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CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY

PRODUCT RELIABILITY AND OPTIMIZATION PROJECT

FINAL ENVIRONMENTAL IMPACT REPORT

Volume I: Final Environmental Impact Report

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PREFACE

This document constitutes the Final Environmental Impact Report (EIR) for the Chevron Products Company El Segundo Refinery Product Reliability and Optimization Project. The Draft EIR was circulated for a 45-day public review and comment period on March 7, 2008. The comment period ended on April 22, 2008. Four comment letters were received during the public comment period on the Draft EIR. The comment letters and responses are included in Appendix G of this document. The comments were evaluated and minor modifications have been made to the Draft EIR such that it is now a Final EIR. None of the modifications alter any conclusions reached in the Draft EIR, nor provide new information of substantial importance relative to the draft document that would require recirculation of the Draft EIR pursuant to CEQA Guidelines §15088.5. Therefore, this document is now a Final EIR. Additions to the text of the EIR are denoted using italics. Text that has been eliminated is shown using ~~strike outs~~.

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CHAPTER 1

INTRODUCTION AND EXECUTIVE SUMMARY

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

1.1 INTRODUCTION

Chevron Products Company is proposing the Product Reliability and Optimization (PRO) Project at its existing El Segundo Refinery (Refinery). The proposed project includes modifications to the No. 2 Crude Unit, No. 2 Residuum Stripper Unit (RSU), Minalk/Merox Unit, Waste Gas Compressors, Fluidized Catalytic Cracking Unit (FCCU), Alkylation Unit, Vacuum Residuum Desulfurization Unit (VRDS), ISOMAX Unit, Cogeneration (Cogen) Facilities, and the Railcar Loading/Unloading Rack. New process units include sulfur processing facilities (i.e., Sour Water Stripper (SWS), Sulfur Recovery Unit (SRU), and Tail Gas Unit (TGU)), Vapor Recovery and Safety Flare System, Water Treatment Facilities (i.e., reverse osmosis units and nitrogen removal units), and additional storage capacity. The purpose of these modifications and additions is to increase the reliability, energy efficiency, and capacity of specific existing Refinery processing equipment; allow the processing of a wider range of crude oils; and voluntarily reduce potential atmospheric emissions from existing pressure relief devices (PRDs). The proposed project will not increase or decrease the overall refinery crude throughput capabilities.

1.2 PURPOSE/LEGAL REQUIREMENTS

In accordance with §15121(a) of the California Environmental Quality Act (CEQA) Guidelines (California Administrative Code, Title 14, Division 6, Chapter 3), the purpose of an Environmental Impact Report (EIR) is to serve as an informational document that: "will inform public agency decision-makers and the public generally of the significant environmental effect of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project." The proposed project requires discretionary approval from the South Coast Air Quality Management District (SCAQMD) and, therefore, it is subject to the requirements of CEQA (Public Resources Code, §21000 et seq.).

CEQA Public Resources Code §21000 et seq., requires that the environmental impacts of proposed projects be evaluated and that feasible methods to reduce, avoid or eliminate significant adverse impacts of these projects be identified and implemented. The lead agency is the public agency that has the principal responsibility for carrying out or approving a project that may have a significant effect upon the environment (Public Resources Code §21067). The proposed project requires discretionary approval from the SCAQMD for air quality permits for modifications to existing stationary source equipment and installation of new stationary source equipment. Therefore, the SCAQMD has the primary responsibility for supervising or approving the entire project as a whole and is the most appropriate public agency to act as lead agency (CEQA Guidelines §15051(b)).

To fulfill the purpose and intent of CEQA, as the lead agency for this project the SCAQMD prepared and released for a 30-day public review and comment period, a Notice of Preparation and Initial Study (NOP/IS) to identify potentially significant environmental impacts, and providing a preliminary analysis associated with the Chevron Products Company's PRO Project (see Appendix A).

1.3 SCOPE AND CONTENT

The NOP/IS was circulated for a 30-day comment period beginning on August 10, 2007 through September 11, 2007. The NOP/IS was circulated in El Segundo and to neighboring jurisdictions, responsible agencies, other public agencies, and interested individuals in order to solicit input on the scope of the environmental analysis to be included in the EIR. Five comment letters were received on the NOP/IS during the public comment period. Responses to those comments are provided in Appendix A. The NOP/IS formed the basis for and focus of the technical analyses in this ~~Draft~~ *Final* EIR. The following environmental issues were identified in the NOP/IS as potentially significant and are further addressed in this document:

- Air Quality,
- Energy,
- Hazards and Hazardous Materials,
- Hydrology/Water Quality,
- Noise,
- Solid/Hazardous Waste, and
- Transportation/Traffic.

The NOP/IS concluded that the proposed project would not create significant adverse environmental impacts to the following areas: aesthetics, agricultural resources, biological resources, cultural resources, geology and soils, land use and planning, mineral resources, population and housing, public services, and recreation. No comments were received disputing this conclusion.

A discussion of potential cumulative impacts is also provided. The alternatives in Chapter 6 of this ~~Draft~~ *Final* EIR were prepared in accordance with §15126.6 of the CEQA Guidelines. Chapter 6 describes a range of reasonable alternatives that could feasibly attain the basic objectives of the proposed project as a means of eliminating or reducing some of the significant adverse environmental effects associated with the proposed project.

1.4 RESPONSIBLE AND OTHER AGENCIES

CEQA Guidelines §15381 defines a "responsible agency" as: "a public agency which proposes to carry out or approve a project, for which a Lead Agency is preparing or has prepared an EIR or Negative Declaration. For purposes of CEQA, responsible agencies include all public agencies other than the lead agency that have discretionary approval authority over the project."

The following agencies may have ministerial permitting authority for aspects of modifications at the Refinery, and have been given an opportunity to review and comment on the NOP/IS and EIR; however, no new discretionary permits or permit modifications are expected to be required from these agencies for the proposed project:

- State Water Resources Control Board (SWRCB),
- Los Angeles Regional Water Quality Control Board (RWQCB), and
- City of El Segundo.

For convenience, all the above agencies will be referred to generally as Responsible Agencies in this EIR. For the record, none of the above agencies submitted a comment letter on the NOP/IS.

No trustee agencies as defined by CEQA Guidelines §15386 have been identified with respect to the proposed project. However, notice of the proposed project has been sent to the Office of Planning and Research pursuant to Public Resources Code §21080.4 for distribution in the event trustee or other responsible agencies are identified for the proposed project.

1.5 INTENDED USES OF THE EIR

The EIR is intended to be a decision-making tool that provides full disclosure of the environmental consequences associated with implementing the proposed project. Additionally, CEQA Guidelines §15124(d)(1) requires a public agency to identify the following specific types of intended uses:

- A list of the agencies that are expected to use the EIR in their decision-making;
- A list of permits and other approvals required to implement the project; and,
- A list of related environmental review and consultation requirements required by federal, state, or local laws, regulations, or policies.

To the extent that local public agencies, such as cities, county planning commissions, etc., are responsible for making land use and planning decisions related to the proposed project, they could possibly rely on this EIR during their decision-making process. See the preceding section for a list of public agencies' whose approval may be required and who may also be expected to use this EIR in their decision-making process.

1.6 AREAS OF CONTROVERSY

In accordance with CEQA Guidelines §15123(b)(2), the areas of controversy known to the lead agency, including issues raised by agencies and the public, shall be identified in the CEQA document. After public notification and review of the NOP/IS, the SCAQMD received five comment letters. Issues raised in the comment letters are related specifically to potential impacts from the proposed project and were addressed in the EIR and responses to those comment letters are provided in Appendix A. "Controversy" is defined as a difference in opinion or a dispute. No such issues have been raised regarding the Chevron proposed project. Consequently, there are no areas of controversy known to the lead agency.

1.7 EXECUTIVE SUMMARY – CHAPTER 2: PROJECT DESCRIPTION

1.7.1 INTRODUCTION

Chevron Products Company is proposing a project at the Refinery to increase the reliability, energy efficiency, flexibility and capacity of specific Refinery equipment. The PRO Project includes modifications to existing specific process units, new process units, and also new infrastructure that supports and links these units to other processes, units or facilities throughout the Refinery. The proposed project will involve physical changes and additions to multiple process units and operations as well as operational and functional improvements primarily within the confines of the Refinery.

1.7.2 PROJECT OBJECTIVES

The objectives of the proposed project at the Refinery are to:

1. Improve the energy efficiency, performance, and reliability of process units;

2. Allow the Refinery to efficiently and reliably process a wider range of crude oils, including higher sulfur-containing crude oils;

3. Produce lower sulfur fuel products and increase production of commercial grade elemental sulfur;

4. Improve the management of blending components of California Air Resources Board (CARB) fuels; and,

5. Reduce the potential for atmospheric releases and related emissions from PRDs in the No. 2 Crude Unit, No. 2 Residuum Unit, and the Minalk/Merox Unit.

The proposed project will not increase or decrease the overall Refinery crude throughput capabilities.

1.7.3 PROJECT LOCATION

The proposed project will occur primarily within the confines of the Refinery, except for improvements at the West Basin Municipal Water District (WBMWD), which is located just east and also just north of the Refinery. Additional utility improvements will be required to Southern California Edison (SCE) facilities. The Refinery, which was constructed over 90 years ago, is located at 324 West El Segundo Boulevard in the City of El Segundo, within the southern California region.

1.7.4 LAND USE AND ZONING

The Refinery is bounded by El Segundo Boulevard to the north, Sepulveda Boulevard to the east, Rosecrans Avenue to the south, and Vista Del Mar to the west. The Chevron Refinery is located in an area of mixed land uses, with industrial, recreation, residential, and commercially zoned areas nearby. Land use to the north of the Chevron Refinery is primarily residential, with a mix of commercial and light industrial zoning mixed in. The predominant adjacent land uses west of the Refinery are nearly all heavy industrial, or open space, which includes: Dockweiler State Beach, Manhattan Beach, and the El Segundo Generating Station, although a small parcel of land at the southwest corner of the Chevron property is made up of commercial and multiple-family residential.

Directly south of the Refinery, there is a single-family residential area bordering the entire length of the Refinery separated by Rosecrans Avenue. The corridor immediately east of the Refinery is comprised of a golf course at the corner of Sepulveda Boulevard and El Segundo Boulevard, with light commercial and heavy industrial zoning for the rest of the tract. The Refinery is located in the City of El Segundo within Los Angeles County in an urbanized area that includes a substantial amount of industrial development, due to the proximity of Los Angeles International Airport (LAX).

1.7.5 EXISTING REFINERY CONFIGURATION AND OPERATION

Crude oil, used to produce gasoline and other refinery products, is delivered by ship to the marine terminal and pumped to the Refinery by existing pipelines or received via pipeline directly to the Refinery. The crude oil is then processed in the crude units where it is heated and distilled into multiple feedstock components that are later processed elsewhere in the Refinery. The heavy residual oil leaving the crude units is further distilled in the vacuum units to yield additional, lighter hydrocarbon products and vacuum residuum. The vacuum residuum is processed in the Coker Unit and the lighter hydrocarbon components from the crude units and vacuum units are fed to other Refinery units for further processing. Some of the major downstream processes are cracking in the FCCU and ISOMAX Unit, processing to recover sulfur in the hydrotreating units including the VRDS Unit, synthesizing in the Alkylation Unit, and reforming in the CCR Unit.

Auxiliary systems are also needed to support Refinery operations including hydrogen plants (to produce hydrogen needed for certain refinery reactions), boilers to produce steam, cogeneration plants to produce electricity and steam, and wastewater treatment systems.

1.7.6. PROPOSED PROCESS UNIT MODIFICATIONS

1.7.6.1. No. 2 Crude Unit

The No. 2 Crude Unit provides the initial separation of crude oil by distillation. The various distillates are then further refined in other processing units in the Refinery. The proposed modifications to the No. 2 Crude Unit include rerouting atmospheric PRDs to the proposed new Vapor Recovery and Safety Flare System. In addition, two knock-out drums will be added to the unit to collect, for recovery purposes, any liquids released from the PRDs in the No. 2 Crude Unit, the No. 2 RSU, and the Minalk/Merox Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere in the event of a process upset.

1.7.6.2 No. 2 Residuum Stripper Unit

The No. 2 RSU processes the heavy hydrocarbons from the bottom of the No. 2 Crude Unit using vacuum distillation to produce various weight gas oils. The proposed modifications to the No. 2 RSU are limited to rerouting PRDs to the proposed new Vapor Recovery and Safety Flare System via the two new knock-out drums in the No. 2 Crude Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere in the event of a process upset.

1.7.6.3 Minalk/Merox Unit

The Minalk/Merox Unit converts sulfur compounds (mercaptans) to disulfides using a catalyst. The proposed modifications to the Minalk/Merox Unit are limited to rerouting PRDs to the proposed new Vapor Recovery and Safety Flare System via a new knock-out drum in the No. 2 Crude Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere in the event of a process upset.

1.7.6.4 Waste Gas Compressors

The Waste Gas Compressors (WGCs) at the No. 2 Crude Unit are currently connected to the Low Sulfur Fuel Oil (LSFO) vapor recovery system and safety flare. As part of connecting PRDs to the New Safety Flare, the WGCs will be rerouted to the New Vapor Recovery and Safety Flare System. The purpose of this modification is to align all PRDs from the No. 2 Crude Unit, No. 2 RSU, Minalk/Merox Unit, and the WGCs to a common vapor recovery and safety flare system.

1.7.6.5 Fluidized Catalytic Cracking Unit

The purposes of the modifications to the FCCU are to increase reliability, consolidate existing equipment, more efficiently separate intermediate streams, increase production of CARB gasoline components, and to improve energy efficiency. The modifications and equipment additions include: installing a new motorized main air blower replacing the existing steam turbine driven main air blower (the existing equipment will be idled and removed from the existing permit); installing a new depropanizer column replacing three smaller existing distillation columns; installing a new deethanizer column; installing new pumps; and, installing new heat exchangers.

1.7.6.6 Alkylation Unit

The Alkylation Unit combines light olefins (propylene, butylene and pentenes) with isobutane to produce an alkylate product for use as a gasoline blending component. The proposed modifications to the Alkylation Unit include supplemental cooling that will be supplied by a new cooling tower and additional heat exchangers. The depropanizer, located in the older section of the Alkylation area, will be removed. This column is one of the three depropanizer columns being removed as part of FCCU upgrades. The purpose of the modifications is to improve reliability through more efficient cooling (i.e., heat removal) and improve product separation in the Unit.

1.7.6.7 Vacuum Residuum Desulfurization Unit

The VRDS Unit desulfurizes and denitrifies gas oil feedstock for the FCCU. The purpose of the modification to the VRDS Unit is to allow taking one of the parallel reactor trains out of service to replace the catalyst while the other train remains in service. The unit modifications and additions include: installing valve manifolds to separate the reactor trains; installing a new, parallel high pressure separator; re-piping of the existing Recycle Hydrogen Heat Exchangers and Recycle Hydrogen Air Coolers to split them between the two trains; and, installing new facilities to allow sulfiding of fresh catalyst in one reactor train with the other train in operation. This includes installation of two new separator vessels, a new sulfiding recycle hydrogen compressor, and a new recycle hydrogen air cooler. In addition, the existing VRDS Product Coolers will be re-piped so they can be used in the catalyst sulfiding loop.

1.7.6.8 ISOMAX Unit

The ISOMAX Unit converts light and intermediate gas oils into jet fuel, motor gasoline, and Liquefied Petroleum Gas (LPG). The unit will be modified to increase the feed capacity by approximately 10,000 barrels per day (BPD), and to produce two additional products, Ultra Low Sulfur Diesel (ULSD) fuel and desulfurized FCCU feed. The purpose of the modifications is to accommodate gas oil production and optimize output from the Unit. Modifications will be made to the Century Type ISOMAX Catalyst for deNitrification (CKN) and distillation sections. A Pressure Swing Absorption (PSA) Unit will be installed to recover hydrogen for reuse in existing Refinery hydrocracking and hydrotreating processes. Heaters in the ISOMAX Unit will be retrofitted with low nitrogen oxides (NOx) burners to reduce NOx emissions. Firing rates for the heaters will operate within existing permit limits.

1.7.6.9 Cogeneration Facilities

The Refinery currently operates a multi-train cogeneration plant to supply most of the electricity and steam used by processing equipment. To supplement electrical needs, electricity is purchased from offsite sources (e.g., SCE). The existing cogeneration facility will be expanded by an additional 49.9 megawatts (MW). The new 49.9 MW Cogen Train D includes a natural gas and refinery gas-fired turbine electric generator, a new steam-driven turbine electrical generator, feed gas compressors, knockout and surge pots, waste heat boilers (including duct burners) to generate steam, a carbon monoxide (CO) oxidation catalyst unit, and a Selective Catalytic Reduction (SCR) unit to control emissions. Expansion of this facility will decrease the Refinery's need for offsite sources of electricity.

1.7.6.10 Railcar Loading/Unloading Rack

The Refinery currently ships and receives LPG by trucks and rail cars. As part of the PRO Project, the LPG Loading/Unloading Rack will be expanded by the addition of four new loading/unloading positions for added flexibility that will increase the ability to optimize CARB-gasoline blending.

1.7.6.11 Utility Improvements

SCE and the WBMWD will improve systems to service the proposed project. SCE improvements expected to be made include adding new 66 kilovolt (kV) circuit breakers in their existing Chevmain Power Substation, new transformers at their existing ISOMAX Power Substation, about 500 feet of overhead or underground cables between the Chevmain Power Substation and the ISOMAX Power Substation, and a new transformer at their Chevgen Power Substation. WBMWD currently provides boiler feed and cooling tower water from secondary-treated effluent from the Hyperion Wastewater Treatment Plant that has been further processed by filtration, chlorination, demineralization by reverse osmosis, and/or denitrification. Improvements as part of the PRO Project at WBMWD, include increasing reverse osmosis and denitrification water production facilities.

1.7.7 PROPOSED NEW PROCESS UNITS

1.7.7.1 Sulfur Recovery Facilities

<u>Sour Water Stripper</u>

A new SWS with a capacity of 300 gallons per minute (gpm) will be constructed to supplement the existing plants. This stripper will allow for increased processing of sour water and production of commercial grade sulfur. The overhead stream from the stripper, containing hydrogen sulfide (H_2S), ammonia and water vapor, will be fed to a new SRU.

Sulfur Recovery Unit

A new SRU with a capacity of 175 long tons per day will be installed to process increased amounts of H_2S to commercial grade, molten sulfur for sale. Ammonia in the feed stream to the SRU will be converted to atmospheric nitrogen and water and exhausted through the TGU to the atmosphere.

Tail Gas Unit

The exhaust from the SRU will be vented to a new TGU for further processing before discharging to the atmosphere. The TGU will include a new incinerator.

1.7.7.2 Vapor Recovery and Safety Flare System

A new closed relief system, including vapor recovery compressors and an elevated safety flare, will be installed that is designed to be capable to handle emergency releases from the equipment that is connected to it. The PRDs on the No. 2 Crude Unit, the No. 2 RSU, and the Minalk/Merox Unit that currently may vent to atmosphere under upset conditions will be routed to this new Vapor Recovery and Safety Flare System. The existing WGCs currently routed to the LSFO vapor recovery system will be re-routed to this new Vapor Recovery and Safety Flare System. In addition, PRDs from the new SWS, SRU and TGU will be routed to this new Vapor Recovery and Safety Flare System. The recovered gases will be treated prior to being added to the existing refinery fuel gas system.

1.7.7.3 Additional Storage Capacity

The proposed project will require additional segregation and storage of intermediate hydrocarbon streams and products. A new LPG sphere (Tank 722), two new FCCU light gasoline tanks (Tanks 302 and 303), and a new ISOMAX diesel tank (Tank 447) with the flexibility to store other products will be added. In addition, new pumps will be added to transfer materials to and from the new tanks.

1.7.7.4 Cooling Tower

A new cooling tower with a water circulation rate of approximately 12,000 gpm will be constructed to support cooling needs at the existing Alkylation Unit, new SRU, new SWS, and new TGU.

1.7.7.5 Hydrogen Compression and Transfer Facilities

Hydrogen is currently produced onsite at the Refinery. Additional hydrogen compression and transfer facilities will be installed to supply Refinery units with hydrogen at the required pressures.

1.7.8 CONSTRUCTION OF THE PROPOSED PROJECT

Construction activities for the Chevron Products Company PRO Project are expected to begin in the second quarter of 2008 and be completed in 2010. The construction activities for most of the components are expected to overlap from the second quarter of 2008 until the fourth quarter of 2009. Construction work shifts are expected to last about ten hours per day during most portions of the construction schedule. However, during certain Refinery unit shutdown periods (e.g., March and October 2009), two construction shifts are expected to take advantage of the disruption in operation.

1.7.9 OPERATION OF THE PROPOSED PROJECT

The permanent work force at the Refinery is expected to increase by approximately 12 additional workers as a result of the proposed project. The proposed project is expected to incrementally reduce truck traffic by about two trucks per day associated with the transport of additional materials to and from the Refinery including among other things, catalyst deliveries and offsite shipments of commercial sulfur and ammonia products. In addition, a maximum of about 12 additional railcars per day could travel to and from the Refinery as a result of the proposed project.

1.8 EXECUTIVE SUMMARY – CHAPTER 3: EXISTING ENVIRONMENTAL SETTING

This chapter presents the existing environmental setting for the proposed project and compares it to the potential impacts of the proposed project that have been previously evaluated. This EIR is focused only on the environmental topics identified in the NOP/IS (see Appendix A) that could be significantly adversely affected by the proposed project. The environmental topics identified in Chapter 3 include both a regional and local setting.

1.8.1 AIR QUALITY

The Chevron Products Company Refinery is located within the SCAQMD's jurisdiction. Over the last decade and a half, air quality has substantially improved within the district. Nevertheless, several air quality standards continue to be frequently exceeded by a wide margin. For example, of the National Ambient Air Quality Standards (NAAQS) established for six criteria pollutants, the district is in attainment for four (sulfur oxide, (SOx), NOx, CO and lead). VOC, a precursor to ozone and particulate matter (PM) are in non-attainment with the standards.

Chapter 3 discusses the effects of meteorological conditions, temperature and rainfall, and wind flow patterns on the existing air quality conditions in the South Coast Air Basin (Basin). Existing air quality will be examined regarding criteria pollutants, regional air quality, local air quality, the Refinery's criteria pollutant emissions, toxic air contaminants (TACs), as well as the regulatory setting.

1.8.2 ENERGY

The major sources of energy in California come from intrastate, interstate and foreign sources. Power plants in California provided approximately 78 percent of the in-state electricity demand in 2006. Hydroelectric power from the Pacific Northwest provides another 7 percent, and power plants in the Southwestern U.S. provide another 15 percent. California is currently ranked fourth in the nation among oil producing states, behind Louisiana, Texas, and Alaska, respectively. Crude oil production in California averaged 731,150 BPD in 2004, a decline of 4.7 percent from 2003. Statewide oil production has declined to levels not seen since 1943. In 2005, the total receipts to refineries of roughly 674 million barrels came from in-state oil production (39.4 percent), combined with oil from Alaska (20.1 percent), and foreign sources (40.4 percent) (CEC, 2006b).

Chapter 3 discusses the existing setting regarding demand, supply and distribution of energy resources on a state and local basis, with electricity and liquid petroleum fuels providing the main topics.

1.8.3 HAZARDS AND HAZARDOUS MATERIALS

The Refinery handles hazardous materials with the potential to cause harm to people, property, or the environment. An accidental release of hazardous materials at a facility can occur due to natural events, such as earthquakes, and non-natural events, such as mechanical failure or human error. Potential existing hazards from the Refinery are those associated with accidental releases of toxic/flammable gas, toxic/flammable liquefied gas, and flammable liquids. Typical hazards at a refinery include toxic gas clouds, fires, vapor cloud explosions, thermal radiation, and overpressure. State and federal laws require detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed of to prevent or mitigate injury to human health or the environment in the event that such materials are accidentally released.

1.8.4 HYDROLOGY/WATER QUALITY

Water issues in the Los Angeles Basin are complex and affect supply, demand, and quality of water for domestic, commercial, industrial, and agricultural use. Since 1900, extensive water development has been carried out in the Los Angeles Basin. The Refinery currently consumes approximately 10 million gallons of water per day.

