CARB is targeting emissions of over 500,000 metric tons in its early action measures, and this Project alone is almost double that amount, the City and Chevron cannot seriously contend that it has no guidance to determine whether the impacts are significant. In addition, CARB's new reporting threshold regulations under AB 32 target "the most significant GHG emission sources" and they include any industrial source that emits over 25,000 metric tons of CO_2 per year from general

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[3](*Communities for a Better Environment v. Cal. Resources Agency* (2002) 103 Cal.App.4th 98, 119-120.)

[4](*Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 721.)

[5] (See Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2004, U.S. Environmental Protection Agency, available online at http://yosemite.epa.gov.oar/globalwarming.nsf/UniqueKeyLookup/RAMR6MBSC3/$File/06_Complete_Report.pdf.)

6. (See http://www/climatechange.ca.gov/climate_action_team/reports/2007-04-20_ARB_early_action_report.pdf.)

stationary combustion.[7] For comparison's sake, this Project is over 36 times as large as targeted by CARB's new AB 32 reporting threshold.

Moreover, as we have previously explained, mitigating for the impacts, but failing to call them "significant" can mislead the public and local officials about the impacts from the Project. It also sends the wrong signal to other jurisdictions and project applicants navigating through the CEQA process.

For these reasons, as suggested on page 20 of the Staff Report, we urge the Planning Commission to amend the FEIR to include an express finding on the significance of the Project's greenhouse gas-related impacts.

The City Should Include Measures to Ensure that Its Stated Priority for On-Site Mitigation is Enforceable

Mitigation Measure 4.3-5(e) outlines the priority by which measures should be implemented – first priority to on-site mitigation at the refinery, second priority to mitigation in the City of Richmond, third priority to mitigation within the Bay Area's air district, and fourth priority to mitigation within California. The priority order makes sense for various reasons, including ease of verification, avoiding unintended off-site impacts and achieving co-benefits; but the City has included no measures to ensure that mitigation will occur in the priority outlined. As written, the measures could occur anywhere in the State. We believe that the City can and should require a certain minimum percentage of the GHG reductions to take place at the refinery and/or in the City of Richmond before allowing Chevron to move to a different priority level. Alternatively, the City could require that Chevron make a specific showing to the Planning Commission that it has exhausted local efforts, before allowing it to mitigate elsewhere. These approaches should help the City better effectuate its stated priorities. As we have noted previously, we believe that local emission offsets and reductions often provide important co-benefits to the local community.

Crude Slate Conditions and Flaring

The FEIR Master Response 2.2 & 2.7 repeatedly state that "[i]t is reasonably foreseeable that Chevron will run a crude slate similar to that which is currently processed at the refinery, but in a mixture that has higher sulfur levels." (FEIR at 2-8, 2-13, 2-15.) Chevron has repeatedly denied that it has any intent of running a crude slate any different than it uses at present, except that it will run a mixture of up to 3% higher sulfur content. The City's Staff Report released on March 14, continues to assert that "there is no expected change to range of

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[7]CARB Proposed Regulation For the Mandatory Reporting of Greenhouse Gas Emissions, to be added to Title 17, California Code of Regulations, proposed section 95101, subd. (b). Available at: http://www.arb.ca.gov/regact/2007/ghg2007/attachbres07_54.pdf.

specific gravity of the refinery crude slate... and the proposed project does not provide any way for the refinery to process a heavier crude slate." (City's Staff Report, pg. 24.)

We recently investigated the claim that "the proposed project does not provide any way for the refinery to process a heavier crude slate" thereby obviating the need to limit the crude slate. We have discovered that changes made by the Project will permit, and are likely to be used to allow the facility to run a heavier crude slate. (See Statement of G.E. Dolbear, PhD. attached to this letter as Exhibit A.) Chevron's Richmond refinery has no coking unit, which is typically used to process heavier crudes, but it has a ROSE (Residual Oil Supercritical Extraction) solvent deasphalting unit (SDA). As part of this Project, Chevron is expanding the capacity of this deasphalting unit. Dr. Dolbear states that the increased SDA capacity will allow, and likely result in Chevron processing increased levels of heavier crudes, and, if it does so, the refinery will likely increase its emissions of pollutants.