The Chevron Refinery is located adjacent to the Santa Monica Bay on the Pacific Ocean. The Bay is recognized by the United States Environmental Protection Agency (U.S. EPA) and the State as a natural resource of national significance. Effluent Limitations and Performance Goals are established in Chevron's National Pollutant Discharge Elimination System (NPDES) Permit (No. CA0000337) for the protection of marine aquatic life and human health. Under its NPDES Permit, the Chevron Refinery is authorized to discharge up to 8.8 million gallons per day (gpd) of treated wastewater during dry weather and up to 23 million gpd during wet weather to the Santa Monica Bay, near Dockweiler State Beach in El Segundo.

Refinery wastewater is currently collected and treated in two separate drain and treatment systems: a segregated system and an unsegregated system. The unsegregated system is normally used for non-process wastewater, including cooling tower blowdown, steam condensate, a portion of the water pumped from groundwater recovery wells, and other wastewater streams containing free oil recovered with primary (physical) treatment only. The unsegregated system is also used to collect and treat stormwater.

The segregated system is normally used to treat process wastewater containing emulsified oil, organic chemicals, and a portion of the water pumped from groundwater recovery wells. This system consists of gravity separators, a dissolved air flotation (DAF) unit, and activated sludge units for secondary (biological) treatment. The biosolids from the biological treatment are disposed to the sanitary sewer for treatment by the Hyperion Treatment Plant under an Industrial Waste Discharge Permit.

Two auxiliary effluent diversion tanks are available for handling wastewater from either of the two systems and excess storm-water runoff. During severe rainstorms, excess runoff is collected and pumped into the diversion tanks, which have a holding capacity of about 13.8 million gallons. From the tanks, water can be routed to either system for treatment prior to discharge.

The wastewater is discharged through an outfall that is located approximately 3,500 feet offshore. Currently, the Refinery discharges approximately seven million gpd of treated wastewater during dry weather, and 21.5 million gpd during wet weather, both within the authorized discharge permitted. The Refinery is authorized to discharge up to 8.8 million gpd of treated wastewater during dry weather and up to 23 million gpd during wet weather.

1.8.5 NOISE

Land use in the vicinity of the Refinery is generally designated commercial and residential to the north; industrial, open, and public land to the east; residential to the south; and industrial to the west. The ambient noise environment in the project vicinity is composed of the contributions from equipment and operations within these commercial and industrial areas, and from the traffic on roadways along or near each of its property boundaries.

The nearest sensitive noise receptors south of the Refinery are residences located in the City of Manhattan Beach, approximately 200 to 400 feet south of the Refinery along Rosecrans Avenue. The nearest sensitive noise receptors north of the Refinery are commercial receptors along El Segundo Boulevard and residences along Lomita Avenue and Grand Avenue approximately one-eighth mile north of the Refinery.

Based on a recent noise survey performed on October 5 through October 9, 2007 to determine the existing ambient noise levels in the vicinity of the Refinery, the Community Noise Equivalent Level (CNEL) ranges between 63 A-weighted noise level measurement is decibels (dBA) and 69 dBA.

1.8.6 SOLID/HAZARDOUS WASTE

As of January 2006, the total remaining permitted Class III landfill capacity in Los Angeles County is about 104 million tons for non-hazardous solid waste. The Los Angeles County Department of Public Works (LACDPW) anticipates that landfill capacity in the county could be exceeded in approximately 10.8 years. The Los Angeles County Sanitation Districts (LACSD) is currently exploring out-of-county disposal options in addition to continuing negotiations to extend current operating permits, as well as implementing waste management plans of source reduction and recycling.

The total remaining permitted inert waste capacity in Los Angeles County is estimated at approximately 46 million tons. There are currently two waste-to-energy facilities (i.e., incinerators) in Los Angeles County with a combined permitted daily capacity of 1,800 tons (six-day week). It is expected that these two facilities will operate at their current permitted daily capacity until the equipment life of the waste-to-energy facilities (incinerators) is exhausted (LACDPW, 2007).

Two hazardous waste landfill facilities are located in California, Chemical Waste Management Inc. (CWMI) Kettleman Hills facility in King’s County, and the Clean Harbors (formerly Safety-Kleen) facility in Buttonwillow (Kern County). Kettleman Hills receives an average of 2,700 tons per day (tpd) and has an estimated two million cubic yard capacity. Buttonwillow receives approximately 960 tons of hazardous waste per day and has an approximate remaining capacity of approximately 8.8 million cubic yards. The expectant life of the Buttonwillow Landfill is approximately 40 years. Hazardous waste also can be transported to permitted facilities outside of California.

1.8.7 TRANSPORTATION AND TRAFFIC

The operating characteristics of an intersection are defined in terms of the Level of Service (LOS), which describes the quality of traffic flow based on variations in traffic volume and other variables such as the number of signal phases. Intersections rated at LOS A to C operate well. Level D typically is the level for which a metropolitan area street system is designed. Level E represents volumes at or near the capacity of the highway, which will result in possible stoppages of momentary duration and fairly unstable traffic flow. Level F occurs when a facility is overloaded and is characterized by stop-and-go (forced flow) traffic with stoppages of long duration.

Peak hour LOS analyses were developed for intersections in the vicinity of the Refinery. The LOS analysis indicates typical urban traffic conditions in the area surrounding the Refinery, with all intersections, except one, currently operating at Levels A to D during morning peak hours (7 am – 9 am). One intersection currently operates at LOS E during morning peak hours, Sepulveda/El Segundo Boulevard. The evening peak hour conditions (4 pm – 6 pm) show overloaded conditions (LOS F) at two intersections, operating near capacity (LOS E) at one intersection, operating at LOS C at one intersection, operating at LOS D at one intersection, and the remainder of the intersections currently operating at LOS A to B.

1.9 EXECUTIVE SUMMARY – CHAPTER 4: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Chapter 4 assesses the potential environmental impacts of the construction and operation of the Chevron Products Company El Segundo Refinery PRO Project. Chapter 4 evaluates those impacts that are considered potentially significant under the requirements of CEQA, as determined by the NOP/IS (see Appendix A). Specifically, an impact is considered significant under CEQA if it leads to a "substantial, or potentially substantial, adverse change in the environment." Table 1-1 (located at the end of this chapter) summarizes the impacts of the proposed project.

1.9.1 AIR QUALITY

1.9.1.1 Environmental Impacts

Project-specific adverse air quality impacts associated with increased emissions of air contaminants (both criteria air pollutants and TACs) during the construction and operation phases of the proposed project are discussed in Chapter 4, as well as impacts to sensitive receptors.

Construction activities vary for the different portions of the proposed project, but construction activities overlap for a number of portions of the project. Therefore, emission calculations evaluated in Chapter 4 were based on the schedule presented in Chapter 2. Peak construction emissions for all pollutants except particulate matter less than 10 microns in diameter (PM10) and particulate matter less than 2.5 microns in diameter (PM2.5) are expected to occur in January 2009, with peak PM10 and PM2.5 emissions expected to occur in August 2008. The construction emissions are expected to be significant for CO, volatile organic compounds (VOCs), NOx, PM10, and PM2.5 following mitigation. Construction emissions are expected to be less than significant for SOx.

The peak construction emissions were modeled to determine the potential impacts on ambient air quality. Based on the Industrial Source Complex – Short Term (ISCST3) model, the ground level concentrations of the criteria pollutants of concern will be below the significant change in air quality concentration. Therefore, no significant change in the local concentrations of criteria pollutants is expected.

Traffic impacts were analyzed to determine if significant traffic impacts could generate a significant increase in CO emissions. The intersection of Aviation Boulevard and El Segundo Boulevard has a potential to have significant traffic impacts during the construction phase. A CO Hotspots Analysis was completed to assess the impacts of the traffic on CO ambient air quality. Based on the analysis, it was determined that no significant change in the ambient CO air quality is expected as a result of the proposed project. Therefore, the proposed project is not expected to cause CO hotspots and no significant adverse impact on ambient air quality.

The proposed project operational emissions are also evaluated in Chapter 4. The primary sources of emissions are from new units including sulfur processing facilities, a Vapor Recovery and Safety Flare System, and from modifications to existing Refinery units. The operational impacts of the proposed project are expected to have significant VOC impacts. The proposed project is not expected to have significant impacts to CO, NOx, SOx, PM10, or PM2.5 during operation. VOC emissions will be offset for stationary sources, which will mitigate the VOC emissions to less than significant.

Based on the air quality modeling and related assumptions, the cancer risks to the Maximum Exposed Individual Worker (MEIW), the Maximum Exposed Individual Resident (MEIR) and the nearest sensitive receptor associated with the proposed project at the Refinery were calculated to be 0.22×10^{-6}, 0.33×10^{-6}, and 0.16×10^{-6} respectively, or less than one in a million. This result does not exceed the cancer risk significance threshold of 10 per million.

The highest acute hazard index for the proposed project is estimated to be 0.0307 for the central nervous system, while the highest chronic hazard index for the proposed project is estimated to be 0.0066 for the reproductive system. The acute and chronic hazard indices for the proposed project do not exceed the relevant significance threshold of 1.0, therefore, no significant adverse acute or chronic health impacts are expected.

1.9.1.2 Mitigation Measures

Mitigation measures will be imposed on the project to reduce emissions associated with construction activities from heavy construction equipment and worker travel. The appropriate mitigation measures are discussed in Chapter 4.

No mitigation measures are required for the operation phase of the project because all emissions were determined to be less than significant, except for VOC emissions that require offsets for stationary sources. Once offset, the VOC emissions will be less that significant. Operational VOC emissions from mobile source emissions (2.8 lbs/day) do not require offsets, and are less than significant so no further mitigation is required.

1.9.1.3 Level of Significance after Mitigation

Construction emissions for the proposed project for CO, VOCs, NOx, PM10, and PM2.5 are expected to remain significant following mitigation. The construction emissions associated with SOx are expected to remain less than significant following mitigation. Construction emissions are expected to be short-term and they will be eliminated following completion of the construction phase.

Localized significant impacts from construction activities were analyzed and determined that no significant change in local ambient air quality for nitrogen dioxide (NO_2), CO, or PM10 is expected for the proposed project. Therefore, the proposed project is not expected to cause a significant adverse impact on ambient air quality.

Traffic impacts were analyzed for potential impact to CO ambient air quality and determined that no significant change in the ambient CO air quality is expected as a result of the proposed project. Therefore, the proposed project is not expected to cause CO hotspots and no significant adverse impact on ambient air quality. Therefore, no mitigation would be required.

The operational impacts of the proposed project are expected to have significant VOC impacts. The proposed project is not expected to have significant impacts to CO, NOx, SOx, PM10, or PM2.5 during operation. VOC emissions will be offset, which will mitigate VOC emissions to less than significant.

The proposed project was analyzed for health impacts and determined to be less than significant. Therefore, the project is not expected to cause a potentially significant adverse impact on air quality.

1.9.2 ENERGY

1.9.2.1 Environmental Impacts

The proposed project includes new equipment that will require additional electricity. The proposed project also includes new cogen equipment that will produce additional electricity. The estimated increase in electricity demand from new equipment is about 29.9 MW. The proposed expansion to the existing multi-train Cogen Facility would increase the Refinery's electrical production by an additional 49.9 MW. The expansion of the Cogen Facility will allow the Refinery to produce all of the electricity required to operate the Refinery in the long-term, thus, reducing electricity purchases from SCE. Therefore, the project impacts on the electricity supply are considered to be beneficial.

1.9.2.2 Mitigation Measures

No significant impacts associated with energy resources are expected from the proposed project during construction or operational phases, so no mitigation measures are required.

1.9.2.3 Level of Significance after Mitigation

The proposed project is expected to generate sufficient electricity so that no significant energy impacts are expected.

1.9.3 HAZARDS AND HAZARDOUS MATERIALS

1.9.3.1 Environmental Impacts

The potential hazards (fires, explosion overpressure, thermal radiation, or release of H_2S) from the new or modified units associated with the proposed project and the results of the modeling for these hazards are discussed in Chapter 4. The hazards analysis can be found in Appendix D. For each potential release, the distance to the significance threshold level was determined before and after the proposed project modifications (where applicable). None of the existing or modified units have the ability to create a hazard that could extend further off-site. Therefore, the potential hazard impacts associated with the proposed project are considered to be less than significant because significance thresholds would not be exceeded. Operation of the proposed project will not involve the use of flammable substances or hazardous materials that are not currently used at the Refinery nor will it involve the use of flammable substances in locations where they are not currently used.

1.9.3.2 Mitigation Measures

No significant hazard or hazardous materials impacts are expected from the proposed project, so no mitigation measures are required.

1.9.3.3 Level of Significance Following Mitigation

The proposed project impacts on hazards and hazardous materials are expected to be less than significant.

1.9.4 HYDROLOGY/WATER QUALITY

1.9.4.1 Environmental Impacts

Regarding water supply, the proposed project is expected to require about 400 gpm (about 576,000 gpd) of water for cooling purposes and about 120 gpm (about 172,800 gpd) of boiler feed water. Therefore, the proposed project will increase the water demand at the Refinery by about 520 gpm or about 748,800 gpd. The increase in water demand is expected to be met by existing sources of water supplied by WBMWD.

The proposed PRO Project includes modifications to the WBMWD utilities to allow the increased production of recycled water that will be used for cooling tower purposes and boiler feed water. All of the increased water use associated with the proposed project (about 748,800 gpd) will be reclaimed water supplied by the WBMWD. Therefore, the proposed project will not result in an increase in the use of potable water, but will only result in an increase in the use of recycled water.

With respect to wastewater, the Refinery currently discharges approximately seven million gpd of treated wastewater to the Santa Monica Bay. It is expected that the proposed project will increase the wastewater discharge by about 223,200 gpd. The wastewater treatment system at the Refinery has sufficient capacity to treat the incremental increase in wastewater produced from the proposed project. Therefore, the proposed project is not expected to change the quality of wastewater produced by the Refinery.

Under its NPDES Permit, the Chevron Refinery is authorized to discharge up to 8.8 million gpd of treated wastewater during dry weather, and up to 23 million gpd during wet weather to the Santa Monica Bay, near Dockweiler State Beach in El Segundo. Following project completion, the total volume of wastewater generated would be about 7,223,200 gpd, which is within the capacity of the existing permit.

1.9.4.2 Mitigation Measures

No significant impacts associated with water demand and wastewater discharge are expected from the proposed project, so no mitigation measures are required.

1.9.4.3 Level of Significance after Mitigation

The proposed project impacts on hydrology and water quality are expected to be less than significant.

1.9.5 NOISE

1.9.5.1 Environmental Impacts

The highest noise impacts from construction activities will be during installation of new and modified process units. Noise sources for the proposed project include heavy construction equipment which will be a source of noise over the approximately two and a half year construction period. The estimated noise level during installation of new and modified process units at the Refinery is expected to average about 85 decibels (dBA) at 50 feet from the center of construction activity for each unit.

The noise levels from the construction equipment at the Refinery are expected to be within the allowable levels established by the City of El Segundo noise ordinance, and increases during construction activities are not expected to exceed 1.2 dBA. The noise levels during the construction phase are generally expected to be similar to current noise levels and no significant (audible) increase in noise levels is expected.

The proposed project will also add equipment to the existing Refinery resulting in additional noise sources from operational activities. Additional noise sources associated with the proposed project generally include process equipment components such as valves, flanges, ejectors, heat exchangers, vents, pumps, and compressors. Noise impacts associated with the proposed project were evaluated using noise modeling (see Appendix E). Noise generated by project equipment would increase the overall noise levels at the Refinery by a maximum of about 1.3 dBA (when compared to baseline conditions), which is below the significant impact level of an increase of three decibels. The noise levels in the area following completion of the proposed project are expected to be about the same as the current levels.

1.9.5.2 Mitigation Measures

No significant impacts associated with noise are expected from the proposed project during construction or operational phases, so no mitigation measures are required.

1.9.5.3 Level of Significance Following Mitigation

The proposed project is expected to be less than significant, so no significant impacts on noise are expected.

1.9.6 SOLID/HAZARDOUS WASTE

1.9.6.1 Environmental Impacts

Due to construction activities associated with the proposed project, an increase is expected in the generation of non-hazardous wastes resulting from demolition of existing structures, grading to provide foundations for new structures, and the installation new structures. Approximately 1,075 tons of municipal (non-hazardous) solid waste would be generated from the proposed project. The landfills in Los Angeles County have the capacity to accept the waste produced during the construction phase of the proposed project on a one-time basis.

Construction of the proposed project is also anticipated to generate approximately 1,200 tons of hazardous waste. Additionally, Chevron estimates that a total of approximately 5,900 tons of contaminated soil may be excavated during construction of the proposed project. There is adequate capacity at the two Class I landfills in California approved to accept hazardous waste.

The operation of the proposed project is expected to require increased amounts of catalyst and generate increased amounts of catalyst waste. As with the current procedures at the Refinery, the additional amounts of recovered catalyst will be transported for recycling offsite, so no increase in waste disposal of catalyst is expected.

1.9.6.2 Mitigation Measures

No significant impacts associated with solid and hazardous waste are expected from the proposed project during construction or operational phases, so no mitigation measures are required.

1.9.6.3 Level of Significance after Mitigation

The impacts of the proposed project on solid/hazardous waste facilities are expected to be less than significant.

1.9.7 TRAFFIC AND TRANSPORTATION

1.9.7.1 Environmental Impacts

Construction of the proposed project will generate additional traffic from construction personnel commuting to and from the site, as well as the transportation of construction materials and equipment to the Refinery. Because the daytime construction shift starts at 6:30 a.m., worker traffic attributable to project construction will not affect the morning peak hour (7:00 am to 9:00 am). The evening peak period is 4:00 p.m. to 6:00 p.m.; therefore, construction related traffic will be leaving and arriving during the evening peak hour and potentially impacting traffic during the evening peak hour.

The construction phase of the proposed project could result in potentially significant traffic impacts at one intersection (Aviation Boulevard and El Segundo Boulevard). In addition, traffic impacts are also potentially significant for the southbound lanes of the San Diego Freeway (I-405) between Rosecrans Avenue and El Segundo Boulevard and the northbound lanes of I-405 between El Segundo Boulevard and Alen M. Anderson Freeway (I-105) interchange. Sufficient parking for the peak estimate of 900 workers is not available at the Chevron Refinery. Therefore off-site parking areas will be used and workers will be transported to and from the Refinery.

Operational impacts from the proposed project are expected to require 12 additional permanent workers at the Refinery, generating 24 additional trips per day. The proposed project will result in increases in truck trips to provide supplies and materials, as well as to deliver products and wastes. The proposed project is also expected to reduce the production and sales of anhydrous ammonia from the Refinery, thus reducing overall truck trips from the Refinery by about two per day.

1.9.7.2 Mitigation Measures

Because of the temporary nature of the construction traffic, feasible mitigation measures are limited. Chevron is using off-site parking structures and transporting workers to the Refinery during peak construction activities to minimize traffic impacts at intersections adjacent to the Refinery. In addition, the construction work shift is scheduled to begin at 6:30 am so that traffic impacts during the morning peak hour will be avoided. Chevron will encourage ridesharing to reduce single occupancy vehicle trips and encourage ridesharing and transit use. Preferential parking for rideshare vehicles will be provided for construction workers. The traffic analysis assumes that no ridesharing will occur and provides a worst-case estimate of project impacts. However, ridesharing during construction activities is common and will help decrease traffic impacts. The amount of ridesharing that will occur cannot be predicted so traffic impacts are assumed to remain significant.

1.9.7.3 Level of Significance after Mitigation

Mitigation measures have been included as part of the proposed project that are expected to reduce traffic impacts during the construction phase. However, construction traffic impacts are expected to remain significant. The construction traffic impacts will cease following completion of the construction phase. The operational impacts of the project on transportation/traffic are less than significant.

1.10 EXECUTIVE SUMMARY – CHAPTER 5: SUMMARY OF CUMULATIVE IMPACTS

CEQA Guideline §15130(a) requires an EIR to discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in §15065(a)(3). There are a number of projects proposed for development in the vicinity of the Refinery, which may contribute cumulative impacts to those generated by the proposed PRO Project. The discussion in Chapter 5 lists projects which are reasonably expected to proceed in the foreseeable future, i.e., project information has been submitted to a public agency.

1.10.1 AIR QUALITY

1.10.1.1 Environmental Impacts

Construction Impacts: Construction activities for some of the projects described in Chapter 5 have the potential to overlap with the proposed Chevron project and result in short-term significant impacts on air quality. On a cumulative basis, construction emissions would exceed SCAQMD CEQA thresholds for CO, VOC, NOx, PM10, and PM2.5. Therefore, the air quality impacts associated with construction activities are considered significant. Mitigation measures to reduce air emissions associated with cumulative construction activities are necessary primarily to control emissions from heavy construction equipment and worker travel.

Operational Impacts: During operation, some of the projects are expected to reduce overall air pollutant emissions. However, there are localized increases for certain air pollutants. Direct stationary emission sources are generally subject to regulation. The operation of the Chevron project will not exceed the SCAQMD thresholds, after mitigation, so no significant, project-specific air quality impacts are expected from the proposed project.

However, cumulative air quality impacts are expected to exceed the SCAQMD mass emission thresholds for CO, VOC, NOx, SOx, and PM10. Therefore, the cumulative air quality impacts for CO, VOC, NOx, SOx, and PM10 are expected to be significant.

Toxic Air Contaminants: The proposed project impacts on health effects associated with exposure to TACs is expected to be below the CEQA significance thresholds and, therefore, less than significant. Therefore, the proposed project impacts are not expected to contribute to cumulative impacts and are not considered to be cumulatively considerable. The impacts from TACs are localized impacts. The only other major industrial project in the area is the El Segundo Power Plant Redevelopment Project. The potential overlap of the El Segundo Power Plant and the Chevron PRO Project would be well below the significance criteria of 10 per million for carcinogenic risk and 1.0 for the acute and chronic hazard indices. Cumulative impacts of TACs on health are expected to be less than significant.

Green House Gases: Global climate change refers to changes in average climatic conditions on earth as a whole, including temperature, wind patterns, precipitation and storms. Global warming, a related concept, is the observed increase in average temperature of the earth's surface and atmosphere. One identified cause of global warming is an increase of greenhouse gases (GHGs) in the atmosphere. Some studies indicate that the potential effects of global climate change may include rising surface temperatures, loss in snow pack, sea level rise, more extreme heat days per year, and more drought years. Events and activities, such as the industrial revolution and the increased consumption of fossil fuels (e.g., gasoline, diesel, coal, etc.), have heavily contributed to the increase in atmospheric levels of GHGs. As reported by the California Energy Commission (CEC), California contributes 1.4 percent of the global and 6.2 percent of the national GHGs emissions.

In response to growing scientific and political concern regarding global climate change, California has recently adopted a series of laws to reduce both the level of GHGs in the atmosphere and to reduce emissions of GHGs from commercial and private activities within the State.

Chevron has reported its GHG emissions to the California Climate Action Registry for the years 2004-2006, which were approximately 13.1 million metric tons per year for all sources in California. The total statewide net GHG emissions in 2004 were approximately 480 million metric tons per year for carbon dioxide (CO_2) equivalent (CO_2e) emissions. Global emissions of GHGs in 1990 were estimated by the Intergovernmental Powers on Climate Change to be 32,100 million metric tons for CO_2e emissions. The two-year average GHG emissions from the Chevron El Segundo Refinery for 2005-2006 were calculated to be 3.588 million metric tons. The major source of emissions is combustion of fuel in heaters and boilers.

The new and modified equipment built as part of the Chevron PRO Project has been evaluated for all GHG emission sources, including both energy supplied via purchased conventional power generation and with energy supplied by the installation of more energy efficient cogeneration power (combined power and steam generation). The PRO Project as proposed is estimated to result in an increase of 0.194 million metric tons/year of GHGs with GHG emission increases generated from Cogen Train D, the tail gas treating unit, and the pilots on the new flare.

Chevron evaluated the electrical needs of the PRO Project and determined that the proposed project would require about 29.9 MW of electricity plus additional steam to operate the proposed new and modified units. The business-as-usual approach would be to purchase the additional electricity from the local provider (SCE). If the Refinery were to continue to rely on SCE for electricity, a new 330 mmBtu/hr boiler would be required to generate additional steam needed for the PRO Project and other Refinery activities. The GHG emissions that would be generated under the business-as-usual approach are estimated to be about 0.281 million metric tons per year.

Instead of business-as-usual, Chevron is proposing to install a new 49.9 MW cogeneration unit to supply the additional electricity and steam, and to reduce the amount of electricity purchased from the local provider. The steam required by the proposed project and other refinery activities can be generated by the Cogen Train D so that no new boiler is required. Although the operation of the new Cogen Train D will result in an increase in GHG emissions at the Refinery, the new Cogen Train D will eliminate the purchase of electricity from less energy efficient sources It is estimated that the PRO Project with the Cogen Train D would generate about 0.089 million metric tons/yr (0.281 – 0.192) less GHG emissions than the PRO Project with a new boiler plus SCE supplied power, i.e, business-as-usual.

The major contributor of greenhouse gases in the PRO Project, the new Cogen Train D, is, in itself, one of the preeminent technologies for minimizing GHG emissions. Cogeneration is far more efficient (in both energy and GHG emissions), than separate generation of electricity and steam. Installing Cogen Train D as part of the PRO Project is consistent with the California Air Pollution Control Officer's Association's (CAPCOA's) Green List of Projects and, thus, the goals of AB32.

The California Public Utility Commission (CPUC) and CEC have established emissions performance standards for the generation of electricity. In order to evaluate compliance with the standard, the thermal output of Cogen Train D was calculated and compared to the emissions performance standard. The efficiency of the Cogen Train D is estimated to be 591 lbs of CO_2e per MW-hr which is well below the emissions performance standard of 1,100 pounds of CO_2 per MW-hr. Therefore, the proposed Cogen Train D will be more energy efficient than required by CPUC and CEC standards, generating lower CO_2 emissions per MW-hr than required by CPUC and CEC standards.

For comparison purposes and consistency with the goals of AB32, the GHG emissions from the Chevron El Segundo Refinery have also been evaluated for the 1990 operating conditions using historical operating data. The 1990 GHG emissions for the Refinery are estimated to be about 3.9 million metric tons of GHGs per year as compared to the 2010 GHG emission estimates of 3.588 million metric tons. In the years since 1990, the Refinery has implemented a number of projects to improve energy efficiency (thereby reducing GHG emissions) and, in one case, to directly reduce CO_2 emissions from the Steam Naphtha Reformer. GHG emissions from the Refinery will be less than the Refinery 1990 baseline - outpacing AB32's goal of reducing to 1990 emission levels by 2020. Through the use of a highly energy efficient cogeneration system, the PRO Project exhibits a highly favorable level of carbon intensity compared to traditional technologies.

In spite of all the past projects undertaken by Chevron and a proactive approach to reducing GHG emissions from the proposed project through the installation of a cogeneration unit, rather than taking a business-as-usual approach (i.e., installing a new boiler and increasing demand for electricity from SCE), the cumulative increase in GHG emissions from the proposed project of 0.194 million metric tons per year is concluded to be significant. Given the position of the legislature on AB32, which states that global warming poses serious threats to the environment, and the requirements of CEQA for the lead agency to determine whether a project will have a significant impact, the overall effect of 0.194 million metric tons per year of GHG emissions is considered cumulatively considerable. Thus, the cumulative greenhouse gas impacts from the proposed project are considered significant. This determination is based on the lack of clear scientific or other criteria for determining the level of significance of the project's contribution to global warming and adverse changes in climate conditions.

To offset GHG emissions from the PRO Project with the new Cogen Train D at the Refinery, Chevron shall offset the GHG emissions resulting from the proposed PRO Project through the purchase of CO_2 emission reduction credits. Chevron will make a contribution to the SoCal Climate Solutions Exchange of $1,500,000 to produce verifiable and quantifiable permanent GHG emission reductions under District SoCal Climate Solutions Exchange and thus offset the net increase in the PRO Project GHG emissions (see Section 5.2.4.4 for further details on the GHG mitigation measures). Through implementation of these mitigation measures, the cumulative impacts of GHG emissions associated with the proposed PRO Project would be less than significant.

1.10.1.2 Mitigation Measures

For the construction period, the mitigation measures developed as part of the proposed Chevron project will be imposed on other related projects, if the SCAQMD is the lead agency and project-specific impacts are concluded to be significant. The mitigation measures to minimize emissions associated with operation of stationary sources of the related projects include the use of BACT for all new emission sources and modifications to existing sources. BACT would be required for stationary sources regardless of whether the SCAQMD is the lead agency or is a responsible agency. The use of BACT would control localized emissions. A BACT review will be completed during the SCAQMD permit approval process for all new/modified sources.

1.10.1.3 Level of Significance Following Mitigation

The cumulative adverse air quality impacts due to construction activities are expected to exceed the SCAQMD significance thresholds for all criteria pollutants except SOx and are considered to be cumulatively considerable, even after mitigation. The cumulative air quality impacts due to operational activities are expected to exceed the SCAQMD significance thresholds for all pollutants and are considered to be cumulatively considerable. The project-specific TAC health impacts would not be significant, and are not considered to be cumulatively considerable. GHG emission impacts are expected to be less than significant after mitigation, through the use of GHG emission offsets.

1.10.2 ENERGY

The project's contribution to energy impacts is not cumulative considerable and, thus, not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.10.2.1 Environmental Impacts from Construction and Operations

The Chevron PRO Project and other projects will consume additional electricity. The new office and commercial buildings are expected to consume additional electricity, while other projects at the Chevron Refinery (e.g., new Chevron administration building, No. 2 Cutpoint Project, LPG Rack Segregation, new jet tank and remodeling of the purchasing building) are not expected to require additional electricity. The PRO Project and the El Segundo Power Plant project will produce additional electricity, 49.9 MW and 280 MW, respectively. As a result, the cumulative projects are not expected to result in significant increases in electrical demand and will produce electricity. No significant cumulative energy impacts are expected.

1.10.2.2 Mitigation Measures

New development will be required to comply with Uniform Building Code requirements which establish energy conservation standards for new construction. These standards are related to insulation requirements, glazing, lighting, shading, window requirements, and water and space heating systems. Implementation of the energy conservation requirements is expected to minimize cumulative energy impacts.

1.10.2.3 Level of Significance After Mitigation

The impacts of the various projects on energy are not expected to be cumulatively considerable, as some of the projects will generate additional electricity, which will compensate for demand.

1.10.3 HAZARDS/HAZARDOUS MATERIALS

The project's contribution to hazards and hazardous materials impacts is not cumulative considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.10.3.1 Environmental Impacts from Construction and Operations

Although other industrial facilities exist in the general vicinity of the Refinery, the cumulative impacts, from and between the onsite operation of the other industrial projects, are not expected to be significant because it is extremely unlikely that upset conditions would occur at more than one facility at a time. Further, hazard impacts at industrial facilities are not expected to overlap because of the distance between facilities. It also is extremely unlikely that an upset condition at one facility would create an upset at another nearby industrial facility because of the distance between facilities. The new project-related explosion or fire hazard impacts associated with the proposed project are expected to stay within the confines of the existing Refinery or travel no further than existing hazards. Therefore, explosion or fire hazards are not expected to reach or overlap with hazard impacts from other industrial projects, so hazard impacts are not expected to be cumulatively considerable.

1.10.3.2 Mitigation Measures

The proposed project impacts on hazards are considered to be less than significant. A number of existing rules and regulations apply to the Refinery and other industrial facilities that handle, transport or store hazardous materials. Compliance with these rules and regulations is expected to minimize industry-related hazards. Compliance with these rules and regulations should also minimize the hazards at other industrial facilities. Site-specific mitigation measures for hazards may be required for other projects.

1.10.3.3 Level of Significance After Mitigation

The impacts of the various projects on hazards are not expected to be cumulatively considerable as hazards at or within one project area are not expected to impact or lead to hazards at other facilities.

1.10.4 HYDROLOGY/WATER QUALITY

The PRO Project's contribution to hydrology/water quality impacts is not cumulative considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.10.4.1 Environmental Impacts from Construction and Operations

Water Supply/Demand: The Chevron PRO Project includes modifications to allow the increase production and use of recycled water that will be used for cooling tower purposes and boiler feed water. All of the increased water use associated with the proposed project (about 748,800 one million gallons per day) will be reclaimed water.

In addition to the proposed Chevron project, the El Segundo Power Plant is expected to require about 207,000 gpd of additional water. Water demand impacts from the power plant are expected to be mitigated by the use of recycled water for some purposes. The other related projects are limited to office buildings, commercial buildings, and some residential buildings, which are not expected to be major users of water. The cumulative increase in water use is expected to be less than the SCAQMD's significance threshold of five million gpd. Therefore, the proposed project and the cumulative projects are not expected to produce significant adverse cumulative impacts to water demand.

Wastewater: The proposed project is anticipated to increase wastewater discharge from the Chevron Refinery by about 223,200 gpd. Wastewater generated by Chevron is treated on-site prior to discharge. No significant impacts associated with wastewater discharge is expected from the Chevron PRO Project.

The total sewage generated by the other cumulative projects in the El Segundo area is estimated to be about one million gpd (see Table 5-10) and most of these facilities are expected to discharge to the LACSD sewage system which is treated by the Joint Water Pollution Control Plant (JWPCP). The JWPCP has a design capacity of about 385 million gpd and currently process an average flow of 323 million gpd. Therefore, JWPCP has sufficient sewage treatment capacity to accommodate the sewage from the cumulative projects. Therefore, impacts to sewage service would not be cumulatively considerable.

1.10.4.2 Mitigation Measures

The proposed project impacts on hydrology/water quality were less than significant. Since no cumulative impacts were identified, no mitigation measures are required.

1.10.4.3 Level of Significance After Mitigation

The cumulative impacts on hydrology/water quality are considered to be less than significant.

1.10.5 NOISE

The Chevron PRO Project's contribution to noise impacts is not cumulative considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.10.5.1 Environmental Impacts from Construction

Construction phases of each of the related projects are expected to generate localized, short-term noise impacts, some of which may be significant during construction. Construction activities associated with the industrial projects are located in industrial areas where limited sensitive receptors are located. The use of muffling devices, restriction of most construction work hours to daytime hours, etc., are expected to mitigate the increase in noise at most of the construction sites.

The cumulative construction impacts associated with the related industrial projects are not expected to be significant or exceed noise ordinances. The Refinery and other industrial projects are generally a sufficient distance apart that the noise levels are not expected to overlap. Some of the commercial/office buildings on-site are located close to residential and other sensitive receptors and may create noise impacts in residential areas. Construction activities are expected to be limited to daytime hours, which reduce the potential for impacts on sensitive receptors.

1.10.5.2 Environmental Impacts from Operations

The operational noise impacts of the industrial projects are not expected to be significant. The noise impacts at the Chevron Refinery are not expected to result in a noticeable change to the surrounding community. The mitigated operational noise at the southern boundary of the El Segundo Power Plant project is predicted to be no greater than 52 dBA. This noise level is less than the SCAQMD’s significance threshold of 90 dBA at the property boundary. Therefore, the noise due to the new generators is not expected to have a significant noise effect and the noise would not overlap with other existing or new noise sources at the Chevron Refinery. In addition, existing traffic noise levels are significant in the Vista Del Mar Boulevard corridor which runs between the power plant and the Refinery, generating a large portion of the community noise levels.

Most of the noise associated with other cumulative projects (e.g., commercial and office buildings) is expected to be primarily associated with traffic. Sufficient distance separates the Refinery from most of the other projects, thus, it is unlikely that noise impacts will overlap.

1.10.5.3 Mitigation Measures

Since noise impacts from the Refinery proposed project are not considered to be cumulatively considerable, they do not contribute to significant adverse cumulative worse impacts. As a result, no mitigation measures are required.

1.10.5.4 Level of Significance After Mitigation

The noise impacts associated with the cumulative projects are not expected to be significant or contribute to significant adverse cumulative noise impacts during construction or operation.

1.10.6 SOLID/HAZARDOUS WASTE

The Chevron PRO Project's contribution to solid and hazardous waste impacts is not cumulative considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.10.6.1 Environmental Impacts from Construction and Operations

Hazardous Waste: The Chevron Refinery and El Segundo Power Plant projects are the main industrial developments in the area that have the potential to generate hazardous waste either through remediation activities or through the discovery of contaminated soils. The total amount of hazardous waste generated by contaminated soil is uncertain but maximum estimates are about 6,975 tons will be generated at the Chevron site and about 4,000 tons at the El Segundo Power Plant. The impacts would be considered adverse but not significant since the existing hazardous waste facilities likely have sufficient capacity to handle the one-time deposition of hazardous wastes that would likely be generated, e.g., contaminated soils. However, the additional waste streams may impact the dwindling capacity of certain landfills. Together, the landfills in California have 10.8 million cubic yards permitted capacity, which will accommodate the waste generated by the proposed project during the construction phase. In addition, other hazardous waste facilities are located out-of-state. Therefore, the cumulative impact of the generation hazardous waste is not considered a significant impact.

Most of the hazardous waste generated during the operational phase of the industrial projects include used oil and spent catalysts, which are expected to be recycled for their economic value. The office, commercial, and residential projects are not expected to generate substantial quantities of hazardous waste. Therefore, no significant cumulative impacts on hazardous waste facilities are expected.

Solid Waste: Non-hazardous solid wastes are usually generated in offices, commercial buildings, and residential units. The estimates of solid waste generated by cumulative projects are about one million tons per year. Because the proposed project's contribution to solid and hazardous waste impacts is not cumulatively considerable, the cumulative impacts on solid/hazardous waste are not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.10.6.2 Mitigation Measures

No mitigation measures are required for the Chevron PRO Project because the impacts are less than significant. Chevron will continue to implement a source reduction and recycling program to minimize solid wastes generated at the Refinery. New development must comply with all applicable city, county, and state requirements regulating solid waste disposal. Cumulative impact mitigation is the responsibility of local regional and state agencies and feasible mitigation measures are expected to be limited to source reduction and recycling measures.

1.10.6.3 Level of Significance After Mitigation

Individual project impacts on hazardous and solid waste from the Chevron PRO Project are less than significant and, therefore, not cumulatively considerable. Cumulative impacts on hazardous waste landfill facilities are expected to be less than significant because the industrial projects are expected to generate hazardous waste that can be recycled. Because the proposed project's contribution to solid and hazardous waste impacts is not cumulatively considerable, the cumulative impacts on solid/hazardous waste are not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.10.7 TRANSPORTATION/TRAFFIC

The potential significant adverse traffic impacts are expected to occur during the construction phase due to the temporary increase in construction workers at the Refinery. Following completion of construction, the increase in permanent workers is expected to be about 12 employees; therefore, the proposed project impacts on traffic during the operational phase are less than significant. Therefore the project's contribution to transportation and traffic impacts during project operation is not cumulative considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.10.7.1 Environmental Impacts from Construction

Traffic impacts associated with the construction of the Chevron proposed project are expected to be potentially significant during the evening peak hour at one intersection, Aviation Boulevard/El Segundo Boulevard and on portions of the I-105 and I-405 Freeways. Therefore, the proposed project may have cumulative traffic impacts with other projects in the area. The proposed project's contribution to cumulative impacts on traffic during the construction phase would be considered cumulatively considerable.

There could be cumulative construction traffic impacts associated with other industrial construction projects in the area that do not avoid peak traffic hours. However, the Chevron PRO Project is expected to provide the major portion of the traffic related to construction activities so cumulative construction impacts on traffic from these projects are considered significant.

1.10.7.2 Environmental Impacts from Operations

The cumulative traffic analysis for operations assumed that the ambient traffic growth rate in the city is 0.50 percent per year from year 2008 to year 2020 and no changes in existing intersection geometrics. On a cumulative basis, general growth in the area may result in significant traffic impacts at the intersections of: (1) Sepulveda Boulevard

(SR1) and El Segundo Boulevard; (2) Sepulveda (SR1) Boulevard and Rosecrans Avenue; (3) Aviation Boulevard and El Segundo Boulevard; and (4) Aviation Boulevard and Rosecrans Avenue.

The increase in traffic is unrelated to the proposed project but is related to general population growth in the area so mitigation measures will need to be developed as new projects that generate traffic are proposed and as part of the City of El Segundo's and Manhattan Beach's General Plan process.

1.10.7.3 Mitigation Measures

Chevron will encourage ride-sharing by construction workers to minimize construction impacts. In addition, different parking areas will be used with construction workers being bussed onto the Refinery so that traffic impacts will be spread throughout the area.

1.10.7.4 Level of Significance After Mitigation

The proposed project is expected to result in significant traffic impacts during the construction phase. However, the construction activities are expected to cease following completion of the proposed project so no long term significant traffic impacts are expected. Because the proposed project's contribution to transportation and traffic impacts during operation is not cumulatively considerable, the cumulative impacts on transportation and traffic are not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

1.11 EXECUTIVE SUMMARY – CHAPTER 6: SUMMARY OF ALTERNATIVES

This EIR identifies and compares the relative merits of a range of reasonable alternatives to the proposed project as required by the CEQA guidelines. According to the CEQA Guidelines, alternatives should include realistic measures to attain the basic objectives of the proposed project and provide a means for evaluating the comparative merits of each alternative. In addition, though the range of alternatives must be sufficient to permit a reasoned choice, they need not include every conceivable project alternative (CEQA Guidelines, §15126.6(a)). The key issue is whether the selection and discussion of alternatives fosters informed decision making and public participation.

1.11.1 Description of Alternatives

Alternatives to the proposed project included Alternative 1 - No Project Alternative; Alternative 2 – No Additional Sulfur Recovery Facilities; Alternative 3 – Eliminate Vapor Recovery and Safety Flare System; Alternative 4 - Eliminate FCCU and Alkylation Unit Modifications; and Alternative 5 - Purchase Additional Electricity.

CEQA Guidelines §15126.6 (e) requires evaluation of a "No Project Alternative" which is Alternative 1 in Chapter 6. Under the "No Project Alternative," no Refinery modifications would occur. The proposed modifications to the No. 2 Crude Unit, No. 2 RSU, Minalk/Merox Unit, FCCU, Alkylation Unit, VRDS, ISOMAX Unit, Cogen Train D, Railcar Loading/Unloading Rack, and utility improvements would not occur. In addition, the proposed new SRU, SWS, TGU, vapor recovery and safety flare system, storage tanks, cooling tower, and hydrogen compression and transfer facilities would not be built and the Refinery would continue to operate under its current configuration.

Under Alternative 2, the Sulfur Recovery facilities, including the SWS, SRU, and TGU, would not be constructed. All other portions of the proposed project would still be constructed including the proposed modifications to the No. 2 Crude Unit, No. 2 RSU, Minalk/Merox Unit, FCCU, Alkylation Unit, VRDS, ISOMAX Unit, Cogen Train D, Railcar Loading/Unloading Rack, and utility improvements. In addition, the proposed vapor recovery and safety flare system, storage tanks, cooling tower, and hydrogen compression and transfer facilities would be built.

Under Alternative 3, the project as described in Chapter 2 would be constructed with the exception of the Vapor Recovery and Safety Flare System. This is a voluntary Refinery modification that is proposed to eliminate the potential for venting of PRDs to the atmosphere, thus minimizing VOC emissions at the Refinery.

Under Alternative 4, the modifications to the FCCU and Alkylation Unit would not occur and the related increase in the recovery of additional LPG from the fuel gas system will not occur. All other portions of the proposed project would still occur.

Under Alternative 5, the new Cogen Unit would not be constructed meaning the required additional electricity demand would be supplied by the local utility company. Under Alternative 5, a new auxiliary boiler or an increase in fired heat duty of an existing boiler would be required to supply the necessary stream demand of the proposed new and modified units. All other portions of the project would still occur.

1.11.2 Environmental Impacts of Alternatives

Based on the analyses in Chapter 6, no feasible alternatives were identified that would reduce or eliminate the potentially significant air quality or traffic impacts during construction activities related to the proposed project and achieve the objectives of the proposed project.

The No Project Alternative (Alternative 1) would prevent Chevron from achieving all of the project objectives. However, the No Project Alternative would eliminate the potentially significant impacts related to air quality and traffic impacts during construction activities, making it an environmentally superior alternative .

Alternative 2 would result in significant impacts to air quality and traffic during construction, but would reduce the emissions and related traffic since the Sulfur

Recovery facilities would not be built. Therefore, in addition to the No Project Alternative, Alternative 2 would be considered the environmentally superior alternative as it would reduce project environmental impacts as compared to the proposed project, but would not reduce potentially significant impacts to less than significant. However, Alternative 2 would not allow the Refinery to meet all the project objectives of: (1) producing low-sulfur fuel products and increase production of commercial grade elemental sulfur; and (2) allowing the Refinery to efficiently and reliably process a wider range of crude oils, including higher sulfur-containing crude oils.

Alternative 3 and 4 would have similar impacts on air quality, energy, hazards/hazardous materials, noise and traffic, as the proposed project. Alternatives 3 and 4 would result in significant impacts to air quality and traffic during construction, but would reduce the construction and operational emissions and related traffic since fewer units would be built. Alternative 3 would not allow the Refinery to control the potential atmospheric releases and related emissions from PRDs in specified units. Alternative 4 would not include the energy efficiency modifications proposed for the FCCU and Alkylation Unit. Alternatives 3 and 4 would reduce project construction-related air quality and traffic impacts, but would not reduce potentially significant impacts to less than significant.

Alternative 5 would reduce project construction-related air quality and traffic impacts, but would not reduce potentially significant impacts to less than significant. Alternative 5 could result in significant impacts on energy because the Cogen Train D would not be constructed. Greenhouse gas emissions would be greater under Alternative 5. Therefore, the proposed project is preferred because it would attain all project objectives.

1.12 EXECUTIVE SUMMARY – CHAPTER 7 AND 8: REFERENCES, ACRONYMS AND GLOSSARY

Information on references cited (including organizations and persons consulted) and the acronyms and glossary are presented in Chapters 7 and 8, respectively.

TABLE 1-1

Summary of Environmental Impacts, Mitigation Measures and Residual Impacts

IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
Air Quality		
The construction emissions for CO, VOC, NOx, PM10, and PM2.5 will exceed the SCAQMD CEQA significance thresholds are significant.	Develop a Construction Emission Management Plan for the proposed project; prohibiting truck idling in excess of five minutes, use electricity or alternate fuels for on-site equipment, where feasible, maintain construction equipment tuned up, use electric welders and electric generators where electricity is available; retrofit cranes of 200 hp or greater with diesel particulate filters; suspend construction activities during first stage smog alerts; develop a fugitive dust emission control plan.	Construction emissions are expected to remain significant for CO, VOC, NOx, PM10 and PM2.5.
The construction emissions of SOx will not exceed SCAQMD CEQA significant thresholds and are less than significant.	None required.	Construction emissions are expected to be less than significant for SOx.
Construction impacts for NO_2, CO, PM10 and PM2.5 would not exceed applicable local significance thresholds.	None required.	Concentrations of NO_2, CO, PM10 and PM2.5 are less than significant.
Traffic impacts from the proposed project are not expected to cause CO hotspots and no significant adverse impact on ambient air quality is expected.	None required.	Concentration of CO from traffic is less than significant.
Operational emissions of CO, NOx, SOx, PM10 and PM2.5 are less than significant.	None required. Project emissions are controlled through use of BACT.	Mass daily emissions of CO, NOx, SOx, PM10 and PM2.5 from stationary and fugitive sources are expected to be less than significant.
Operational emissions of criteria pollutants are significant for VOC.	VOC emissions from stationary sources will be offset.	The VOC offsets will reduce the proposed project to less than significant.

TABLE 1-1 (continued)

Summary of Environmental Impacts, Mitigation Measures and Residual Impacts

IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
Air Quality (continued)		
Ambient air quality modeling indicates that the project emissions on NO_2, CO, PM10, and PM2.5 will be below ambient air quality standards and are less than significant.	None required.	Project emissions of NO_2, CO, PM10, and PM2.5 will be below ambient air quality standards and are less than significant.
The cancer risk due to the operation of the proposed project is expected to be less than the significance criterion of 10 per million, so that project impacts are less than significant.	None required.	Cancer risk impacts are less than significant.
The proposed project's impacts associated with exposure to non-carcinogenic compounds are expected to be less than significant. The chronic hazard index and the acute hazard index are both below 1.0.	None required.	No significant non-carcinogenic health impacts are expected.
Energy		
No significant energy resource impacts are expected from the construction or operation of the proposed project, as the project includes Cogen Train D which will provide additional electricity to the Refinery.	None required.	Energy resources impacts are less than significant.
Hazards and Hazardous Materials		
None of the new or modified units will create a hazard that could extend further off-site so no significant adverse hazards and hazardous material impacts are expected from the construction or operation of the proposed project.	None required.	Hazards and hazardous material impacts are less than significant.