"A comparison of Chevron's block flow diagrams for its current refinery configuration and its proposed configuration after the Renewal Project, as shown in the DEIR, shows no difference in the number and types of units to treat and convert the SDA; only the ROSE unit is being expanded at this time. The only reason for doing this must be to treat a larger volume of resid from the distillation units. Chevron is not asking to increase the volume of crude oil fed to its crude distillation unit, so the only reason to use SDA on a larger volume of resid is that Chevron anticipates processing a crude mix with higher resid content. Since higher resid contents are characteristic of heavier crudes, simple logic reveals that Chevron intends to process crude blends containing heavier crudes once the ROSE expansion is complete." (See Statement of G.E. Dolbear, PhD at ¶28.)

Even if Chevron does not intend at this point in time to change its crude mix, the fact that this Project enables Chevron to change its crude mix at some point in the future without undergoing further review has several legal and practical implications. First, the FEIR repeatedly affirms that Chevron will run a crude slate similar to its current crude slate except for an increased sulfur content. (FEIR at 2-8, 2-13, 2-15.) If this Project enables Chevron to use a different, dirtier crude mix with greater polluting potential, this fact is not disclosed in the FEIR and the FEIR is legally deficient under CEQA on this issue. The City can correct this deficiency by imposing a limitation in the conditional use permit precluding Chevron from altering its crude slate mix other than the 3% sulfur increase which has already been disclosed and analyzed in the FEIR.

Second, we have reviewed the City's mitigation and conditions for controlling and monitoring excess flaring which might result from a crude slate switch and found several areas of concern. First, the City is only committing to monitor flare events for a two year period for heavy metals and other constituents identified in the City's Health Risk Assessment. See Condition D1. If the City intends to ensure that the crude slate is not changed over time, the City should require Chevron to monitor these levels for the life of the permit as a condition of the permit. Given the statement from Dr. Dolbear, it appears likely that Chevron's ability to process heavier crude will already be in place. Second, the City should have a method other than declaring that flare events exceeding certain levels be deemed a public nuisance. The City could, for example, make the flare exceedance a permit violation subject to further City review and possible actions, such as reduced throughput or further limits on other emissions.

Conclusion

These comments are provided to assist the City in developing the most effective set of conditions possible. We appreciate the opportunity to comment on this project and urge the City to take our suggestions into further consideration.

Sincerely,

/S/

JAMIE B. JEFFERSON
Deputy Attorney General

For EDMUND G. BROWN JR.
Attorney General

EXHIBIT A

Expert Report of G.E. Dolbear & Associates, Inc.
Statement of G.E. Dolbear, PhD

Issue: Chevron's proposed expansion of its Richmond, CA refinery includes increased capacity of its solvent deasphalter ("SDA"). Will such an expansion provide Chevron with the ability to process a crude mixture containing increased levels of heavier crudes? If so, would the new mixture increase pollution?

Short Answer: The increased SDA capacity will allow Chevron to process increased levels of heavier crudes, and, if it does so, the refinery will likely increase its emissions of pollutants. The increased SDA capacity *could* be used for purposes other than for processing a crude mixture containing increased levels of heavier crudes, but the fact remains that the SDA and related configuration allows Chevron to process the heavier crudes.

Professional Background

1. I am a physical chemist with more than 40 years industrial experience developing new and improved petroleum refining processes and catalysts. During this period I have worked for several large companies, in both research and management roles, and have published in trade and scholarly journals and received 10 US patents in the areas of hydroprocessing and fluid catalytic cracking. I have taught seminars in both hydrocracking and hydrotreating, and have served as chairman of the American Chemical Society, Division of Petroleum Chemistry.

2. I received a Bachelor of Science in Chemistry from the University of California, Berkeley in 1962 and a Doctor of Philosophy in Chemistry from Stanford University in 1966 where my dissertation was prepared under the direction of Professor Henry Taube, winner of the Nobel Prize in Chemistry in 1983.

3. I have worked as an industrial scientist since completing my work at Stanford, including seven years from 1982-89, at Unocal Science and Technology Division where I was involved in research and development towards processes for refining heavy crude oils and resides.

4. My time has been divided between laboratory and pilot plant research and managing groups of other scientists and engineers. Since 1989, I have worked full time as a consultant to the industry, solving a variety of problems for large and small companies in the chemical and petroleum industries, including Shell International E&P, Inc., Tosco Refining, and Unocal. I am currently employed as a Principal at G.E. Dolbear & Associates.