TABLE 1-1 (continued)

Summary of Environmental Impacts, Mitigation Measures and Residual Impacts

IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
Hydrology and Water Quality		
The increase in water demand associated with the project will be provided through the use of reclaimed water so no significant adverse impacts on water demand are expected.	None required.	Water demand impacts are less than significant.
The increase wastewater generated by the proposed project is within the capacity of the wastewater treatment plant and the facility's NPDES permit.	None required.	Wastewater impacts are less than significant.
Noise		
Construction noise increases are expected to be less than 1.2 decibels and less than significant.	None required.	Construction noise impacts are less than significant.
Operational noise increases are expected to be less than 1.3 decibel so no audible change in noise levels is expected and noise impacts are less than significant.	None required.	Operational noise impacts are less than significant.
Solid and Hazardous Waste		
No significant adverse solid and hazardous waste impacts are expected from the construction or operational phases of the proposed project.	None required.	Solid and hazardous waste impacts are less than significant.
Transportation and Traffic		
The demand for parking facilities due to construction workers will exceed the spaces available at the Refinery.	The proposed project includes the use of satellite parking lots and transporting workers to the Refinery via bus.	Parking impacts during construction are less than significant.

TABLE 1-1 (concluded)

Summary of Environmental Impacts, Mitigation Measures and Residual Impacts

IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
Transportation and Traffic (continued)		
During the peak construction period, evening peak traffic at the intersection of Aviation Boulevard/El Segundo Boulevard is expected to change the LOS from E to F, creating a significant traffic impact. The construction work shift is schedule to begin at 6:30 a.m. which will avoid the morning peak traffic period.	Ridesharing of construction will be encouraged but cannot be guaranteed.	Construction traffic impacts during the evening peak hour are expected to remain significant.
During the peak construction period, two freeway segments will be impacted during the evening peak hour, including the southbound lanes of I-405 between Rosecrans Ave. and El Segundo Blvd. and the northbound lanes of I-405 between El Segundo Blvd. and the I-105 interchange.	Ridesharing of construction will be encouraged but cannot be guaranteed.	Construction traffic impacts during the evening peak hour are expected to remain significant.
The proposed project is expected to generate an additional 24 trips per day during the operational phase and a reduction of truck trips of about 2 per day. No significant adverse traffic impacts are expected.	None required.	Transportation and traffic impacts associated with operation of the proposed project are less than significant.

CHAPTER 2

PROJECT DESCRIPTION

2.0 PROJECT DESCRIPTION

2.1 INTRODUCTION

Chevron Products Company is proposing a project at its El Segundo Refinery (Refinery) to increase the reliability, energy efficiency, flexibility and capacity of specific Refinery equipment. The overall focus of this project is to increase the reliability and energy efficiency of the Refinery's existing equipment, increase the capacity of certain existing equipment, and optimize the ability of specific processes to increase production of CARB regulated transportation fuels and sulfur product derived from the refining process. With respect to the transportation fuel products, the CEC report entitled *Transportation Fuels, Technologies, and Infrastructure Assessment* states: "… as California's population and economic output grow, demand for transportation services and fuel will grow. Petroleum will continue to be the energy resource of choice … total demand for gasoline and diesel fuels will increase by almost 35 percent over the next 20 years." (CEC, 2003)

The Product Reliability and Optimization (PRO) Project includes modifications to existing specific process units, and also new infrastructure that supports and links these units to other processes, units or facilities throughout the Refinery. The proposed project will involve physical changes and additions to multiple process units and operations as well as operational and functional improvements within the confines of the Refinery.

2.2 PROJECT OBJECTIVES

The objectives of the proposed project at the El Segundo Refinery are to:

1. Improve the energy efficiency, performance, and reliability of process units;

2. Allow the Refinery to efficiently and reliably process a wider range of crude oils, including higher sulfur-containing crude oils;

3. Produce lower sulfur fuel products and increase production of commercial grade elemental sulfur;

4. Improve the management of blending components of CARB fuels; and,

5. Reduce the potential for atmospheric releases and related emissions from PRDs in the No. 2 Crude Unit, No. 2 Residuum Unit, and the Minalk/Merox Unit.

The proposed project will not increase or decrease the overall Refinery crude throughput capabilities.

2.3 PROJECT LOCATION

The proposed project will occur within the confines of the Chevron Products Company El Segundo Refinery, except for the associated improvements at the WBMWD that is located just east and also just north of the Refinery. The Refinery, which was constructed over 90 years ago, is located within the overall southern California region, as shown in Figure 2-1. The Refinery is located at 324 West El Segundo Boulevard in the City of El Segundo, California, as shown in Figure 2-2.

2.4 LAND USE AND ZONING

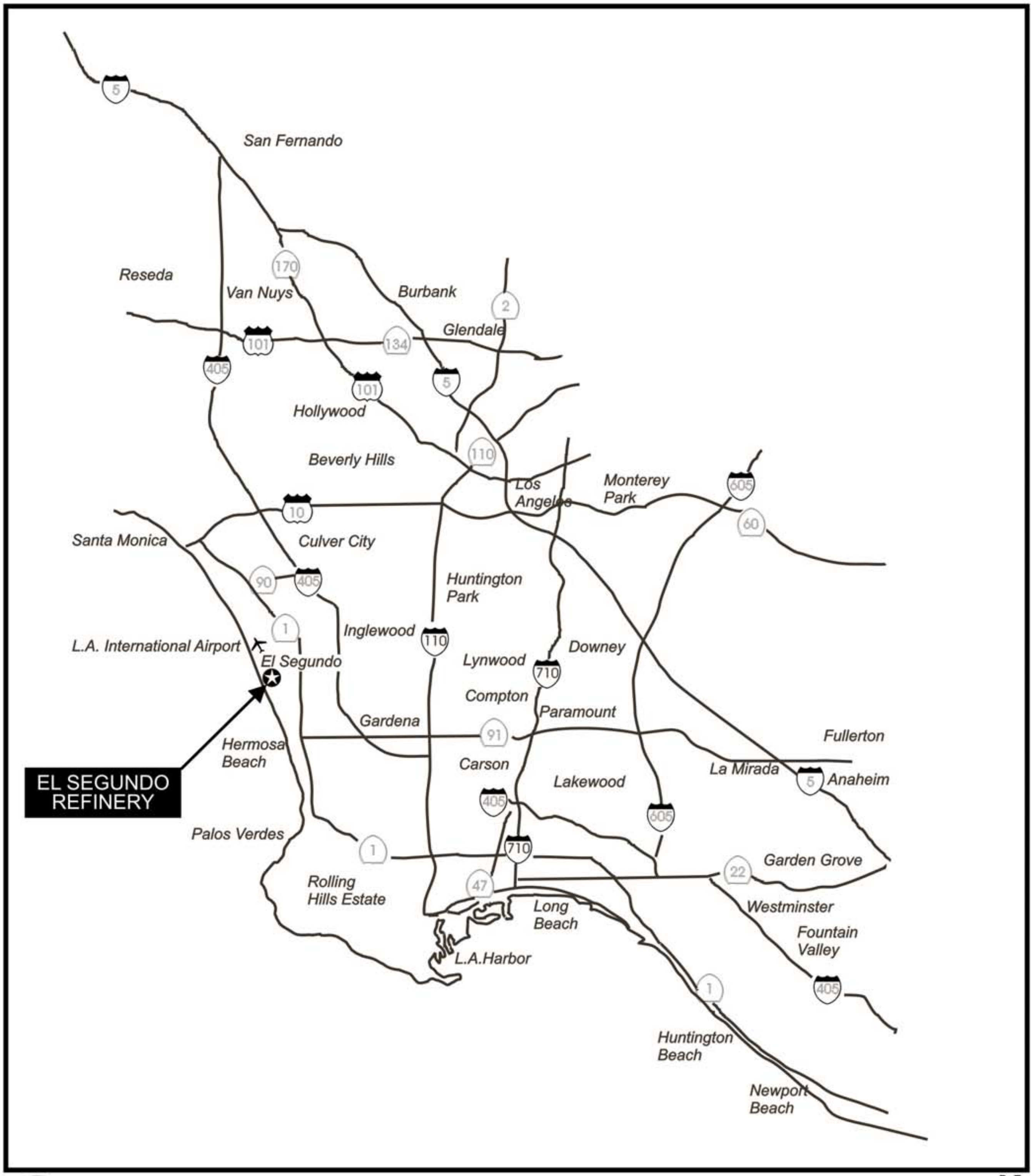
Implementation of the proposed modifications at the Chevron Products Company El Segundo Refinery will occur within existing property boundaries. Land use on the facility property and within the immediate vicinity is mixed use including heavy industry, light industry, manufacturing, commercial, and residential. The closest residential area is immediately adjacent to the property line at the southwest corner of the Refinery. The closest residential area to the proposed project locations within the Refinery is about 1,000 feet.

The Refinery is bounded by El Segundo Boulevard to the north, Sepulveda Boulevard to the east, Rosecrans Avenue to the south, and Vista Del Mar to the west. The Chevron Refinery is located in an area of mixed land uses, with industrial, recreation, residential, and commercially zoned areas nearby. Land use to the north of the Chevron Refinery is primarily residential, with a mix of commercial and light industrial zoning. The predominant adjacent land uses west of the Refinery are nearly all heavy industrial, or open space, which includes: Dockweiler State Beach, Manhattan Beach, and the El Segundo Generating Station, although a small parcel of land at the southwest corner of the Chevron property is made up of commercial and multiple-family residential.

Directly south of the Refinery, there is a single-family residential area bordering the entire length of the Refinery separated by Rosecrans Avenue. The corridor immediately east of the Refinery is comprised of a golf course at the corner of Sepulveda Boulevard and El Segundo Boulevard, with light commercial and heavy industrial zoning for the rest of the tract. The Refinery is located in the City of El Segundo within Los Angeles County in an urbanized area which includes a substantial amount of industrial development, due to the proximity of LAX (see Figure 2-2).

2.5 EXISTING REFINERY CONFIGURATION AND OPERATION

The locations of the existing Refinery units are shown in Figure 2-3 along with the proposed new and modified units. Figure 2-4 shows a flow diagram of the existing Refinery operations. Crude oil, used to produce gasoline and other refinery products, is delivered by ship to the marine terminal and pumped to the Refinery by existing pipelines or received via pipeline directly to the Refinery.



Environmental Audit, Inc.

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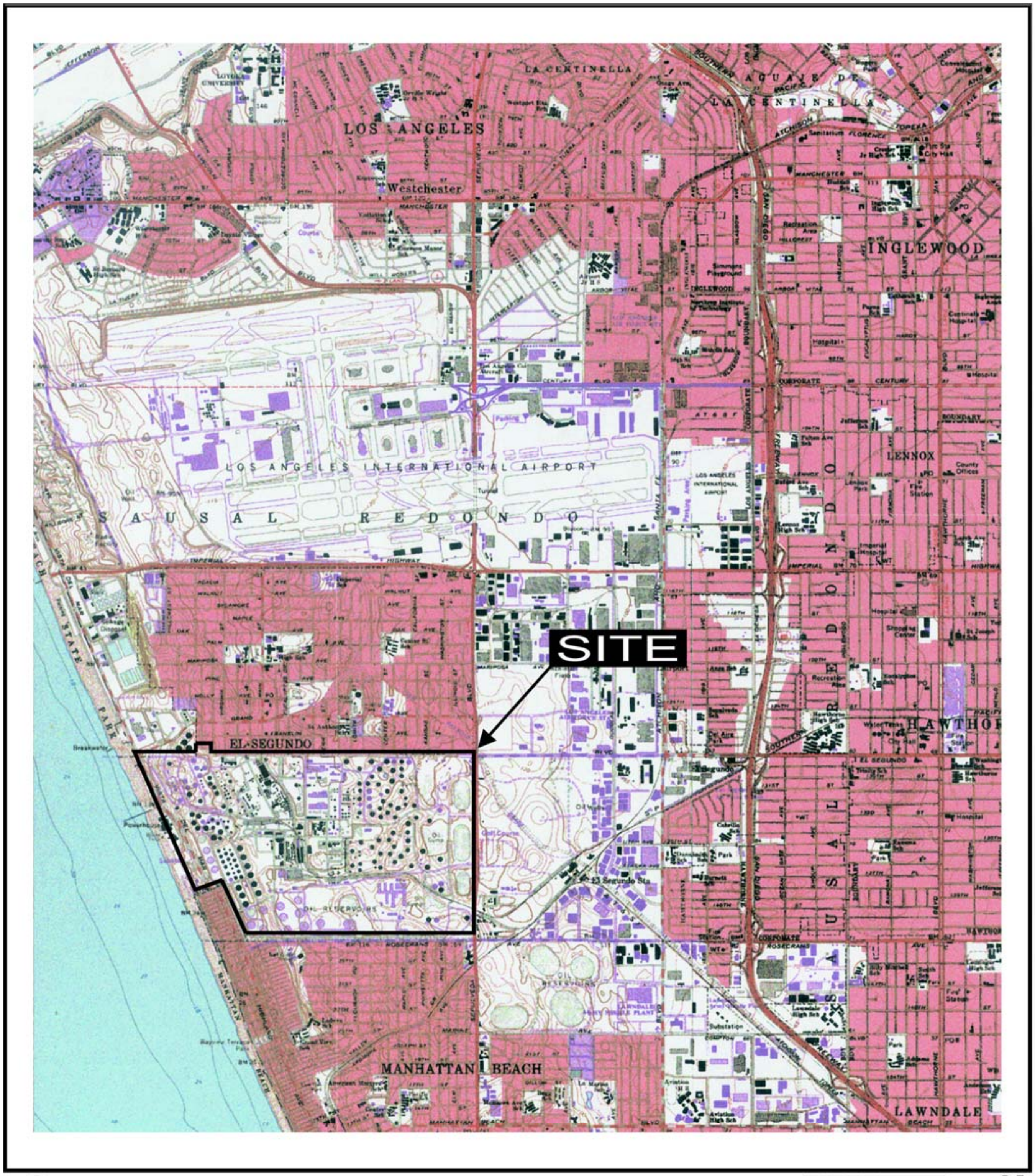
REGIONAL MAP
Chevron Products Company
El Segundo Refinery

Project No. 2505

Figure 2-1

N:\2505-1\DEIR\RegionalMap.cdr



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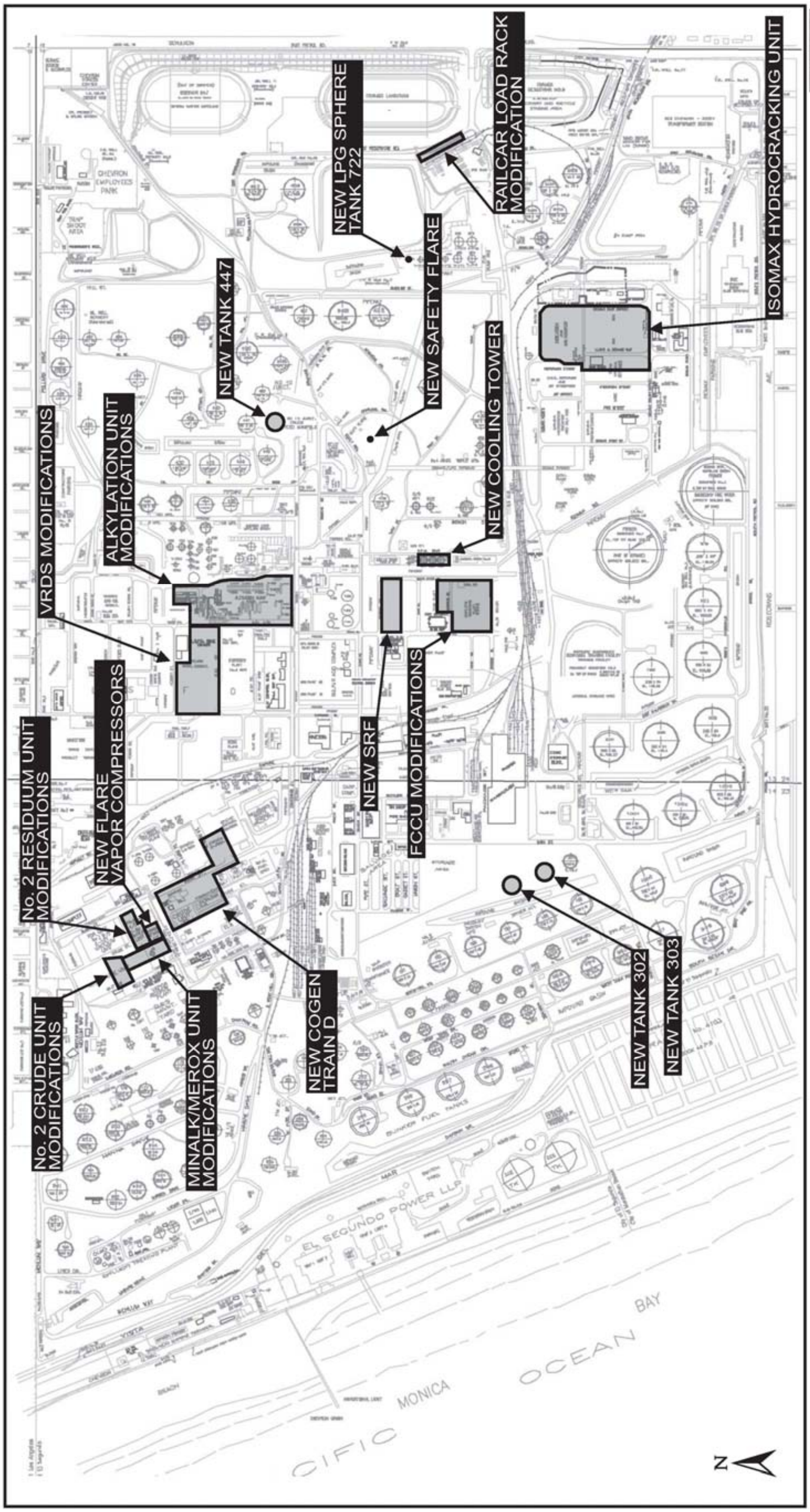
SITE LOCATION MAP
Chevron Products Company
El Segundo Refinery

Project No. 2505

Figure 2-2

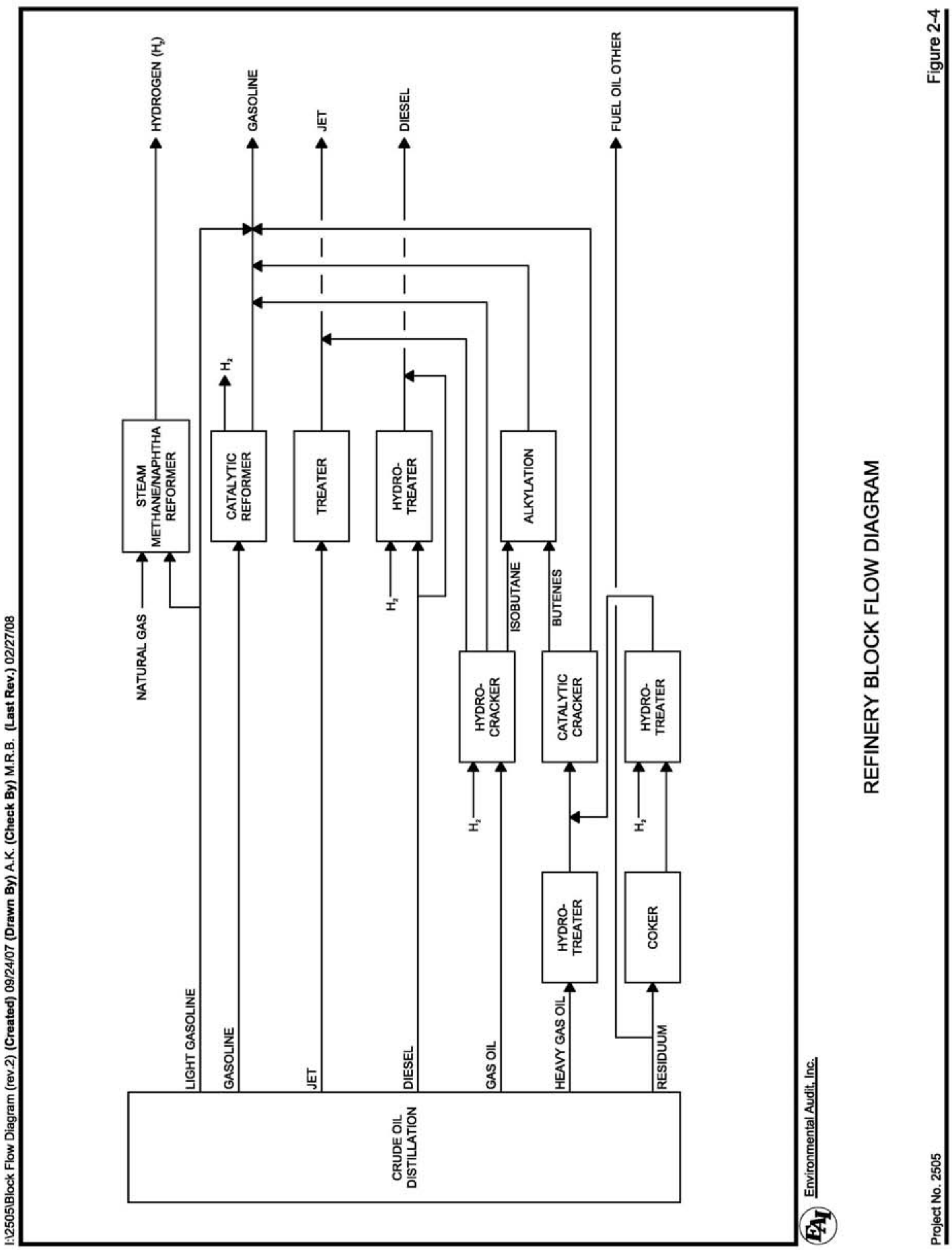
N:\2505-1\DEIR\SiteLocMap.cdr



CHEVRON PRODUCTS COMPANY
PROJECT COMPONENT LOCATIONS

Figure 2-3

Project No. 2505
N:\2505\SourceLocationsMap (rev.9).CDR


I:\2505\Block Flow Diagram (rev.2) (Created) 09/24/07 (Drawn By) A.K. (Check By) M.R.B. (Last Rev.) 02/27/08
CRUDE OIL DISTILLATION
LIGHT GASOLINE
GASOLINE
JET
DIESEL
GAS OIL
HEAVY GAS OIL
RESIDUUM
NATURAL GAS
STEAM METHANE/NAPHTHA REFORMER
CATALYTIC REFORMER
TREATER
HYDRO-TREATER
ALKYLATION
HYDRO-CRACKER
CATALYTIC CRACKER
HYDRO-TREATER
COKER
ISOBUTANE
BUTENES
H_2
HYDROGEN (H_2)
GASOLINE
JET
DIESEL
FUEL OIL OTHER
REFINERY BLOCK FLOW DIAGRAM
Environmental Audit, Inc.
Project No. 2505
Figure 2-4

The crude oil is then processed in the crude units where it is heated and distilled into multiple feedstock components that are later processed elsewhere in the Refinery. The heavy residual oil leaving the crude units is further distilled in the vacuum units to yield additional, lighter hydrocarbon products and vacuum residuum. The vacuum residuum is processed in the Coker Unit and the lighter hydrocarbon components from the crude units and vacuum units are fed to other Refinery units for further processing. Some of the major downstream processes are cracking (i.e., breaking up larger molecules into smaller ones) in the FCCU and ISOMAX Unit, processing to separate sulfur in the hydrotreating units including the VRDS Unit, synthesizing (i.e., combining smaller molecules into larger ones) in the Alkylation Unit, and reforming (i.e., rearranging straight-chain molecules into branched-chain molecules) in the CCR Unit.

Certain units in the Refinery are designed to separate elemental constituents, such as sulfur and nitrogen, from crude oil for conversion into commercial products. Sulfur Recovery Units convert sulfur compounds separated from crude oil into elemental sulfur, which is sold commercially. Nitrogen separated from the crude oil is converted into ammonia and used onsite and also sold commercially.

Auxiliary systems are also needed to support Refinery operations including hydrogen plants (to produce hydrogen needed for certain refinery reactions), boilers to produce steam, cogeneration plants to produce electricity and steam, and wastewater treatment systems.

2.6 PROPOSED PROJECT MODIFICATIONS TO THE REFINERY

The following discussions describe each of the proposed Refinery modifications. The locations of both the proposed new and modified components are shown in Figure 2-3.

2.6.1 PROPOSED PROCESS UNIT MODIFICATIONS

The following units will be modified as part of the PRO Project.

2.6.1.1 No. 2 Crude Unit

The No. 2 Crude Unit provides the initial separation of crude oil by distillation. The various distillates are then further refined in other processing units in the Refinery. The proposed modifications to the No. 2 Crude Unit include rerouting atmospheric PRDs to the proposed new Vapor Recovery and Safety Flare System. In addition, two knock-out drums will be added to the unit to collect, for recovery purposes, any liquids released from the PRDs in the No. 2 Crude Unit, the No. 2 RSU, and the Minalk/Merox Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere in the event of a process upset.