5. I am co-author of *Petroleum Catalysis in Non-Technical Language*, with John S. Magee.

6. I have developed new hydroprocessing strategies based on a detailed understanding of the composition, properties, and behavior of the asphaltenes in residual oil, heavy oils, and bitumen. I have published several papers on this topic, including most recently coauthoring the chapter, "Hydrotreating and Hydrocracking: Fundamentals", with P.R. Robinson, chapter 7 in *Practical Advances in Petroleum Processing*, edited by C.S. Hsu and P.R. Robinson; 2006.

7. I was asked by the California Attorney General's Office to determine whether Chevron's proposal to increase the capacity of its solvent deasphalter would provide Chevron with the ability to process a crude mixture containing increased levels of heavier crudes? If so, would the new mixture increase pollution?

Refinery Basics (101)

8. The job of a refinery is to convert crude oil into valuable products for sale to customers. The crude oil arrives by pipeline or tanker ship and is pumped directly to one or more large storage tanks. These are usually located on the side of a hill so that the oil can flow downward into the refinery. Modern refineries typically receive a selection of several crude oils from different oil fields and process them as a blend to maintain a relatively stable feed mixture that works well in the existing collection of equipment.

9. The first step in refining the blend of crude oils is to wash it with water to remove trace amounts of salt from the oil; the apparatus for accomplishing this is called a desalter. The desalted crude is then pumped through a fired heater to raise its temperature to 650 to 700 ºF and then to a large distillation tower operation at atmospheric pressure; this first distillation is called a crude tower and its capacity, (or the sum of capacities of two or more crude towers) calculated as barrels per day (bpd), is the listed size of the refinery. At Chevron in Richmond, the capacity is reported by Chevron to the industry magazine Oil & Gas Journal (December 24, 2007) is 243,000 bpd.

10. Fractions of the crude oil that exist as vapors in the crude tower pass up the distillation column an out the top of one or more collection points along the side of the column. Fractions that do not vaporize exit the bottom of the tower. These Atmospheric Tower Bottoms (ATB) are reheated and distilled again at lower pressures in the vacuum tower. Chevron's vacuum tower handles 110,000 bpd. The fraction that vaporizes at low pressure and rises in the vacuum tower is collected from the top of the tower ("overhead") and known as vacuum gas oil in the refinery. The fraction that does not distill under these conditions, having an atmospheric equivalent boiling point above about 1050 ºF, is variously called Residual Oil, Resid, or Vacuum Tower Bottoms (VTB).

11. It can be difficult to trace oil volumes through a refinery because the densities of the various streams differ. For instance, adding hydrogen to an oil decreases its density, allowing the same mass to fill more volume. The hydrogen addition increases the mass a few percent, and hydrogenolysis or cracking produces byproduct gas that reduces the mass a few percent. As a result the density change is the most important factor. This density effect is important throughout the refinery – refiners sometimes call this "volume swell" – and it contributes to the profits, since petroleum and its products in the US are bought and sold by volume.

12. The various distilled fractions and the VTB are led away from the crude unit to various refining process that treat them to remove impurities such as sulfur or convert them to fractions having different boiling points ranges. Several examples follow:

Liquids distilling in the range from about 400 ºF to about 650 ºF may be led to a diesel hydrotreater where they are heated to about 600 ºF and treated over a highly active catalyst under a high pressure of hydrogen to remove essentially all of the sulfur and reduce the concentration of aromatic (benzene-like molecules) to meet specifications for diesel fuel.

Vacuum gas oils, distilling in the range from 650 to about 1050 ºF, are catalytically cracked to produce streams boiling in the gasoline and diesel ranges. In the Fluid Catalytic Cracking process (FCC), the oils are rapidly heated to about 1000 F by contact with a finely powdered catalyst that cracks the molecules in a reaction that takes place in one or two seconds. The vapor products of this conversion are separated from the catalyst and led to a distillation column that separates them into the desired fractions for further treatment or blending into fuels. The hydrocracking process performs a similar function, albeit more slowly, under a high pressure of hydrogen.

Residual oils, which can account for one third or more of the original crude, can be used directly as asphalt for paving. Since asphalt demand in relatively limited compared to the sizes of today's refineries, most residual oils are processed to convert them to other products. Often a coker is employed for this, heating the oil to about 1000 ºF and holding in at temperature for several minutes to form a solid coke product. Cracked vapors are collected and led into another refinery treating and conversion units. Coke, which has a very low value because it contains high levels sulfur and other impurities, typically accounts for about one fourth to one third of the resid fed into the coker.