2.6.1.2 No. 2 Residuum Stripper Unit

The No. 2 RSU processes the heavy hydrocarbons from the bottom of the No. 2 Crude Unit using vacuum distillation to produce various weight gas oils. The proposed modifications to the No. 2 RSU are limited to rerouting PRDs to the proposed new Vapor Recovery and Safety Flare System via the two new knock-out drums in the No. 2 Crude Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to the atmosphere in the event of a process upset.

2.6.1.3 Minalk/Merox Unit

The Minalk/Merox Unit converts sulfur compounds (mercaptans) to disulfides using a catalyst. The proposed modifications to the Minalk/Merox Unit are limited to rerouting PRDs to the proposed new Vapor Recovery and Safety Flare System via a new knock-out drum in the No. 2 Crude Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to the atmosphere in the event of a process upset.

2.6.1.4 Waste Gas Compressors

The WGCs at the No. 2 Crude Unit are currently connected to the LSFO vapor recovery system and safety flare. As part of connecting PRDs to the New Vapor Recovery and Safety Flare System, the WGCs will be rerouted to the New Vapor Recovery and Safety Flare System. The purpose of this modification is to align all PRDs from the No. 2 Crude Unit, No.2 RSU, Minalk/Merox Unit, and the WGCs to a common vapor recovery and safety flare system.

2.6.1.5 Fluidized Catalytic Cracking Unit

The FCCU converts heavy petroleum gas oils into lighter, more valuable products such as gasoline, LPG, and refinery intermediate product streams. The FCCU consists of a number of major sections, including the Reactor Section, the Regenerator Section, the Main Fractionator Section and the Gasoline Recovery Section. The reactor is the vessel where preheated feed is vaporized, contacted by regenerated catalyst, and cracked into lighter components. In the Regenerator Section, spent catalyst from the reactor is regenerated with oxygen to remove carbon. The reaction mix from the reactor enters the Main Fractionator where the separation of cracked gas oils and lighter products takes place. The Gasoline Recovery Section receives gases and liquids from the Main Fractionator overhead. The uncondensed gases in this overhead stream are compressed by the wet gas compressor and routed to the deethanizer where most of the hydrogen, methane and ethane are separated from the stream to be desulfurized and then utilized in the Refinery fuel gas system. Fuel gas is burned to provide heat to operate the Refinery.

The proposed FCCU modifications do not functionally change the process flow, control of the FCCU, or affect the emissions from the control equipment at the FCCU (i.e., the electrostatic precipitator and SCR). The purposes of the modifications to the FCCU are to increase reliability, consolidate existing equipment, more efficiently separate intermediate streams, increase production of CARB gasoline components, and to improve energy efficiency. The modifications and equipment additions are as follows:

- Installing a new motorized main air blower replacing the existing steam turbine driven main air blower (the existing equipment will be idled and removed from the existing permit);
- Installing a new depropanizer column replacing three smaller existing distillation columns;
- Installing a new deethanizer column;
- Installing new pumps; and,
- Installing new heat exchangers.

2.6.1.6 Alkylation Unit

The Alkylation Unit combines light olefins (propylene, butylene and pentenes) with isobutane to produce an alkylate product for use as a gasoline blending component. The unit provides the controlled conditions for the alkylation reaction, which occurs in the presence of sulfuric acid catalyst. The Alkylation Unit also produces propane and normal butane as secondary commercial product streams. The proposed modifications to the Alkylation Unit include supplemental cooling that will be supplied by a new cooling tower (see Section 2.6.2.4) and additional heat exchangers. The depropanizer column (C-12), located in the older section of the Alkylation area, will be removed. This column is one of the three depropanizer columns being removed as part of FCCU upgrades. The purpose of the modifications is to improve reliability through more efficient cooling (i.e., heat removal) and improve product separation in the unit.

2.6.1.7 Vacuum Residuum Desulfurization Unit

The VRDS Unit desulfurizes and denitrifies gas oil feedstock for the FCCU. There are two parallel reactor trains, each consisting of two reactors in series. Feed to the reactors is mixed with hydrogen and then preheated in reactor feed/effluent heat exchangers and a feed heater. Treated gas oil from the reactors passes through the high pressure separator to remove hydrogen and then to the low pressure separator to remove remaining gases and then fed to the H_2S Stripper Column. VRDS product from the bottom of the stripper is cooled and pumped to the FCCU or to intermediate tankage. Hydrogen from the high pressure separator is cooled and sent through two liquid separators to the DEA Scrubber to capture H_2S prior to being directed to the reactors. The H_2S is converted to commercial grade sulfur in the SRUs.

The purpose of the modification to the VRDS Unit is to allow taking one of the parallel reactor trains out of service to replace the catalyst while the other train remains in service. The unit modifications and additions are as follows:

- Installing valve manifolds to separate the reactor trains;
- Installing a new, parallel high pressure separator;
- Repiping of the existing Recycle Hydrogen Heat Exchangers and Recycle Hydrogen Air Coolers to split them between the two trains; and,
- Installing new facilities to allow sulfiding of fresh catalyst in one reactor train with the other train in operation. This includes installation of two new separator vessels, a new sulfiding recycle hydrogen compressor, and a new recycle hydrogen air cooler. In addition, the existing VRDS Product Coolers will be repiped so they can be used in the catalyst sulfiding loop.

2.6.1.8 ISOMAX Unit

The ISOMAX Unit converts light and intermediate gas oils into jet fuel, motor gasoline, and LPG. The feed and makeup hydrogen are passed through four parallel CKN (a Century Type ISOMAX Catalyst for deNitrification) reactor modules to convert sulfur and nitrogen to H_2S and ammonia. The H_2S and ammonia are absorbed in water that is injected into the reaction stream, removed from the unit, and processed into commercial products in other units in the Refinery. CKN gas oils and additional hydrogen are passed through two parallel Iso-reactor modules, where the hydrocracking reaction takes place. Products are separated from the reaction mix in the distillation section.

The ISOMAX unit will be modified to increase the feed capacity by approximately 10,000 BPD and to produce two additional products, ULSD fuel and desulfurized FCCU feed. The purpose of the modifications is to accommodate gas oil production and optimize output from the unit.

In the CKN section the main feed pumps will be replaced. Feed/effluent heat exchangers in each module will be replaced with larger units to preclude the need for fired heater modifications. A new hydrogen booster compressor will be installed.

The Distillation Section modifications include: installing a new vacuum distillation column, and appurtenances; and, replacing three Iso-splitter Column bottoms pumps with larger pumps.

A PSA Unit will be installed to recover hydrogen for reuse in existing Refinery hydrocracking and hydrotreating processes. The additional hydrogen will be recovered from hydrogen-rich fuel gas produced at No. 4 Hydrogen Sulfide Plant. This hydrogen is currently routed into the Refinery fuel system, which provides fuel to combustion sources (e.g., process heaters) throughout the Refinery in lieu of commercially purchased natural gas.

The new equipment includes an eight-bed PSA skid together with a motor-driven feed gas/purge gas compressor. The compressor system has feed gas suction, intermediate and discharge knockout drums with inter-coolers and after-coolers. Purge gas from the PSA skid will be fed to the existing on-site hydrogen manufacturing plant.

Heaters in the ISOMAX Unit will be retrofitted with low NOx burners to reduce NOx emissions. Firing rates for the heaters will operate within existing permit limits.

2.6.1.9 Cogeneration Facilities

The Refinery currently operates a multi-train cogeneration plant to supply electricity and steam used by processing equipment. To supplement electrical needs, electricity is purchased from offsite sources (e.g., SCE). The existing cogeneration plant will be expanded by an additional 49.9 MW. The new 49.9 MW Cogeneration Unit (Cogen Train D) includes a natural gas and refinery gas-fired turbine electric generator, a new steam-driven turbine electrical generator, feed gas compressors, knockout and surge pots, waste heat boilers (including duct burners) to generate steam, a CO oxidation catalyst unit, and an SCR unit to control emissions. Expansion of this facility will substantially decrease the Refinery's need for offsite sources of electricity.

2.6.1.10 Railcar Loading/Unloading Rack

The Refinery currently ships and receives liquefied petroleum gas (LPG) by trucks and rail cars. As part of the PRO Project, the LPG Loading/Unloading Rack will be expanded by the addition of four new loading/unloading positions for added flexibility that will increase the ability to optimize CARB-gasoline blending.

2.6.1.11 Utility Improvements

SCE and the WBMWD will improve systems to service the proposed project. SCE improvements expected to be made include adding new 66 kV circuit breakers in their existing Chevmain Power Substation, which is located north of Rosecrans Avenue, new 66 kV to 13.2 kV transformers at their existing ISOMAX Power Substation, about 500 feet of overhead or underground 66 kV cables connecting the two sites and a new transformer at the Chevgen Power Substation. WBMWD currently provides boiler feed water from secondary-treated effluent from the Hyperion Wastewater Treatment Plant that has been further processed by filtration, chlorination, and demineralization by reverse osmosis. WBMWD also currently provides cooling tower water from secondary-treated effluent from the Hyperion Wastewater Treatment Plant that has been further processed by filtration, chlorination, and denitrification. Improvements as part of the PRO Project at WBMWD, located nearby, include increasing reverse osmosis and denitrification water production facilities.

2.6.2 PROPOSED NEW PROCESS UNITS

The following subsections describe each of the proposed new units at the Refinery. The locations of the proposed new components are shown in Figure 2-3.

2.6.2.1 Sulfur Recovery Facilities

Sour Water Stripper

A new SWS with a capacity of 300 gpm will be constructed to supplement the existing plants. Sour water is a process water stream that contains sulfur compounds, primarily H_2S, nitrogen compounds, and ammonia. The sulfur and nitrogen are contained in crude oil and are recovered from the crude oil for use when it is processed. This stripper will allow for increased processing of sour water and production of commercial grade sulfur. The overhead stream from the stripper, containing H_2S, ammonia and water vapor, will be fed to a new SRU.

Sulfur Recovery Unit

A new SRU with a capacity of 175 long tons per day will be installed to process increased amounts of H_2S to commercial grade, molten sulfur for sale. Ammonia in the feed stream to the SRU will be converted to atmospheric nitrogen and water and exhausted through the TGU to the atmosphere.

Tail Gas Unit

The exhaust from the SRU will be vented to a new TGU for further processing to remove SOx before discharging to the atmosphere. The TGU will include a new incinerator.

2.6.2.2 Vapor Recovery and Safety Flare System

A new closed relief system, including vapor recovery compressors and an elevated safety flare, will be installed that is designed to be capable to handle emergency releases from the equipment that is connected to it. The PRDs on the No. 2 Crude Unit, the No. 2 RSU, and the Minalk/Merox Unit that currently may vent to atmosphere under upset conditions will be routed to this new Vapor Recovery and Safety Flare System. The existing WGCs currently routed to the LSFO vapor recovery system will be rerouted to the new Vapor Recovery and Safety Flare System. In addition, PRDs from the new SWS, SRU and TGU will be routed to this new Vapor Recovery and Safety Flare System. The recovered gases will be treated prior to being added to the existing refinery fuel gas system.

2.6.2.3 Additional Storage Capacity

The proposed project will require additional segregation and storage of intermediate hydrocarbon streams and products. A new LPG sphere (Tank 722), two new FCCU light gasoline tanks (Tanks 302 and 303), and a new ISOMAX diesel tank (Tank 447) with the flexibility to store other products will be added. In addition, new pumps will be added to transfer materials to and from the new tanks.

2.6.2.4 Cooling Tower

A new cooling tower with a water circulation rate of approximately 12,000 gpm will be constructed to support cooling needs at the existing Alkylation Unit, new SRU, new SWS, and new TGU.

2.6.2.5 Hydrogen Compression and Transfer Facilities

Hydrogen (H_2) is currently produced onsite at the Refinery. Additional hydrogen compression and transfer facilities will be installed to supply Refinery units with hydrogen at the required pressures.

2.7 CONSTRUCTION OF THE PROPOSED PROJECT

Construction activities for the PRO Project are expected to begin in the second quarter of 2008 and be completed in 2010. As shown in Figure 2-5, the construction schedule for each component of the PRO Project varies. The construction activities for most of the components are expected to overlap from the second quarter of 2008 until the fourth quarter of 2009. Construction work shifts are expected to last about ten hours per day during most portions of the construction schedule. However, during certain Refinery unit shutdown periods (e.g., January, February, and October 2009), two construction shifts are expected. The first shift is scheduled to operate from 6:30 a.m. to 5:00 p.m. and the second shift is scheduled to operate from 5:00 p.m. to 3:30 a.m. Construction activities include the delivery of project-related equipment to the Refinery.

2.8 OPERATION OF THE PROPOSED PROJECT

The permanent work force at the Refinery is expected to increase by about 12 additional workers as a result of the proposed project. The proposed project is expected to incrementally reduce truck traffic by about two trucks per day associated with the transport of materials to and from the Refinery including among other things, catalyst deliveries and offsite shipments of commercial sulfur and ammonia products. The Refinery has an ammonia plant and currently produces excess aqueous ammonia. The excess aqueous ammonia is sold as a product, but the project will require ammonia for the Cogen Train D SCR. In addition, ammonia can be used a a fuel source in the proposed new Sulfur Recovery Facilities. Therefore, the truck traffic reduction is due to the decrease in the sale of aqueous ammonia. In addition, a maximum of about 12 additional railcars per day of intermediate products (i.e., LPG and CARB gasoline blending components) could travel to and from the Refinery as a result of the proposed project. These additional railcars are expected to be added to existing trains that already visit the Refinery. No change to marine vessel traffic is expected from the proposed project.

Figure 2-5

Chevron Products Company El Segundo Refinery
Product Reliability and Optimization Project
Construction Schedule

Project	2008												2009											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MODIFICATIONS																								
No. 2 Crude Unit PRDs																								
No. 2 Residuum Stripper Unit PRDs																								
Minalk/Merox Unit PRDs																								
WGCs																								
FCCU																								
Alkylation Unit																								
VRDS Unit																								
ISOMAX Unit																								
Cogen Train D Facilities																								
Railcar Loading/Unloading Rack																								
Utility Improvements																								
SCE																								
WBMWD																								
NEW UNITS																								
Sulfur Recovery Facilities																								
SWS																								
SRU																								
TGU																								
Vapor Recovery and Safety Flare System																								
Additional Storage Facilities																								
Cooling Tower																								
H_2 Compression & Transfer Facilities																								

2.9 PERMITS AND APPROVALS

The proposed project will require approvals or permits from a variety of federal, state, and local agencies (see Table 2-1). Examples of general permits and approvals required for the Refinery are summarized in the following subsections. The following discussion summarizes representative permits required for the Refinery but is not necessarily exhaustive. Many of these permits are not expected to require permit modifications due to the proposed project.

Federal Approvals

No federal agency approvals for the proposed project are expected to be required although the project applicant is required to notify and receive concurrence on some issues (e.g., Prevention of Significant Deterioration (PSD) applicability). Many of the U.S. EPA regulations and requirements are implemented by state or local agencies. For example, New Source Performance Standards (NSPS) are implemented by the SCAQMD and hazardous waste regulations are enforced by the California Department of Toxic Substances Control (DTSC). The Spill Prevention Control and Countermeasure (SPCC) Plan (40 Code of Federal Regulations (CFR) Part 112) may require modifications to assure that all new and modified Refinery units are included in the Plan. The U.S. EPA also has authority over the PSD Program with some authority delegated to the SCAQMD and the proposed project may require review to assure compliance with the PSD program for the proposed modifications.

The Occupational Safety and Health Administration (OSHA) regulates workplace hazards and enforces regulations that protect worker health and safety. Under federal OSHA, regulations have been promulgated that require the preparation and implementation of a Process Safety Management (PSM) Program (40 CFR Part 1910, Section 119, and Title 8 of the California Code of Regulations (CCR), Section 5189). The Refinery will be required to complete a PSM program to evaluate and minimize hazards associated with the proposed project. Finally, the U.S. Department of Transportation (U.S. DOT) regulates the transportation of hazardous substances and the Federal Aviation Administration regulates the height of structures that could impact navigable airspace.

State Approvals

Construction-related permits may be required from the California Occupational Safety and Health Administration (CalOSHA) for demolition, construction, excavation, and tower and crane erection. Any transport of heavy construction equipment, which requires the use of oversized transport vehicles on state highways, will require a Caltrans transportation permit. DTSC regulates the generation, transport, treatment and disposal of hazardous wastes. Hazardous wastes generated by the proposed project activities and related to refining activities are governed by rules and regulations enforced by DTSC. The existing PSM program and hazard communication program may require updating with CalOSHA due to the proposed project revisions.

TABLE 2-1

Federal, State and Local Agency Permits and Applications

Agency Permit or Approval	Requirement	Applicability to Project
Federal		
Environmental Protection Agency (U.S. EPA)	NSPS 40 CFR Part 60 General Provisions (Subpart A)	Requires facilities subject to a NSPS to provide notification, maintain and submit records, and in some cases undertake performance tests.
	Accidental Release Prevention Risk Management Program, 40 CFR 68 (and California Accidental Release Program, Title 19, Div. 2, Chapter 4.5)	Off-site consequence analysis required for regulated hazardous materials.
	Benzene Waste National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 61 Subpart FF	Reporting and record keeping.
	Refinery Maximum Achievable Control Technology (MACT) Standard, 40 CFR Part 63 Subpart CC	Requires a startup, shutdown, and malfunction plan for process vents and on-site gas loading.
	National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline) 40 CFR Part 63 Subpart EEEE	Other organic liquids distribution.
	Prevention of Significant Deterioration	Air quality requirements for modifications to stationary sources in attainment areas.
	Superfund Amendments and Reauthorization Act (SARA) Title III	Requires reporting off-site releases of hazardous substances.
	Emergency Planning and Community Right-to-Know Act, Section 302	Requires disclosure of hazardous substances being used.
	Pretreatment Standards, 40 CFR Part 400 et seq.	Standards for wastewater discharge.
	Resource Conservation and Recovery Act (RCRA), 40 CFR Parts 260 – 279	Requires proper handling of hazardous waste material.
	Spill Prevention Control and Countermeasure Plan (40 CFR 112)	Modifications to Refinery facilities that affect the potential for oil or flammable materials discharge into navigable waters.
	National Pollutant Discharge Elimination System (NPDES), 40 CFR Part 122	Requires compliance with Clean Water Act (CWA) standards for discharges to Santa Monica Bay.
Federal Aviation Administration (FAA)	Notice of Proposed Construction or Alteration (FAA Form 7460-1) to comply with FAA Advisory Circular 70/7460-21, Proposed Construction or Alteration of Objects that may Affect Navigable Airspace (14 CFR Part 77.13)	Construction or alteration of a structure more than 200 feet above the ground level. Construction equipment, such as cranes, are subject to this requirement.
U.S. Department of Transportation (U.S. DOT)	Compliance with DOT regulations regarding transportation of hazardous substances (as defined in 49 CFR parts 171 – 180)	Project-related transportation of hazardous substances such as ammonia and sulfur, as well as hydrocarbons such as LPG.
Occupational Safety and Health Administration (OSHA)	Process Safety Management OSHA 29 CFR Part 1910	Worker process safety standards.

TABLE 2-1 (continued)

Federal, State and Local Agency Permits and Applications

Agency Permit or Approval	Requirement	Applicability to Project
State		
California Department of Transportation (Caltrans)	Transportation permit	Application required to transport overweight, oversize, and wide loads on highways.
Cal-OSHA	Construction - related permits	Excavation, construction, demolition, and tower and crane erection permit.
Office of Environmental Health Hazard Assessment	Proposition 65 warnings for known exposures to listed chemicals	Required if significant risk identified exceeds regulatory limit.
Department of Toxic Substances Control (DTSC)	Hazardous Waste Control Law (HSC, Division 20, Chapter 6.5)	Required if facility stores, treats or disposes of hazardous waste as described in the regulation.
Regional		
Regional Water Quality Control Board (RWQCB)	Remedial action plan	Required if contaminated soil is found and remediated.
South Coast Air Quality Management District (SCAQMD)	CEQA Review/EIR	SCAQMD is the lead agency for certification of the proposed project EIR.
	SCAQMD Rule 201: Permit to Construct	Applications are required to construct or modify stationary emissions sources.
	SCAQMD Rule 203: Permit to Operate	Applications are required to operate stationary source emissions.
	SCAQMD Rule 212: Standards for Approving Permits	Requires public notification for a "significant project."
	SCAQMD Rule 219: Equipment Not Requiring a Written Permit Pursuant to Regulation II	Equipment with minimal emissions does not need to be permitted.
	SCAQMD Rule 401: Visible Emissions	Prohibits visible emissions from single emission sources.
	SCAQMD Rule 402: Nuisance	Discharges which cause a nuisance to the public are prohibited.
	SCAQMD Rule 403: Fugitive Dust	Contains best available control measure requirements for operations or activities that cause or allow emissions of fugitive dust.
	SCAQMD Rule 407: Liquid and Gaseous Contaminants	Limits CO and sulfur dioxide (SO2) emissions.
	SCAQMD Regulation IX: Standards of Performance for New Stationary Sources	Incorporates Federal regulations by reference.
	SCAQMD Rule 1113: Architectural Coating	Specifies allowable VOC content of coatings for structures.
	SCAQMD Rule 1118: Emissions from Refinery Flares	Requires monitoring and limiting flaring events during startup and shutdown activities.
	SCAQMD Rule 1158: Storage, Handling, and Transport of Coke, Coal, and Sulfur	Places requirements on storage and handling of solid sulfur and coke to control dust.
	SCAQMD Rule 1166: Excavation of VOC Contaminated Soils	Required if soils to be excavated are impacted by hydrocarbons.

TABLE 2-1 (concluded)

Federal, State and Local Agency Permits and Applications

Agency Permit or Approval	Requirement	Applicability to Project
SCAQMD (concluded)	SCAQMD Rule 1173: Fugitive Emissions of VOC	Contains requirements for inspection and maintenance of fugitive VOC emitting components.
	SCAQMD Rule 1176: Sumps and Wastewater Separators	A compliance plan is required for VOC control from wastewater systems.
	SCAQMD Regulation XIII: New Source Review (NSR) including key rules Rule 1303: Requirements Rule 1304: Exemptions Rule 1306: Emission Calculations Rule 1309: Emission Reduction Credits	New source review requirements for non-RECLAIM pollutant emissions sources, including need for BACT, modeling for significant impacts, and providing offsets for emission increases.
	SCAQMD Rule 1401: NSR of Toxic Air Contaminants	New sources emitting toxic air contaminants must limit emissions to the extent that the health risks to the maximum exposed individual are within allowable limits. Best Available Control Technology for Toxics (TBACT) is generally required when cancer risk is greater than one in one million (1×10^{-6}).
	SCAQMD Regulation XVII: Prevention of Significant Deterioration Permits	Partial delegation of Prevention of Significant Deterioration (PSD) Permits for new or modified PSD permit air quality requirements for modifications to stationary sources in attainment areas.
	SCAQMD Regulation XX: Regional Clean Air Incentives Market (RECLAIM)	RECLAIM is a market incentive program designed to allow facilities flexibility in achieving emission reduction requirements for NOx, and SOx under the Air Quality Management Plan using methods which include, but are not limited to: add-on controls, equipment modifications, reformulated products, operational changes, shutdowns, and the purchase of excess emission reductions.
	Title V of the 1990 Clean Air Act	SCAQMD Regulations XXX: Title V Permits. Applications are required to construct, operate, or modify air emission sources.
Local		
County Sanitation Districts of Los Angeles	Industrial wastewater discharge approval	Required when discharging into sewer.
El Segundo Fire Department – Hazardous Materials Division	Permit for above ground storage tanks and storage of flammable materials; business disclosure form, building plan check	Required for ASTs and areas where storage of flammable materials occur; required for storage of hazardous materials; required to review plans for construction.
City of El Segundo	Building permit	Required for foundations, building, etc.
	Grading permit	Required prior to grading land.
	Plumbing and electrical permits	General construction permit.

Regional Approvals

The proposed project may require a Remedial Action Plan approved by the RWQCB if contaminated soil is found.

The SCAQMD has responsibility as lead agency for the CEQA process and for certification of the EIR because it has primary approval authority over the proposed project (CEQA Guidelines §15051(b)). Permits to Construct/Operate for new equipment and modifications to existing units will be required. Certain components of the proposed project would also be subject to existing SCAQMD rules and regulations. Permits or plan approvals also may be required by SCAQMD Rule 1166 for soil remediation activities and demolition activities.

Local Approvals

The LACSD and the LACDPW have responsibility for issuance of industrial wastewater discharge permits which are required for discharges into public sewers. No modifications are expected to be required to the Refinery's existing industrial wastewater discharge permits due to the proposed project.

The El Segundo Fire Department, Hazardous Materials Division is responsible for issuing permits for storage tanks and for review and approval of Risk Management Plans (RMP) which will be required as part of the proposed project. The Fire Department also is responsible for assuring that the City fire codes are implemented. Building and grading permits for the proposed project will be required from the City of El Segundo to assure that the proposed project complies with the Uniform Building Code.

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CHAPTER 3

ENVIRONMENTAL SETTING

Introduction
Air Quality
Energy
Hazards and Hazardous Materials
Hydrology/Water Quality
Noise
Solid/Hazardous Waste
Transportation/Traffic

3.0 ENVIRONMENTAL SETTING

3.1 INTRODUCTION

CEQA Guidelines §15125 requires that an EIR include a description of the environment within the vicinity of a proposed project as it exists at the time the NOP/IS is published, or if no NOP/IS is published, at the time the environmental analyses commences, from both a local and regional perspective. This chapter presents the existing environmental setting for the proposed project against which potential impacts of the project have been evaluated. This chapter also describes the existing environment around the El Segundo Refinery as applicable that could be adversely affected by the proposed project. This EIR is focused only on the environmental topics identified in the NOP/IS (see Appendix A) that could be significantly adversely affected by the proposed project. The reader is referred to the NOP/IS for discussion of environmental topics not considered in this EIR, and the rationale for inclusion or exclusion of each environmental topic. The environmental topics identified in this chapter include both a regional and local setting.

3.2 AIR QUALITY

The Chevron Products Company El Segundo Refinery is located within the SCAQMD jurisdiction (referred to hereafter as the district). The district consists of the four-county Basin that includes Orange, and the non-desert portions of Los Angeles, Riverside, and San Bernardino counties, the Riverside County portions of the Salton Sea Air Basin (SSAB), and the Mojave Desert Air Basin (MDAB). The Basin is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east.

3.2.1 METEOROLOGICAL CONDITIONS

The climate in the Basin generally is characterized by sparse winter rainfall and hot summers tempered by cool ocean breezes. A temperature inversion, a warm layer of air that traps the cool marine air layer underneath it and prevents vertical mixing, is the prime factor that allows contaminants to accumulate in the Basin. The mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, and Santa Ana winds. The climate of the area is not unique, but the high concentration of mobile and stationary sources of air contaminants in the western portion of the Basin, in addition to the mountains, which surround the perimeter of the Basin, contribute to poor air quality in the region.

3.2.2 TEMPERATURE AND RAINFALL

Temperature affects the air quality of the region in several ways. Local winds are the result of temperature differences between the relatively stable ocean air and the uneven heating and cooling that takes place in the Basin due to a wide variation in topography. Temperature also has a major effect on vertical mixing height and affects chemical and photochemical reaction times. The annual average temperatures vary little throughout the Basin, averaging 75^{o}F. The coastal areas show little variation in temperature on a year round basis due to the moderating effect of the marine influence. On average, August is the warmest month while January is the coolest month. Most of the annual rainfall in the Basin falls between November and April. Annual average rainfall varies from nine inches in Riverside to 14 inches in downtown Los Angeles.

3.2.3 WIND FLOW PATTERNS

Wind flow patterns play an important role in the transport of air pollutants in the Basin. The winds flow from offshore and blow eastward during the daytime hours. In summer, the sea breeze starts in mid-morning, peaks at 10-15 miles per hour, and subsides after sundown. There is a calm period until about midnight. At that time, the land breeze begins from the northwest, typically becoming calm again about sunrise. In winter, the same general wind flow patterns exist except that summer wind speeds average slightly higher than winter wind speeds. This pattern of low wind speeds is a major factor that allows the pollutants to accumulate in the Basin.

The normal wind patterns in the Basin are interrupted by the unstable air accompanying the passing storms during the winter and infrequent strong northeasterly Santa Ana wind flows from the mountains and deserts north of the Basin.

3.2.4 EXISTING AIR QUALITY

Local air quality in the Basin is monitored by the SCAQMD, which operates a network of monitoring stations throughout the Basin. CARB operates additional monitoring stations.

3.2.4.1 Criteria Pollutants

The sources of air contaminants in the Basin vary by pollutant but generally include on-road mobile sources (e.g., automobiles, trucks and buses), other off-road mobile sources (e.g., airplanes, ships, trains, construction equipment, etc.), residential/commercial sources, and industrial/manufacturing sources. Mobile sources are responsible for a large portion of the total Basin emissions of several pollutants.

Mobile sources, both on-road and off-road, continue to be the major contributors for each of the five criteria pollutants monitored in the Basin. For example, mobile sources represent 64 percent of VOC emissions, 91 percent of NOx emissions, and 98 percent of CO emissions. For directly emitted particulate matter less than 2.5 microns in diameter (PM2.5), mobile sources represent 39 percent of the emissions with another 20 percent due to vehicle-related entrained road dust (SCAQMD, 2007).

Criteria air pollutants are those pollutants for which the federal and state governments have established ambient air quality standards or criteria for outdoor concentrations in order to protect public health with a margin of safety (see Table 3-1). National Ambient Air Quality Standards (NAAQS) were first authorized by the federal Clean Air Act of 1970 and have been set by the U.S. EPA. California Ambient Air Quality Standards were authorized by the state legislature in 1967 and have been set by CARB. Air quality of a region is considered to be in attainment of the standards if the measured concentrations of air pollutants are continuously equal to or less than the air quality standards over the previous three-year period.

Health-based air quality standards have been established by the U.S. EPA and the CARB for ozone, CO, NOx, PM10, PM2.5, SOx, and lead. The California standards are more stringent than the federal air quality standards. California also has established standards for sulfate, visibility, H_2S,

TABLE 3-1

Federal and State Ambient Air Quality Standards

	STATE STANDARD	FEDERAL PRIMARY STANDARD	MOST RELEVANT EFFECTS
AIR POLLUTANT	CONCENTRATION/ AVERAGING TIME	CONCENTRATION/ AVERAGING TIME	
Ozone	0.09 ppm, 1-hr. avg. > 0.07 ppm, 8-hr	0.08 ppm, 8-hr avg>	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage
Carbon Monoxide	9.0 ppm, 8-hr avg. > 20 ppm, 1-hr avg. >	9 ppm, 8-hr avg.> 35 ppm, 1-hr avg.>	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
Nitrogen Dioxide	0.25 ppm, 1-hr avg. >	0.053 ppm, ann. avg.>	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
Sulfur Dioxide	0.04 ppm, 24-hr avg.> 0.25 ppm, 1-hr. avg. >	0.03 ppm, ann. avg.> 0.14 ppm, 24-hr avg.>	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM10)	20 µg/m^3, ann. arithmetic mean > 50 µg/m^3, 24-hr average>	Annual standard revoked in 2006 arithmetic mean > 150 µg/m^3, 24-hr avg.>	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease; (b) Excess seasonal declines in pulmonary function, especially in children
Suspended Particulate Matter (PM2.5)	12 µg/m^3, ann. Arithmetic mean	15 µg/m^3, annual arithmetic mean> 35 µg/m^3, 24-hour average>(1)	Decreased lung function from exposures and exacerbation of symptoms in sensitive patients with respiratory disease; elderly; children.
Sulfates	1 µg/m^3, 24-hr avg. >=		(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead	1.5 µg/m^3, 30-day avg. >=	1.5 µg/m^3, calendar quarter>	(a) Increased body burden; (b) Impairment of blood formation and nerve conduction
Visibility-Reducing Particles	In sufficient amount to give an extinction coefficient >0.23 inverse kilometers (visual range to less than 10 miles) with relative humidity less than 70%, 8-hour average (10am – 6pm PST)		Visibility impairment on days when relative humidity is less than 70 percent

(1) The U.S. EPA lowered the PM2.5 24-hour average standard from 65 ug/m^3 to 35 ug/m^3 in September 2006.
Note: ppm = parts per million
µg/m^3 = micrograms per cubic meter

and vinyl chloride. H_2S and vinyl chloride currently are not monitored in the Basin because they are not a regional air quality problem, but are generally associated with localized emission sources. The Basin is currently designated as non-attainment for PM10, PM2.5, and ozone for both state and federal standards. The Basin, including the project area, is classified as attainment for both the state and federal standards for CO, NOx, SOx, sulfates, and lead.

3.2.4.2 Regional Air Quality

The SCAQMD monitors levels of various criteria pollutants at approximately 30 monitoring stations. In 2006, the maximum ozone, PM10 and PM2.5 concentrations continued to exceed federal standards by wide margins. Maximum one-hour and eight-hour average ozone concentrations (0.180 parts per million (ppm) and 0.142 ppm, recorded in the east San Gabriel Valley and central San Bernardino Mountain areas, respectively) were 150 and 178 percent of the federal standard. The central San Bernardino Mountain area has remained as the most affected area in terms of the number of days exceeding the eight-hour federal ozone standard in recent years (SCAQMD, 2006), with 59 days in 2006, followed by the Perris Valley with 53 days in 2006 (SCAQMD, 2006). Other areas that exceeded the state ozone standards included the San Gabriel Valley, San Fernando Valley, San Bernardino and Riverside counties including the Coachella Valley (SCAQMD, 2006).

Maximum 24-hour average and annual average PM10 concentrations (142 micrograms per cubic meter (ug/m^3)) recorded in the Central San Bernardino Valley area and 125 ug/m^3 recorded in the Perris Valley area in the Riverside County area) were 94 and 83 percent of the federal 24-hour and annual average standards, respectively. Maximum 24-hour average and annual average PM2.5 concentrations (72.2 ug/m^3 recorded in south San Gabriel Valley area and 68.5 ug/m^3 recorded in Metropolitan Riverside County area) were 206 and 196 percent of the federal 24-hour and annual average standards, respectively (SCAQMD, 2006).

The CO concentrations did not exceed the standards in 2006. The highest eight-hour average CO concentration recorded (6.4 ppm in south central Los Angeles County area) was ten percent of the federal CO standard. The maximum annual average NO_2 concentration (0.0310 ppm recorded in the northwest San Bernardino Valley area) was 58 percent of the federal standard. Concentrations of other pollutants remained well below the federal standards (SCAQMD, 2006).

In 2006, neither federal nor state standards for NO_2, SO_2 or lead were exceeded. Currently, the District is in attainment with the ambient air quality standards for CO, lead, SO_2, and NO_2. In 2006, the sulfate standard was exceeded in the San Gabriel valley on one day, or on 1.7 percent of the days sampled (SCAQMD, 2006).

3.2.4.3 Local Air Quality

The project site is located within the SCAQMD's Southwest Coastal Los Angeles County 2 source receptor area. Recent background air quality data for criteria pollutants for the Southwest Coastal Los Angeles County 2 monitoring station are presented in Table 3-2. The area has shown a general improvement in air quality with decreasing or consistent concentrations of most pollutants (see Table 3-2). Air quality in the Southwest Coastal Los Angeles County 2 source receptor area complies with the state and federal ambient air quality standards for CO, NO_2, SO_2 and lead. The

TABLE 3-2

Ambient Air Quality Southwest Coastal Los Angeles County 2 Monitoring Station (2002-2006) Maximum Observed Concentrations

CONSTITUENT		2002	2003	2004	2005	2006
Ozone:	1-Hour (ppm)	0.088	0.110	0.120*	0.086	0.08
	Federal Standard	(0)	(0)	(0*)	(0)	(0)
	State Standard	(0)	(2)	(4*)	(0)	(0)
	8-Hour (ppm)	0.073	0.078	0.100*	0.076	0.066
	Federal Standard	(0)	(0)	(4*)	(0)	(0)
	State Standard	(--)	(--)	(13*)	(1)	(0)
Carbon Monoxide:						
	1-Hour (ppm)	7	7	6*	3	3
	8-Hour (ppm)	6.1	5.0	4.4*	2.1	2.3
	Federal Standard	(0)	(0)	(0*)	(0)	(0)
	State Standard	(0)	(0)	(0*)	(0)	(0)
Nitrogen Dioxide:						
	1-Hour (ppm)	0.10*	0.12	0.09*	0.09	0.02
	State Standard	(0)	(--)	(--)	(--)	(--)
	24-Hour (ppm)	--	--	--	--	0.006
	Annual (ppm)	0.0244*	0.0238	0.0136*	0.0134	0.0020
PM10:	24-Hour (ug/m^3)	121	58	47*	44	45
	Federal Standard	(0)	(0)	(0*)	(0)	(0)
	State Standard	(19.7%)	(4.9%)	(0.0*%)	(0.0%)	(0.0%)
	Annual (ug/m^3)					
	Geometric Mean	34.1	(--)	(--)	(--)	(--)
	Arithmetic Mean	37.4	29.7	25.1*	22.9	26.5
PM2.5:	24-Hour (ug/m^3)	--	--	--	--	--
	Federal Standard	(--)	(--)	(--)	(--)	(--)
	Annual Arithmetic Mean (ug/m^3)	--	--	--	--	--
Sulfur Dioxide:						
	1-Hour (ppm)	0.07	0.03	0.02*	0.04	0.02
	24-Hour (ppm)	0.007	0.006	0.007*	0.012	0.006
	Annual Arithmetic Mean (ppm)	--	--	--	--	0.0020
Lead:	30-Day (ug/m^3)	0.02	0.17	0.01	--	0.01
	Quarter (ug/m^3)	0.02	0.10	0.01	--	0.01
Sulfate:	24-Hour (ug/m^3)	15.6	16.4	14.3	--	13.6
	State Standard	(0%)	(0%)	(0%)	(--)	(0%)

Source: SCAQMD Air Quality Data Annual Summaries 2002-2006.

Notes: (18) = Number of days or percent of samples exceeding the state standard, (--) = Not monitored, ppm = parts per million, ug/m^3 = micrograms per cubic meter, * = Less than 12 full months of data, so data may not be representative.

air quality in the area also is in compliance with the federal eight-hour ozone standard and the federal and state 24-hour PM10 standard.

The monitoring station in the Southwest Coastal Los Angeles County 2 area source receptor did not monitor PM2.5 levels in 2006. The nearest monitoring station to the proposed project that did monitor PM2.5 levels in 2006 is the South Coastal Los Angeles County station. The air quality in the South Coastal Los Angeles County source receptor area exceeded the federal 24-hour PM2.5 standards on 1.7 percent of the days sampled. The air quality in this monitoring area also exceeds PM2.5 state annual average standards (SCAQMD, 2006).

3.2.4.4 Chevron Products Company El Segundo Refinery Criteria Pollutant Emissions

Operation of the existing Chevron Products Company El Segundo Refinery results in the emissions of criteria pollutants. The reported emissions of criteria air pollutants from the Refinery for the last five-year period, based on the annual emission fee reports prepared for the SCAQMD, are shown in Table 3-3. The emissions in Table 3-3 are based on actual operations and not the maximum potential to emit (PTE). Baseline for the Refinery is considered to be the actual emissions for the facility, unless the units have reached their PTE, in which case PTE is considered to be the baseline, e.g., the ISOMAX heaters have reached their PTE during recent Refinery operations so that the baseline is the PTE. The Chevron Products Company El Segundo Refinery is permitted for higher emissions than presented in Table 3-3.

TABLE 3-3

Chevron El Segundo Refinery
Reported Criteria Pollutant Emissions (Tons/Year)

Reporting Period	CO	VOC	NOx	SOx	PM10
2002-2003	3,104	825	1,023	1,179	272
2003-2004	3,222	1,011	1,036	1,288	420
2004-2005	2,068	775	1,088	1,142	427
2005-2006	892	631	1,007	396	357
2006-2007	765	588	902	388	318

The baseline for the Refinery was determined using five years of actual operational data because of the cyclical nature of the refining processes. Five years provides a reasonable period of time to take into consideration the variability of the refining operations, e.g., unit shutdowns for maintenance or repair, equipment replacement/repair, equipment failures, etc. In addition, the five-year baseline takes into consideration catalyst behavior which is generally more efficient during the earlier periods of use (catalysts generally require replacement every three to five years).

3.2.4.5 Toxic Air Contaminants

The California Health and Safety Code (§39655) defines a TAC as an air pollutant which may cause or contribute to an increase in mortality, an increase in serious illness, or which may pose a present or potential hazard to human health. Under California's TAC program

(Assembly Bill 1807, Health and Safety Code §39650 et seq.), the CARB, with the participation of the local air pollution control districts, evaluates and develops any needed control measures for air toxics. The general goal of regulatory agencies is to limit exposure to TACs to the maximum extent feasible.

Monitoring for TACs is limited compared to monitoring for criteria pollutants because toxic pollutant impacts are typically more localized than criteria pollutant impacts. CARB conducts air monitoring for a number of TACs every 12 days at approximately 20 sites throughout California. The Refinery is located closest to the North Long Beach Monitoring station. A summary of the averaged data from 2006 monitoring from the North Long Beach station for various TACs is considered to be an appropriate estimate of the TAC concentration in the vicinity of the Refinery (see Table 3-4).

The SCAQMD measured TAC concentrations as part of its Multiple Air Toxic Exposure Study, referred to as MATES. The purpose of the study is to provide an estimate of exposure to TACs to individuals within the Basin. In the second study, MATES-II, the SCAQMD conducted air sampling at about 24 different sites for over 30 different TACs between April 1998 and March 1999. The Final MATES-II Report from this study indicated the following: (1) cancer risk levels appear to be decreasing since 1990 by about 44 percent to 63 percent; (2) mobile source components dominate the risk; (3) approximately 70 percent of all risk is attributed to diesel particulate emissions; (4) about 20 percent of all risk is attributed to other toxics associated with mobile sources; (5) about 10 percent of all risk is attributed to stationary sources; and (6) no local "hot spots" have been identified. The average carcinogenic risk in the Basin is about 1,400 per million people. This means that 1,400 people out of a million are susceptible to contracting cancer from exposure to the known TACs over a 70-year period of time. The cumulative risk averaged over the four counties (Los Angeles, Orange, Riverside and San Bernardino) 980 in one million when diesel sources are included and about 260 in one million when diesel sources are excluded. Of the monitoring sites in the MATES-II study, the Hawthorne microscale study site is the closest to the Chevron Refinery. The Hawthorne site identified no specific stationary sources of toxic emissions within the prescribed monitoring area. The results of the monitoring for the Hawthorne site indicate that regional emissions (e.g., mobile sources) overwhelm local influences (local stationary sources). The complete final Report on the MATES-II study is available from the SCAQMD (SCAQMD, 2000).

The SCAQMD recently concluded a third study, referred to as MATES-III, that includes monitoring for 21 TACs at ten fixed, and five temporary, sites within the Basin in neighborhoods near toxic emission sources or in areas where community members are concerned about health risks from air pollution. The initial scope of the monitoring was for a one-year period from April 2004 through March 2005. Due to heavy rains in the Basin in the fall and winter of this period, there was concern that the measurements may not be reflective of typical meteorology. The study was thus extended for a second year from April 2005 through March 2006. The SCAQMD has released a Draft Report from this study, which is out for public review and comment period until April 4, 2008. The MATES-III found about 94 percent of the risk is attributed to emissions associated with

TABLE 3-4

Ambient Air Quality Toxic Air Contaminants – North Long Beach Maximum Concentration 2006

Pollutant	Annual average	Pollutant	Annual average
VOCs	**ppbv(1)**		**ppbv**
Acetaldehyde	3.8	Ethyl Benzene	0.7
Acetone	33	Formaldehyde	7.3
Acetonitrile	5.5	Methyl Bromide	0.08
Acrolein	1.3	Methyl Chloroform	0.23
Acrylonitrile	0.8	Methyl Ethyl Ketone	0.3
Benzene	1.8	Methyl tertiary - Butyl Ether	--
1,3 – Butadiene	0.57	Methylene Chloride	1.1
Carbon Disulfide	0.05	Perchloroethylene	0.28
Carbon Tetrachloride	--	Styrene	0.9
Chloroform	0.13	Toluene	15
o – Dichlorobenzene	0.15	Trichloroethylene	0.09
p – Dichlorobenzene	0.15	meta/para – Xylene	2.7
cis – 1,3 – Dichloropropene	0.05	Ortho – Xylene	1.0
trans – 1,3 – Dichloropropene	0.05		
PAHs(2)	**nanograms/m^3(3)**		**Nanograms/m^3**
Benzo(a)pyrene	0.61	Benzo(k)fluoranthene	0.019
Benzo(b)fluoranthene	0.51	Dibenz(a,h)anthracene	0.18
Benzo(g,h,i)perylene	1.7	Indeno(1,2,3-cd)pyrene	0.64
Inorganic compounds(4)	**nanograms/m^3**		**nanograms/m^3**
Aluminum	1700	Nickel	9
Antimony	3	Phosphorous	35
Barium	56	Potassium	890
Bromine	9	Rubidium	4
Calcium	2300	Selenium	1
Chlorine	2000	Silicon	5600
Chromium	6	Strontium	24
Cobalt	7.5	Sulfur	1300
Copper	36	Tin	2.5
Hexavalent Chromium (5)	0.11	Titanium	140
Iron	1600	Uranium	1.5
Lead	12	Vanadium	23
Manganese	33	Yttrium	2
Mercury	1.5	Zinc	110
Molybdenum	1	Zirconium	7

Source: CARB, 2006. Annual Toxics Summary by Monitoring Sites.

(1) ppbv = parts per billion by volume.
(2) The most recent data for PAHs is for 2004.
(3) nanograms/m^3 = nanograms per cubic meter.
(4) The most recent data for inorganic compounds is from 2003.
(5) 2006 data.

mobile sources, and about six percent of the risk is attributed to toxics emitted from stationary sources, which include industries, and businesses such as dry cleaners and chrome plating operations. The results indicate that diesel exhaust is the major contributor to air toxics risk, accounting for about 84 percent of the total. Compared to previous studies of air toxics in the Basin, this study found a decreasing risk for air toxics exposure, with the population weighted risk down by 17 percent from the analysis in MATES-II. The highest risks are found near the port area, an area near central Los Angeles, and near transportation corridors. The average carcinogenic risk in the Basin is about 1,200 per million people. This means that 1,200 people out of a million are susceptible to contracting cancer from exposure to the known TACs over a 70-year period of time. Of the monitoring sites in the MATES-III study, the North Long Beach study site is the closest to the Chevron Refinery. The results of the monitoring for the North Long Beach site indicate that regional emissions (e.g., mobile sources) overwhelm local influences (local stationary sources). The complete Draft Report on the MATES-III study is available online and can be accessed from the SCAQMD websie at http://www.aqmd.gov/prdas/matesIII/matesIII.html. Once the MATES-III study results are finalized and adopted by the SCAQMD Governing Board, they will supercede the MATES-II study results.

3.2.4.6 Greenhouse Gases

Global warming is the observed increase in average temperature of the earth's surface and atmosphere. An identified contributor to global warming is an increase of GHGs in the atmosphere. Due to the global nature of the effects of greenhouse gases, the environmental setting, and applicable impacts are primarily discussed in Chapter 5 – Cumulative Impacts.

3.2.5 REGULATORY BACKGROUND

Ambient air quality standards in California are the responsibility of, and have been established by, both the U.S. EPA and CARB. These standards have been set at concentrations, which provide margins of safety for the protection of public health and welfare. Federal and state air quality standards are presented in Table 3-1. The SCAQMD has established levels of episodic criteria and has indicated measures that must be initiated to immediately reduce contaminant emissions when these levels are reached or exceeded. The federal, state, and local air quality regulations are identified below in further detail.

3.2.5.1 Federal Regulations

The U.S. EPA is responsible for setting and enforcing the NAAQS for ozone, CO, NO_2, SO_2, PM10, PM2.5, and lead. The U.S. EPA has primary jurisdiction over emissions sources that are under the primary authority of the federal government including aircraft, locomotives, and emissions sources (marine vessels) outside state waters (Outer Continental Shelf). However, SCAQMD rules apply to stationary sources in the Outer Continental Shelf as authorized in the Clean Air Act. The U.S. EPA also establishes emission standards for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission requirements of the CARB.

In 1990, the amendments to the federal CAA conditionally required states to implement programs in federal CO non-attainment areas to require gasoline to contain a minimum oxygen content in the winter beginning in November 1992. In response to the federal CAA requirements to reduce CO emissions, California established a wintertime oxygenate gasoline program requiring between 1.8 and 2.2 weight percent oxygen content in gasoline.