13. Treatment and conversion of the various streams provides as many as 30 different liquid streams that are blended to provide commercial products such as gasoline, diesel, jet fuel, home heating oil, lubricating oils, and occasionally feedstocks for petrochemical manufacture.

14. Hydrocarbon gas is a co-product of the various refinery units, collected in an extensive network of pipes for internal use in the refinery fuel gas system. This supplies clean fuel for raising the temperature of reactor feeds in process heaters. Hydrogen sulfide, H_2S, is a common impurity in the fuel gas and must be removed by direct contact with an alkaline reactant, typically a nitrogen-containing base called an amine. H_2S is then released from the amine in a separate part of the treating unit and converted to sulfur by selective oxidation in a unit called the Claus reactor. Trace sulfur making it through this labyrinth of reactors is scrubbed from the waste stream in a tail-gas process, often employing the Stretford process.

15. Some of the gases produced in the refinery are used selectively for making high value gasoline blending components by alkylation. Alkylation takes places using a catalyst very strong acids such as sulfuric acid or hydrofluoric acid. This approach to making products is unique in using small molecules to make larger ones, since most processes in the refinery concentrate on breaking larger molecules into small pieces for use in transportation fuels. Large volumes of hydrogen are required in the modern refinery for desulfurization and for cracking in the hydrocracking reactors. Some of this hydrogen comes as a product of the conversion of paraffinic molecules such as heptane into high octane aromatics such as toluene in a process called platinum reforming. The remainder of the hydrogen must be made on purpose, usually by steam reforming natural gas, heating a mixture of steam and methane to temperatures well in excess of 1000 ^oF in the presence of a nickel catalyst. Carbon dioxide (CO_2) is a product of steam reforming and will certainly be controlled in the future.

16. Chevron Richmond has many of the features described above. The table below is taken from the most recent listing in Oil & Gas Journal (December 24, 2007).

Chevron Richmond Listed Capacities (feed capacities except where noted)		
Refinery Unit	Capacity, b/day	
Crude distillation	243,000	
Vacuum distillation	110,000	
Catalytic cracking (FCC)	80,000	
Catalytic (platinum) reforming	69,000	
Catalytic hydrocracking	51,000 38,250 65,000	
Catalytic hydrotreating	13,000 65,000 58,000 59,000 30,000 30,000	
Alkylation	24,000	
Polymerization/Dimerization	3,700	Production capacity
Isomerization	8,600 28,000	Production capacity
Lubes	16,000	Production capacity
Hydrogen	150 MMscfd 20 MMscfd	Production capacity
Sulfur	600 tons/day	Production capacity
Information from tables published by Oil & Gas Journal, December 24, 2007		

17. Chevron's Richmond refinery has no coking unit, but it has a large ROSE (Residual Oil Supercritical Extraction) solvent deasphalting unit that is not listed in the magazine.

18. Solvent deasphalting, as its name implies, separates the asphaltic fractions of the resid, sometimes called pitch, leaving behind relatively clean oil. The clean oil can then be blended with other oils in the refinery for treatment and conversion to gasoline, diesel and other products. SDA is more expensive to run than a coker but it makes a better product in a process with fewer emissions. The pitch can be blended into other heavy liquids to make heavy fuel oil, sometimes called number 6 or bunker fuel; these are used as fuels on ocean-going ships.

<u>SDA Capacity and Crude Mix</u>

19. Chevron's SDA Unit: Chevron's SDA uses the ROSE (Residual Oil Supercritical Extraction) process (Oil & Gas Journal, Nov 30, 1992). The process uses high pressure to keep the extraction solvent in the liquid state and to separate the solvent from the products via a pressure change rather than by heating. By varying solvent composition and operating conditions, the refiner can control how large a fraction of the resid feed goes into the DAO and how much reports to the pitch.

20. Expanding the SDA will allow Chevron to increase the proportion of crudes having high resid content, providing more deasphalted oil to the FCC by way of the TKC. In Chevron's Richmond refinery, the heaviest part of the crude oil feed mixture, the resid distilling at temperatures higher than about 1050 ºF, is fed to a solvent deasphalting unit to remove the heaviest and "dirtiest" molecules. The remaining deasphalted oil, DAO, is sent to a treating unit, which Chevron called the TKC. Here it is hydrogenated to improve its properties as a feed for the Fluid Catalytic Cracking unit, FCC.