Other federal regulations applicable to the proposed project include Title III of the Clean Air Act, which regulates TACs. Title V of the Act establishes a federal permit program. The Refinery has submitted its Title V permit application and the proposed project will require modifications to the Title V application and/or operating permit. The Title V program is implemented by the SCAQMD in the southern California area. The U.S. EPA also has authority over the PSD Program with some authority delegated to the SCAQMD and a PSD review may be required for the proposed project because the proposed Refinery modifications will result in an increase in NOx and SOx emissions.

3.2.5.2 California Regulations

CARB, which became part of the California Environmental Protection Agency in 1991, is responsible for ensuring implementation of the California Clean Air Act and federal Clean Air Act, and for regulating emissions from consumer products and motor vehicles. CARB has established California Ambient Air Quality Standards for all pollutants for which the federal government has NAAQS and also has standards for sulfates, visibility, H_2S and vinyl chloride. H_2S and vinyl chloride are not measured at any monitoring stations in the Basin because they are not considered to be a regional air quality problem. California standards are generally more stringent than the NAAQS. CARB has established emission standards for vehicles sold in California and for various types of equipment. CARB also sets fuel specifications to reduce vehicular emissions, although it has no direct regulatory approval authority over the proposed project. Federal and state air quality standards are presented in Table 3-1.

California gasoline specifications are governed by both state and federal agencies. During the past decade, federal and state agencies have imposed numerous requirements on the production and sale of gasoline in California. CARB adopted the Reformulated Gasoline Phase III regulations that required, among other things, that California phase out the use of MTBE in gasoline.

The California Clean Air Act (AB2595) mandates achievement of the maximum degree of emission reductions possible from vehicular and other mobile sources in order to attain the state ambient air quality standards by the earliest practical date.

California also has established a state air toxics program (AB1807, Tanner) which was revised by the new Tanner Bill (AB2728). This program sets forth provisions to implement the national program for control of hazardous air pollutants.

The Air Toxic "Hot Spots" Information and Assessment Act (AB2588), as amended by Senate Bill 1731 (SB1731), requires operators of certain stationary sources to inventory air toxic emissions from their operations and, if directed to do so by the local air district, prepare a health risk assessment to determine the potential health impacts of such emissions. If the health impacts are determined to be "significant" (cancer risk greater than 10 per million exposures or non-cancer hazard index greater than 1.0), each facility operator must, upon approval of the health risk assessment, provide public notification to affected individuals.

3.2.5.3 Local Regulations

The Basin is under the jurisdiction of the SCAQMD, which has regulatory authority over stationary sources, air pollution control equipment, and limited authority over mobile sources. The SCAQMD is responsible for air quality planning in the Basin and development of the Air Quality Management Plan (AQMP). The AQMP establishes the strategies that will be used to achieve compliance with National and California Ambient Air Quality Standards in all areas within the SCAQMD's jurisdiction. The SCAQMD generally regulates stationary sources of air pollutants. There are a number of SCAQMD regulations that may apply to the proposed project including Regulation II – Permits, Regulation III – Fees, Regulation IV – Prohibitions, Regulation IX – New Source Performance Standards, Regulation X - National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Regulations, Regulation XI – Source Specific Standards, Regulation XIII – New Source Review, Regulation XIV – Toxics and Other Non-criteria Pollutants (including Rule 1401 - New Source Review of Toxic Air Contaminants, and Rule 1403 - Asbestos Emissions from Demolition/Renovation Activities), Regulation XVII – Prevention of Significant Deterioration, Regulation XX – Regional Clean Air Incentives Market (RECLAIM) Program, and Regulation XXX – Title V Permits.

3.3 ENERGY

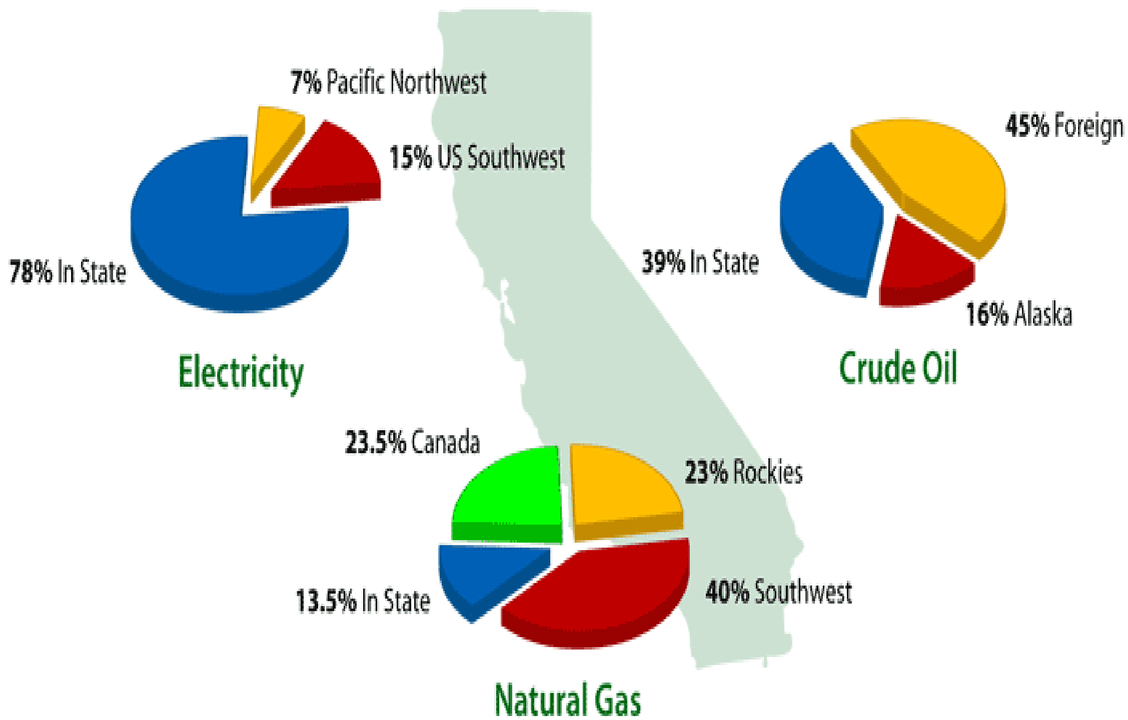
3.3.1 STATEWIDE ENERGY TRENDS

Figure 3-1 shows California's major sources of energy. In 2006, 39 percent of the crude oil came from in-state, with 16 percent coming from Alaska, and 45 percent being supplied by foreign sources. Also in 2006, 78 percent of the electricity came from in-state sources, while 22 percent was imported into the state. The electricity imported totaled 64,763 gigawatt hours (gWh), with 19,804 gWh coming from the Pacific Northwest and 44,959 gWh from the Southwest (CEC, 2007b). (Note: A gigawatt is equal to one million kilowatts). For natural gas in 2006, 40 percent came from the Southwest, 23 percent from Canada, 14 percent from in-state, and 23 percent from the Rockies (CEC, 2007a).

3.3.1.1 Electricity

Power plants in California provided approximately 78 percent of the in-state electricity demand in 2006. Hydroelectric power from the Pacific Northwest provides another 7 percent, and power plants in the Southwestern U.S. provide another 15 percent. The relative contribution of in-state and out-of-state power plants depends upon, among other factors, the precipitation that occurred in the previous year and the corresponding amount of hydroelectric power that is available. Two of the largest power plants in California are located in southern California: Alamitos and Redondo Beach. Both of these plants consume natural gas to produce electricity. San Onofre, the state's largest power plant in terms of net capability, is nuclear powered and is located in San Diego County. In addition in Southern California, a significant percentage of our imported power comes from plants that are generally coal-fired facilities.

FIGURE 3-1
California's Major Sources of Energy (2006)



Local electricity distribution service is provided to customers within southern California by one of two privately owned utilities – either SCE or San Diego-based Sempra Energy – or by a publicly-owned utility, such as the Los Angeles Department of Water and Power.

SCE is the largest electricity utility in southern California with a service area that covers all or nearly all of Orange, San Bernardino, and Ventura counties, and most of Los Angeles and Riverside counties. SCE provides approximately 70 percent of the total electricity demand in southern California.

The Los Angeles Department of Water and Power is the largest of the publicly owned electric utilities in southern California. Los Angeles Department of Water and Power provides electricity service to most customers located in the City of Los Angeles and provides approximately 20 percent of the total electricity demand in the Basin.

Table 3-5 shows the amount of electricity delivered to residential and nonresidential entities in Los Angeles County in 2005 (CEC, 2007).

TABLE 3-5

California Utility Electricity Deliveries for 2005

	Residential		Non-residential		Total	
County	**Number of Accounts**	**kWh[1] (million)**	**Number of Accounts**	**kWh (million)**	**Number of Accounts**	**kWh (million)**
Los Angeles	3,071,899	19,796	358,286	49,380	3,430,185	69,177

California Energy Commission (CEC, 2007)

[1] kilowatt-hour (kWh): The most commonly-used unit of measure telling the amount of electricity consumed over time. It means one kilowatt (1000 watts) of electricity supplied for one hour.

The Chevron Refinery currently operates three existing Cogeneration Units generating power and high pressure steam to operate refinery equipment. Electricity supply at the Refinery is supplemented by SCE, providing approximately 20 MW.

3.3.1.2 Liquid Petroleum Fuels

California is currently ranked fourth in the nation among oil producing states, behind Louisiana, Texas, and Alaska, respectively. Crude oil production in California averaged 731,150 BPD in 2004, a decline of 4.7 percent from 2003. Statewide oil production has declined to levels not seen since 1943. In 2005, the total receipts to refineries of roughly 674 million barrels came from in-state oil production (39.4 percent), combined with oil from Alaska (20.1 percent), and foreign sources (40.4 percent) (CEC, 2006b).

California is the major refining center for West Coast petroleum markets with combined crude oil distillation capacity totaling more than 1.9 million BPD, ranking the state third highest in the nation. California ranks first in the U.S. in gasoline consumption and second in jet fuel consumption (CEC, 2006).

A large network of crude oil pipelines connect producing areas with refineries that are located in the San Francisco Bay area, Los Angeles area and the Central Valley. Major ports in northern and southern California receive Alaska North Slope and foreign crude oil for processing in many of the state's 21 refineries (CEC, 2006b).

Most gasoline and diesel fuel sold in California for on-road motor vehicles is refined in California to meet state-specific formulations required by CARB. Major petroleum refineries in California are concentrated in three counties: Contra Costa County in northern

California, Kern County in central California, and Los Angeles County in southern California. In Los Angeles County, petroleum refineries are located mostly in the southern portion of the county (SCAG, 2005).

Californians use nearly 44 million gallons of gasoline and 10 million gallons of diesel every day. California refineries produce these fuels and other products from crude oil and blending components. Transportation fuel production in California depends on the availability and quality of the crude oils used by refineries in the state. The supply of crude oil to California refineries has changed substantially in the last 10 years. Most notably, receipts of foreign crude oil have increased as production sources from California and Alaska have continued to decline (CEC, 2006c).

In the last two decades, California refineries have been running increasingly closer to capacity levels. Southern California refineries have also shown an increasing level of crude oil imports during this same period. In addition, refineries are also required to meet new diesel regulations promulgated by the U.S. EPA and CARB. The U.S. EPA lowered the allowable amount of sulfur in on-road diesel fuel from less than 500 ppm to less than 15 ppm. This requirement became effective in 2006. The sulfur content and American Petroleum Institute (API) gravity of crude oil input to the Refinery in conjunction with the complexity of process units will affect the quantity of ULSD produced by the facility. The hydrocracking and hydrotreater units recover sulfur at the Refinery. Recovered sulfur is converted into elemental sulfur for commercial sale. Hydrocracking units also break hydrocarbon molecules into lighter compounds in the presence of hydrogen. Refineries throughout the U.S. have upgraded their desulfurization processes in order to meet the new diesel sulfur standards. This upgrade typically involves techniques such as changing the catalyst in the hydrotreater or installing booster pumps to force more feedstock through the unit. Both hydrocrackers and hydrotreaters also remove heavy metals and aromatics from the feedstock. This is particularly important in California where lower aromatic standards will be required along with the new ULSD standards (CEC, 2006c).

3.3.2 REGULATORY BACKGROUND

Federal and state agencies regulate energy use and consumption through various programs. On the federal level, the U.S. DOT, United States Department of Energy (U.S. DOE), and U.S. EPA are three agencies with substantial influence over energy policies and programs. Generally, federal agencies influence transportation energy consumption through establishment and enforcement of fuel economy standards for automobiles and light trucks, through funding of energy related research and development projects, and through funding for transportation infrastructure projects. On the state level, the California Public Utilities Commission (CPUC) and CEC are two agencies with authority over different aspects of energy. The CPUC regulates privately-owned utilities in the energy, rail, telecommunications, and water fields. The CEC collects and analyzes energy-related data, prepares state-wide energy policy recommendations and plans, promotes and funds energy efficiency programs, and regulates the power plant siting process. California is preempted under federal law from setting state fuel economy standards for new on-road motor vehicles. Some of the more relevant federal and state transportation-energy-related laws and plans are discussed in the following subsections.

3.3.2.1 Federal Regulations

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the National Highway Traffic and Safety Administration, which is part of the U.S. DOT, is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon. Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 miles per gallon. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with federal fuel economy standards is not determined for each individual vehicle model, but rather, compliance is determined on the basis of each manufacturer's average fuel economy for the portion of their vehicles produced for sale in the U.S. The Corporate Average Fuel Economy (CAFE) program, which is administered by U.S. EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. The U.S. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the U.S. DOT is authorized to assess penalties for noncompliance.

In late 2007, CAFE standards received their first overhaul in more than 30 years. On December 19, President Bush signed into law the Clean Energy Act of 2007, which requires in part that automakers boost fleetwide gas mileage to 35 mpg by the year 2020. This requirement applies to all passenger automobiles, including “light trucks.” The bill signed into law December 2007 was an 822-page document changing U.S. energy policy in many areas. Key provisions were:

- Improved vehicle fuel economy.
- Increased CAFE standards. Automakers are required to boost fleetwide gas mileage to 35 miles per gallon (14.8 kilometers per liter) by 2020. This applies to all passenger automobiles, including “light trucks.”
- Improved vehicle technology and transportation electrification. Incentives for the development of plug-in hybrids.
- New conservation requirements for federal vehicle fleets.

- Increased production of biofuels. The total amount of biofuels added to gasoline is required to increase to 36 billion gallons by 2022, from the 4.7 billion gallons in 2007. The Energy Act specifies that 21 billion gallons of the 2022 total must be derived from non-cornstarch products (e.g., sugar or cellulose).

Intermodal Surface Transportation Efficiency Act

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) promoted the development of inter-modal transportation systems to maximize mobility as well as address national and local interests in air quality and energy. ISTEA contained factors that Metropolitan Planning Organizations (MPOs), such as SCAG, were to address in developing transportation plans and programs, including some energy-related factors. To meet the new ISTEA requirements, MPOs adopted explicit policies defining the social, economic, energy, and environmental values that were to guide transportation decisions in that metropolitan area. The planning process for specific projects would then address these policies. Another requirement was to consider the consistency of transportation planning with federal, state, and local energy goals. Through this requirement, energy consumption was expected to become a decision criterion, along with cost and other values that determine the best transportation solution.

Transportation Equity Act for the 21st Century

The Transportation Equity Act for the 21st Century (TEA-21) was signed into law in 1998 and builds upon the initiatives established in the ISTEA legislation, discussed above. TEA-21 authorizes highway, highway safety, transit, and other surface transportation programs for the next six years. TEA-21 continues the program structure established for highways and transit under ISTEA, such as flexibility in the use of funds, emphasis on measures to improve the environment, and focus on a strong planning process as the foundation of good transportation decisions. TEA-21 also provides for investment in research and its application to maximize the performance of the transportation system through, for example, deployment of Intelligent Transportation Systems, to help improve operations and management of transportation systems and vehicle safety.

Clean Cities Program

The U.S. DOE's Clean Cities Program promotes voluntary, locally-based government/industry partnerships for the purpose of expanding the use of alternatives to gasoline and diesel fuel by accelerating the deployment of alternative fuel vehicles (AFVs) and building a local AFV refueling infrastructure. The Clean Cities Program has created more than 70 partnerships in communities throughout the country. Six of these partnerships have been established in the southern California region: Coachella Valley, Lancaster, Long Beach, Los Angeles, Northwest Riverside, and one administered by SCAG (SCAG, 2005).

3.3.2.2 State Regulations

State of California Integrated Energy Policy Report

In 2002, the Legislature reconstituted the State's responsibility to develop an integrated energy plan for electricity, natural gas, and transportation fuels. On November 1, 2003, and every two years thereafter, the CEC, in consultation with other State energy agencies, must provide an overview of the major energy trends and issues facing California, including supply, demand, price, reliability, and efficiency. It must assess the impacts of these trends and issues on public health and safety, the economy, resources, and the environment. Finally, it must make policy recommendations to the Governor and the Legislature that are based on an in-depth and integrated analysis of the most current and pressing energy issues facing the State (SCAG, 2005).

Reducing California's Petroleum Dependence

The CEC and CARB produced a joint report *Reducing California's Petroleum Dependence* to highlight petroleum consumption and to establish a performance based goal to reduce petroleum consumption in California over the next thirty years. The report includes the following recommendations to the Governor and Legislature regarding petroleum:

- Adopt the recommended statewide goal of reducing demand for on-road gasoline and diesel to 15 percent below the 2003 demand level by 2020 and maintaining that level for the foreseeable future.

- Work with the California delegation and other states to establish national fuel economy standards that double the fuel efficiency of new cars, light trucks, and sport utility vehicles.

- Establish a goal to increase the use of non-petroleum fuels to 20 percent of on-road fuel consumption by 2020, and 30 percent by 2030.

The CEC will use these recommendations when developing its series of recommendations to the Governor and Legislature for the integrated energy plan for electricity, natural gas, and transportation fuels (SCAG, 2005).

Renewables Portfolio Standard

California's renewables portfolio standard (RPS) requires retail sellers of electricity to increase their procurement of eligible renewable energy resources by at least one percent per year so that 20 percent of their retail sales are procured from eligible renewable energy resources by 2017. If a seller falls short in a given year, they must procure more renewables in succeeding years to make up the shortfall. Once a retail seller reaches 20 percent, they need not increase their procurement in succeeding years. The CEC and the CPUC are jointly implementing the standard.

California Environmental Quality Act

Appendix F of the CEQA Guidelines describes the types of information and analyses related to energy conservation that are to be included in EIRs that are prepared pursuant to the CEQA. In Appendix F of the CEQA Guidelines, energy conservation is described in terms of decreased per capita energy consumption, decreased reliance on natural gas and oil, and increased reliance on renewable energy sources. To assure that energy implications are considered in project decisions, EIRs must include a discussion of the potentially significant energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy.

3.4 HAZARDS AND HAZARDOUS MATERIAL

3.4.1 TYPES OF ON-SITE HAZARDS

In general, hazard impacts are not a discipline with specific environmental characteristics that can be easily described or quantified. Instead, hazard incidents consist of accidental occurrences that may create adverse effects on human health or the environment.

This section describes features of the existing environment as they relate to the risk of a major accident occurring at the Refinery. Factors which are taken into consideration to determine the magnitude of an upset event are as follows:

- The probability of an event occurring;
- The consequences of an event (exposures);
- The types of materials potentially involved in an upset event; and,
- The location of receptors e.g. residences, schools, and businesses that could be affected by upset events.

Potential hazards at a Refinery may include exposure to toxic gases, fires, vapor cloud explosions, thermal radiation, and overpressure. These hazards are described below.

Toxic gas releases: Toxic gas releases (e.g., ammonia and H_2S) could migrate off-site and create adverse health impacts to some exposed individuals. "Worst-case" conditions tend to arise when very low wind speeds coincide with accidental release, which can allow the chemicals to accumulate rather than disperse.

Torch fires (gas and liquefied gas releases), flash fires (liquefied gas releases), pool fires, and vapor cloud explosions (gas and liquefied gas releases): The rupture of a storage tank or vessels containing a flammable gaseous material (like propane), without immediate ignition, can result in a vapor cloud explosion. The "worst-case" upset occurs when a release occurs and produces a large aerosol cloud with flammable properties. If the flammable cloud does not ignite after dispersion, the cloud would simply dissipate. If the flammable cloud were to ignite during the release, a flash fire or vapor cloud explosion could occur. If the flammable cloud were to ignite immediately upon release, a torch fire would ensue.

Thermal Radiation: Thermal radiation is the heat generated by a fire and the potential impacts associated with exposure. Exposure to thermal radiation would result in burns, the severity of which would depend on the intensity of the fire, the duration of exposure, and the distance of an individual to the fire.

Explosion/Overpressure: Process vessels containing flammable explosive vapors and potential ignition sources are present at refineries. Explosions may occur if the flammable/explosive vapors came into contact with an ignition source. An explosion could cause impacts to individuals and structures in the area due to overpressure.

Based on a review of the existing Refinery operations and processes, the greatest potential for an upset condition to occur that would affect the public would result from the ignition of flammable material. The chemicals considered to pose the greatest public health risks are pressurized gases such as LPG, which is stored in large quantities at the Refinery. Both radiant heat and blast overpressures could result from ignition of an LPG release. Other events that could have offsite impacts are the release and ignition of LPG from a pipeline rupture and release of ammonia from ammonia storage facilities. These types of events are the most likely to occur in an industrial environment such as a refinery and establish the environmental setting.

Chevron currently adheres to the following safety design and process standards:

- The California Health and Safety Code Fire Protection specifications.
- The design standards for petroleum refinery equipment established by American Petroleum Institute, American Society of Mechanical Engineers, the American Institute of Chemical Engineers, the American National Standards Institute, and the American Society of Testing and Materials.
- The applicable federal and CalOSHA requirements.

Chevron maintains its own emergency response capabilities, including onsite equipment and trained emergency response personnel who are available to respond to emergency situations anywhere within the Refinery.

The Refinery also has prepared a RMP for the, butane, pentane, ammonia and other hazardous materials that are currently used at the Refinery. The City of El Segundo Fire Department administers this program. As indicated above, the Refinery prepared an Emergency Response Manual to address RMP concerns. This manual describes the emergency response procedures that would be followed in the event of any of several release scenarios and the responsibilities for key response personnel. The scenarios include the accidental release of the following:

- Ammonia stored in bulk tanks.
- Hydrogen sulfide as a component of various intermediate refinery streams.
- Natural gas or refinery fuel gas used throughout the Refinery involving both ignited and unignited vapors.
- LPG leaks involving both ignited and unignited vapors.
- Sulfuric acid used in the Alkylation Unit.
- Butane shipments from the facility.
- Constituents of the petroleum tanks that are located throughout the Refinery.

Modifications under the RMP and the California Accidental Release Prevention (CalARP) are required for covered processes if changes to usage or the process can reasonably be expected to produce a change by a factor of two in the distance to the endpoint for the off-site consequences analysis. Modifications are also required if there is a major change to the process requiring a new process hazard analysis.

Ammonia

Ammonia is the third highest volume chemical produced in the U.S. At atmospheric temperature and pressure, ammonia is a colorless gas with a distinct irritating odor. It is very soluble in water, which makes water useful in suppressing gaseous ammonia releases. Although ammonia is lighter than air, pressurized liquid ammonia released to the atmosphere initially forms a dense, cold ammonia mist. Depending on the concentration of the released ammonia, its vapors can irritate mucous membranes. If inhaled in large amounts, ammonia may injure the lungs, with possibly fatal results. Although ammonia is a flammable gas, high concentrations are required for ignition, so flammability typically is not a concern. Chevron has an on-site ammonia recovery plant which manufacturers and stores ammonia in an aqueous solution until it is used in NOx control systems or SCR systems at the Refinery. In addition, Chevron transports aqueous ammonia off-site for distribution to other users.

Anhydrous ammonia is a designated Acutely Hazardous Material (AHM). Because aqueous ammonia is much less hazardous than anhydrous ammonia, anhydrous ammonia applications at the Refinery, such as SCR systems, have been converted to aqueous ammonia applications.

Hydrogen Sulfide, Hydrogen

H_2S and hydrogen are produced and consumed in the refining process, but are not stored in substantial quantities because they are gases at standard temperature and pressures.

Liquefied Petroleum Gas (LPG)

LPG is the only pressurized chemical posing a risk of explosion at the Refinery. LPG (propane and butane) is stored at the Refinery, and LPG is transported into and out of the Refinery on a regular basis via trucks and rail cars.