21. The use of SDA in this manner is unusual in US refineries. Converting the resid in a coker is much more common.

22. Chevron is seeking to increase the capacity of the ROSE SDA unit by approximately 62%. Currently, the ROSE unit processes 40,600 bpd, the capacity of the ROSE unit as originally announced in the trade literature is 50,000 bpd, and Chevron is seeking to increase processing capacity to 66,000 bpd.

23. I reviewed a set of documents for the California Attorney General's Office that provided a description of process changes for the SDA and based on my knowledge, experience, expertise, and the documents reviewed, determined that increasing the capacity of the SDA at Chevron's Richmond refinery would allow heavier crude oils to be processed even without a coker.

24. Chevron currently uses a mixture of crude oils in a bled at its Richmond refinery. Blending allows Chevron and other refiners to purchase a variety of types of crude oil, including heavier crudes which typically cost less than lighter crudes and the blend lighter and heavier crudes to optimize the production at the refinery while keeping prices as low as possible. Thus a refinery might use a mixture of crudes from Alaska's north slope, California's central valley, and imported crudes from Indonesia or elsewhere.

25. Chevron's statements that it "will continue to run the same crude oil types as processed currently" is incomplete at best, and misleading at worst. It fails to disclose that Chevron will certainly change the detailed mix – the recipe – for the crude oil blends it uses even as it draws from the same collection of crudes. Chevron will be increasing its use of heavier crude oils because of the worldwide increase in the average density of crude oils, an increase that has been continuous for at least the last half century. The increase use of heavier crudes will be small but continuous for the foreseeable future.

26. While the expansion of the SDA will certainly allow Chevron to process heavier crude oil, it can potentially also serve other purposes. These include 1) reducing the need to purchase heavy gas oils to feed an enlarged Fluidized Catalytic Cracker (FCC) unit; 2) providing a cleaner feed to the FCC unit by rejecting a larger fraction of asphalt; and 3) reducing the possible need to divert VTB to fuel oil when the proportion of resid in the refinery crude slate increases. The SDA expansion will provide for the possibility of all these options.

27. A comparison of Chevron's block flow diagrams for its current refinery configuration and its proposed configuration after the Renewal Project, as shown in the DEIR, shows no difference in the number and types of units to treat and convert the SDA; only the ROSE unit is being expanded at this time. The only reason for doing this must be to treat a larger volume of reside from the distillation units. Chevron is not asking to increase the volume of crude oil fed to its crude distillation unit, so the only reason to use SDA on a larger volume of resid is that Chevron anticipates processing a crude mix with higher resid content. Since higher resid contents are characteristic of heavier crudes, simple logic reveals that Chevron intends to process crude blends containing heavier crudes once the ROSE expansion is complete.

28. The major impacts on emissions of processing heavier crude oil will be increased NO_x and particulate emissions from natural-gas-fired heaters fro the hydrogen plant and any other units being expanded. In making hydrogen, natural gas is burned in air to provide process heat. Higher hydrogen demand will result in increased heat demand and thus increase particulates and NO_x. Any increase in TKC volume capacity, an issue not addressed here, will also result in higher emissions from its own process heaters and even higher hydrogen volumes with their resulting emissions.

29. Heavier crude oils contain proportions of chemical compounds distilling above about 1050 ºF. Such compounds tend to have higher levels of sulfur and bound metals, especially nickel and vanadium. Increasing the proportion of heavier crudes forces the refinery to deal with increased amounts of sulfur and these metals and will put higher demands on the sulfur scrubbing and tail gas systems. In applying solvent deasphalting, Chevron routes the majority of these metals into the heavy fuel oil, typically burned in the immense diesel engines on ships.

30. Aqueous emissions will be most impacted if the proportion of California Central Valley crude is increased in the mix. This would increase the requirements for selenium removal including the demand on water treatment to remove it from the refinery waste streams.

31. Based on the information reviewed, it is not possible to tell for certain what Chevron will do with the proposed increased capacity for the SDA, but undoubtedly Chevron will have the ability to process more heavy crude oil unless restrictions on permit conditions are imposed.

Date: March 19, 2008

Geoffy E Dolbear PhD

Geoffrey E. Dolbear PhD.