The most serious accidents likely to occur at the Refinery would involve: stored LPG in an unconfined vapor cloud explosion (UVCE) due to failure of two-inch or smaller piping or fittings, an instantaneous release from a full catastrophic rupture of a storage sphere, or a boiling liquid expanding vapor explosion (BLEVE) resulting from structural failure of a sphere. The instantaneous release would yield worst-case overpressures and the BLEVE would yield worst-case radiant heat fluxes. The major LPG storage area within the Refinery is just to the northeast of the ISOMAX Complex. The LPG spheres are located a minimum of about 1,150 feet from the nearest property line – about 2,200 feet from the nearest residences – and are spaced about 50 feet apart.

Chevron's LPG storage facilities comply with American National Standards Institute (ANSI) and API standards requiring spheres with capacities greater than 12,500 barrels to be at least 200 feet from the nearest property line and spaced at least three feet apart. The supporting legs of the spheres are fireproofed to provide four hours of fire resistance, doubling API standards. The spheres have internal water injection systems that would, in the event of a leak in the supply or discharge piping or bottom connections, fill the bottom portion of the tank and raise the LPG level above the point of leakage, so that water would leak instead of LPG.

Drainage around the tanks is designed to prevent pooling of liquids beneath the tanks, and to conduct released liquids to an impoundment area. Fixed cooling water systems would provide a water film on the upper, gas-phase portions of the tanks, in case of a fire, and monitors provide a water spray to cool the lower portions of the tanks; the design water delivery rate is at least 0.25 gallon per minute per square foot.

3.4.2 TRANSPORTATION RISKS

Regulations for the transport of hazardous materials by public highway are described in 49 CFR 173 and 177. Although the transport of hazardous materials is regulated for safety by the U.S. DOT, there is a possibility that a tanker truck could be involved in an accident spilling its contents. The factors that enter into accident statistics include distance traveled and type of vehicle or transportation system. Factors affecting truck transportation accidents include the type of roadway, presence of road hazards, vehicle type, maintenance and physical condition, and driver training. A common reference frequently used in measuring probable risk of an accident is the number of accidents per million miles traveled. Complicating the assessment of probable risk is the fact that some accidents can cause significant damage without injury or fatality.

Every time hazardous materials are moved from the site of generation, opportunities are provided for accidental (unintentional) release. A study conducted by the U.S. EPA indicates that the expected number of hazardous materials spills per mile shipped ranges from one in one million to one in 100 million, depending on the type of road and transport vehicle used. The U.S. EPA analyzed accident and traffic volume data from New Jersey, California, and Texas, using the Resource Conservation and Recovery Act Risk/Cost Analysis Model and calculated the accident involvement rates presented in Table 3-6. The study concluded that the release rate for tank trucks is much lower than for any other container type (Los Angeles County, 1988). The data in Table 3-6 are for all types of trucks.

TABLE 3-6

Truck Accident Rates for Cargo on Highways

Highway Type	Accidents Per 1,000,000 miles
Interstate	0.13
U.S. and State Highways	0.45
Urban Roadways	0.73
Composite*	0.28

* Average number for transport on interstates, highways, and urban roadways.

3.4.3 REGULATORY BACKGROUND

There are many federal and state rules and regulations that refineries and petroleum storage facilities must comply with which serve to minimize the potential impacts associated with hazards at these facilities. The most important and relevant regulations relative to hazards are summarized in the following paragraphs.

Under OSHA regulations (29 CFR Part 1910), facilities which use, store, manufacture, handle, process, or move highly hazardous materials must prepare a fire prevention plan. In addition, 29 CFR Part 1910.119, PSM of Highly Hazardous Chemicals, and Title 8 of the CCRs, General Industry Safety Order §5189, specify required prevention program elements to protect workers at facilities that handle toxic, flammable, reactive or explosive materials. Prevention program elements are aimed at preventing or minimizing the consequences of catastrophic releases of the chemicals and include process hazard analyses, formal training programs for employees and contractors, investigation of equipment mechanical integrity, and an emergency response plan.

Section 112 (r) of the Clean Air Act Amendments of 1990 [42 U.S.C. 7401 et. Seq.] and Article 2, Chapter 6.95 of the California Health and Safety Code require facilities that handle listed regulated substances to develop RMPs to prevent accidental releases of these substances, U.S. EPA regulations are set forth in 40 CFR Part 68. In California, the CalARP Program regulation (CCR Title 19, Division 2, Chapter 4.5) was issued by the Governor's Office of Emergency Services (OES). RMPs consist of three main elements: a hazard assessment that includes off-site consequences analyses and a five-year accident history, a prevention program, and an emergency response program. RMPs for existing facilities were required to be submitted by June 21, 1999. Chevron has complied with the RMP requirements and has submitted the appropriate reports. The El Segundo Fire Department administers the CalARP program for the Refinery. The Refinery is also required to comply with the U.S. EPA's Emergency Planning and Community Right-to-Know Act (EPCRA), which requires annual reporting of releases from the Refinery and specific requirements in the event of an emergency release.

All Refinery facilities are required to have a SPCC Plan per the requirements of 40 Code of Federal Regulations, Section 112. The SPCC Plan is designed to prevent spills from on-site facilities and includes requirements for secondary containment, provides emergency response procedures, establishes training requirements, and so forth. Additional spill equipment is available through commercial contracts with suppliers that specialize in spill cleanup. Commercial contractors that specialize in oil cleanup are employed to place any additional booms or other spill capture equipment, if necessary, and to remove oil from the water, if the oil is released into waterways.

The Hazardous Materials Transportation (HMT) Act is the federal legislation that regulates transportation of hazardous materials. The primary regulatory authorities are the U.S. DOT, the Federal Highway Administration, and the Federal Railroad Administration. The HMT Act requires that carriers report accidental releases of hazardous materials to the DOT at the earliest practical moment (49 CFR Subchapter C). Incidents which must be reported involve deaths, injuries requiring hospitalization, and property damage exceeding $50,000. The Caltrans sets standards for trucks in California. The regulations are enforced by the California Highway Patrol.

California Assembly Bill 2185 requires local agencies to regulate the storage and handling of hazardous materials and requires development of a plan to mitigate the release of hazardous materials. Businesses that handle any of the specified hazardous materials must submit to government agencies (i.e., fire departments), an inventory of the hazardous materials, an emergency response plan, and an employee training program. The business plans must provide a description of the types of hazardous materials/waste on-site and the location of these materials. The information in the business plan can then be used in the event of an emergency to determine the appropriate response action, the need for public notification, and the need for evacuation.

3.5 HYDROLOGY AND WATER QUALITY

3.5.1 WATER SUPPLY

Water issues in the Los Angeles Basin are complex and affect supply, demand, and quality of water for domestic, commercial, industrial, and agricultural use. Since 1900, extensive water development has been carried out in the Los Angeles Basin. The Los Angeles Aqueduct, which imports water from the Owens Valley, was completed in 1913 and extended to the Mono Lake Basin in 1940. Due to restrictions on diversions from the Mono Basin and Owens Valley, the amount of water that can be diverted to the Los Angeles area has been reduced.

The Colorado River Aqueduct, which now provides approximately 25 percent of the region's water supply, was completed in 1941. Contracts allow the diversion of 1.21 million acre-feet per year to the Los Angeles area. Approximately 750,000 acre-feet were diverted by the Metropolitan Water District of Southern California during 2004.

In an average year, 70 to 75 percent of the water used in the Los Angeles area is imported from the Colorado River, the State Water Project via the California Aqueduct, and the eastern Sierras via the Los Angeles Aqueduct. Wells in the San Fernando Valley and other local groundwater basins supply approximately 15 percent of the water.

Between July 2004 and June 2005, approximately 2.06 million acre-feet of water were provided to the southern California area. About two-thirds of the water demand is for residential uses. About one-quarter of the demand is for commercial and governmental uses. Therefore, industrial use represents a small part of the overall water use in the Los Angeles area.

The Refinery currently consumes approximately 10 million gpd of water. Approximately 2.6 million gpd of fresh/potable water, which is purchased from the WBMWD, is used. In addition, approximately 7.5 million gpd of reclaimed water, which is also purchased from the WBMWD, is consumed. The WBMWD applies tertiary treatment to the secondary-treated effluent from the City of Los Angeles Hyperion Treatment Plant. Approximately 200,000 gpd of reclaimed water is used for irrigation of Refinery landscaping, approximately 3.5 million gpd of denitrified reclaimed water is used for the cooling towers, and approximately 3.8 million gpd of reclaimed water is used for boiler feed water.

3.5.2 WASTEWATER GENERATION

The Chevron Refinery is located adjacent to the Santa Monica Bay on the Pacific Ocean. The Bay is recognized by the U.S. EPA and the State as a natural resource of national significance. Effluent Limitations and Performance Goals are established in Chevron's NPDES Permit (No. CA0000337) for the protection of marine aquatic life and human health.

Refinery wastewater is currently collected and treated in two separate drain and treatment systems: a segregated system and an unsegregated system. The unsegregated system, which consists of an API separator and induced air flotation (IAF) units, is normally used for non-process wastewater, including cooling tower blowdown, steam condensate, a portion of the water pumped from groundwater recovery wells, and other wastewater streams containing free oil recovered with primary (physical) treatment only. Primary treatment consists of the separation of oil, water, and solids in two stages. During the first stage (API separator), wastewater moves very slowly through the separator allowing free oil to float to the surface and be skimmed off and solids to settle to the bottom. Periodically, the separator is shut down and the sludge is collected for disposal. The second stage utilizes an IAF unit, which bubbles air through the wastewater, and both oil and suspended solids are skimmed off the top. The unsegregated system is also used to collect and treat stormwater. Both structural (impoundments, berms, and curbs) and non-structural (inspections and training) controls are used to keep contaminants from entering the unsegregated system. The unsegregated system can be operated such that flow can be diverted to effluent diversion tankage or to the segregated treatment system, where additional treatment can be performed.

The segregated system is normally used to treat process wastewater containing emulsified oil, organic chemicals, and a portion of the water pumped from groundwater recovery wells. This system consists of gravity separators, a DAF unit, and activated sludge units for secondary (biological) treatment. In secondary treatment, dissolved oil and other organic pollutants may be consumed biologically by microorganisms. Effluent that does not meet the discharge limits may receive additional solids removal from an auxiliary off-specification DAF unit or be routed to two auxiliary effluent diversion tanks for additional IAF treatment. The biosolids from the biological treatment are disposed to the sanitary sewer for treatment by the Hyperion Treatment Plant under an Industrial Waste Discharge Permit.

Two auxiliary effluent diversion tanks are available for handling wastewater from either of the two systems and excess storm-water runoff. During severe rainstorms, excess runoff is collected and pumped into the diversion tanks, which have a holding capacity of about 13.8 million gallons. From the tanks, water can be routed to either system for treatment prior to discharge.

Under its NPDES Permit, the Chevron Refinery is authorized to discharge up to 8.8 million gpd of treated wastewater during dry weather and up to 23 million gpd during wet weather to the Santa Monica Bay, near Dockweiler State Beach in El Segundo. The wastewater is discharged through an outfall that is located approximately 3,500 feet offshore. Currently, the Refinery discharges approximately seven million gpd of treated wastewater during dry weather.

3.5.3 REGULATORY BACKGROUND

The primary objective of the Federal Water Pollution Control Act, otherwise known as the Clean Water Act (CWA), is to restore and maintain the chemical, physical, and biological integrity of the nation's surface waters. This Act requires industries that discharge wastewater to municipal sewer systems to meet pretreatment standards. The regulations authorize the U.S. EPA to set the pretreatment standards. The CWA regulates three categories of pollutants "priority" pollutants, including various toxic pollutants; "conventional" pollutants, such as biochemical oxygen demand (BOD), total suspended solids (TSS), oil and grease, and pH; and "non-conventional" pollutants, including any pollutant not identified as either conventional or priority. The regulations also allow the local treatment plants to set more stringent wastewater discharge requirements, if necessary, to meet local conditions.

The CWA regulates both direct and indirect discharges. The NPDES Program (CWA §502) controls direct discharges into waters of the United States. NPDES permits contain industry-specific, technology-based limits and may also include additional water quality-based limits, and establish pollutant monitoring requirements. A NPDES permit may also include discharge limits based on federal or state water quality criteria or standards. In 1987, the CWA was amended to require a program to address storm water discharges. In response, the U.S EPA promulgated the NPDES storm water permit application regulations.

The Porter-Cologne Water Quality Act is the state of California's primary water quality control law. It implements the state's responsibilities under the Federal Clean Water Act, but also establishes state wastewater discharge requirements. The RWQCB administers the state requirements as specified under the Porter-Cologne Water Quality Act, which include storm water discharge permits.

In response to the CWA, the SWRCB prepared two state-wide plans that address storm water runoff: the California Inland Surface Waters Plan and the California Enclosed Bays and Estuaries Plan. These Plans contain similar provisions and complement each other. Both establish numerous water quality objectives for water bodies. The California Enclosed Bays and Estuaries Plan specifies the Los Angeles-Long Beach Harbor (to which surface water from the Los Angeles River eventually flows) as an enclosed bay.

On June 13, 1994, the LARWQCB adopted an updated Water Quality Control Plan for the Los Angeles Region (LA Basin Plan). The LA Basin Plan incorporates by reference the SWRCB water quality control plans for ocean waters, control of temperature, significant SWRCB policies that are applicable to the Los Angeles Region, and the anti-degradation policy. The LA Basin Plan contains water quality objectives for, and lists the following beneficial uses of, water bodies in the vicinity of the Refinery:

- <u>Nearshore Zone</u> (Bounded by the shoreline and a line 1,000 feet from the shoreline or the 30-foot depth contour, whichever is farther from shore)

Existing Beneficial Uses: Industrial service supply, navigation, water-contact and non-water-contact recreation, ocean commercial and sport fishing, preservation of areas of special biological significance, preservation of rare and endangered species, marine habitat, shellfish harvesting, and fish spawning.

- Offshore Zone (Beyond the Nearshore Zone)

  Existing Beneficial Uses: Industrial service supply, navigation, water-contact and non-water-contact recreation, ocean commercial and sport fishing, preservation of rare and endangered species, marine habitat, and shellfish harvesting.

- Dockweiler Beach (Hydrologic Unit 405.12, specifically defined unit separate from the Nearshore Zone):

  Existing Beneficial Uses: Industrial service supply, navigation, water-contact recreation, non-water-contact recreation, commercial and sport fishing, marine habitat, and wild habitat.

  Potential Beneficial Uses: Spawning, reproduction, and/or early development of marine fishes

Because Chevron contains or treats all of its storm water flows, the only applicable requirement from the California General Storm Water Permit is to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP). The Refinery has complied with this requirement. Additionally, a SPCC Plan and an approved Emergency Response Plan have been prepared for the Refinery.

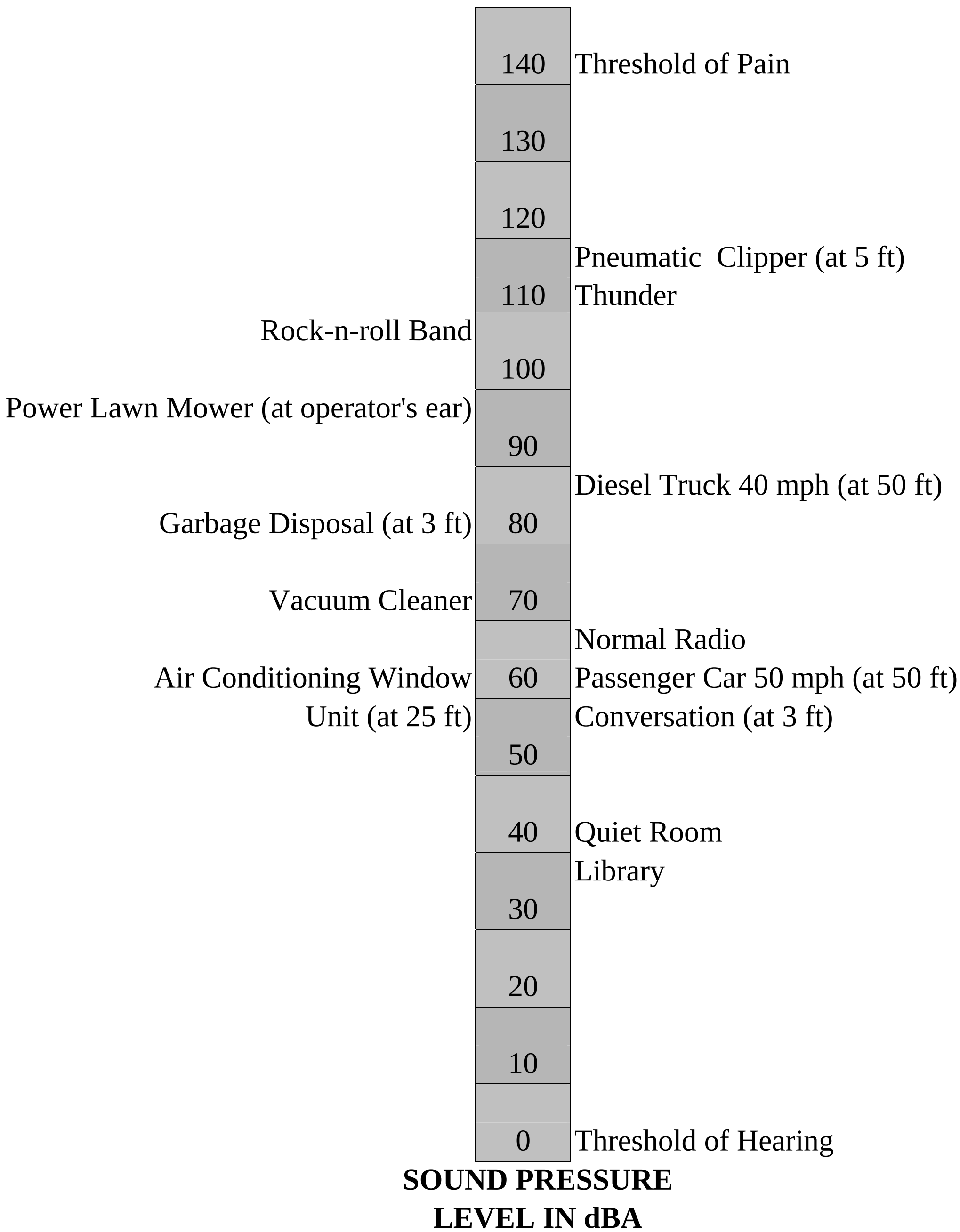
3.6 NOISE

3.6.1 INTRODUCTION

Noise is a by-product of urbanization and there are numerous noise sources and receptors in an urban community. Noise is generally defined as unwanted sound. The range of sound pressure perceived as sound is extremely large. The decibel is the preferred unit for measuring sound since it accounts for these variations using a relative scale adjusted to the human range for hearing (referred to as the A-weighted decibel or dBA). The A-weighted decibel is a method of sound measurement which assigns weighted values to selected frequency bands in an attempt to reflect how the human ear responds to sound. The range of human hearing is from 0 dBA (the threshold of hearing) to about 140 dBA which is the threshold for pain. Examples of noise and their A-weighted decibel levels are shown in Figure 3-2.

FIGURE 3-2

GENERAL NOISE SOURCES AND THEIR SOUND PRESSURE LEVELS



Sources: Industrial Noise Manual, 3rd Edition, AIHA, 1975; City of Long Beach, 1975

In addition to the actual instantaneous measurements of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. To analyze the overall noise levels in an area, noise events are combined for an instantaneous value or averaged over a specific time period. The time-weighted measure is referred to as equivalent sound level and represented by energy equivalent sound level (Leq). The percentage of time that a given sound level is exceeded also can be designated as L_{10}, L_{50}, L_{90}, etc. The subscript notes the percentage of time that the noise level was exceeded during the measurement period. Namely, an L_{10} indicates the sound level is exceeded 10 percent of the time and is generally taken to be indicative of the highest noise levels experienced at the site. The L_{90} is that level exceeded 90 percent of the time and this level is often called the base level of noise at a location. The L_{50} sound (that level exceeded 50 percent of the time) is frequently used in noise standards and ordinances.

The sound pressure level is measured on a logarithmic scale with the 0 dBA level based on the lowest detectable sound pressure level that people can perceive. Decibels cannot be added arithmetically, but rather are added on a logarithmic basis. A doubling of sound energy is equivalent to an increase of three dBA. Because of the nature of the human ear, a sound must be about 10 dBA greater than the reference sound to be judged twice as loud. In general, a three to five dBA change in community noise levels starts to become noticeable, while one-two dBA changes are generally not perceived (City of Los Angeles, 1998).

The State Department of Aeronautics and the California Commission of Housing and Community Development have adopted the Community Noise Exposure Levels (CNEL) to measure and regulate noise sources within communities. The CNEL is the adjusted noise exposure level for a 24-hour day and accounts for noise source, distance, duration, single event occurrence frequency, and time of day. The CNEL considers a weighted average noise level for the evening hours, from 7:00 p.m. to 10:00 p.m., increased by five dBA (i.e., an additional five dBA is added to all actual noise measurements), and the late evening and morning hour noise levels from 10:00 p.m. to 7:00 a.m., increased by 10 dBA (an additional 10 dBA is added to all actual noise measurements). The daytime noise levels are combined with these weighted levels and averaged to obtain a CNEL value. Using this formula, the CNEL weighted average noise level weights noise measurements taken in the evening and nighttime hours more heavily than noise during the daytime. The adjustment accounts for the lower tolerance of people to noise during the evening and nighttime period relative to the daytime period.

3.6.2 REFINERY EXISTING NOISE LEVELS

Land use in the vicinity of the Refinery is generally designated commercial and residential to the north; industrial, open, and public land to the east; residential to the south; and industrial to the west. The ambient noise environment in the project vicinity is composed of the contributions from equipment and operations within these commercial and industrial areas, and from the traffic on roadways along or near each of its property boundaries (El

Segundo Boulevard, Sepulveda Boulevard, Rosecrans Avenue, and Vista Del Mar Avenue). Vehicular traffic is heavy on Sepulveda Boulevard and Rosecrans Avenue, which border the Refinery to the east and south, respectively, and dominates the local noise environment.

The Union Pacific and BNSF railroads both operate daily to the Chevron Refinery and to other nearby industries. For Chevron, switching operations are located within the confines of the Refinery. Railroads in El Segundo do not pass through residential areas, so that rail traffic does not appear to contribute significantly to the existing community noise environment. Aircraft noise associated with the LAX affects the northwestern portion of the City of El Segundo.

The nearest sensitive noise receptors south of the Refinery are residences located in the City of Manhattan Beach, approximately 200 to 400 feet south of the Refinery along Rosecrans Avenue. The nearest sensitive noise receptors north of the Refinery are commercial receptors along El Segundo Boulevard and residences along Lomita Avenue and Grant Avenue approximately one-eighth mile north of the Refinery.

A noise survey was performed on October 5 through October 9, 2007 to determine the existing ambient noise levels in the vicinity of the Refinery. The noise monitoring locations are summarized in Table 3-7 and shown on Figure 3-3.

TABLE 3-7

Noise Survey Locations

Location	Description
1 (NMT#1)*	Located on the south-west berm, adjacent to Rosecrans Ave., close to Chevron Gate 22.
2 (NMT #2)	Located on the western property line by Crest Drive and 45th Street in Manhattan Beach.
3 (NMT #3)	Located on the north property line, adjacent to El Segundo Blvd, near the Chevron Administration Building.
4 (NMEWS #1)	Located on the south-central side of the Refinery, adjacent to Rosecrans Avenue and north of the berm.
5 (NMEWS #2)	Located on the south-east side of the Refinery, adjacent to Rosecrans Ave. and south of Sepulveda Blvd. and north of the berm by the electrical sub-station.

* Locations identified in the noise survey (see Appendix E)

All noise monitors used during the environmental noise survey meet the American National Standards Institute (ANSI) S1.4, 1983 specification for Type I (precision) sound level meters. Each monitor is calibrated on an annual basis in accordance with the National Institute of Standards Technology. The results of the noise survey are summarized in Table 3-8 and are further discussed in Appendix E.

CHEVRON EL SEGUNDO REFINERY
Noise Monitoring Locations

Figure 3-3

Project No. 2505

TABLE 3-8

Ambient Noise Levels

Date	Noise Levels at Each Station (CNEL in dBA)				
	1	**2**	**3**	**4**	**5**
10/5/07	63.7	61.9	68.7	68.0	63.8
10/6/07	64.2	61.7	68.8	69.1	63.9
10/7/07	65.3	65.5	69.7	69.1	64.3
10/8/01	63.5	60.4	68.9	69.2	63.8
10/9/07	63.4	66.7	69.1	68.2	63.8
Average	64.0	63.3	69.0	68.7	63.9
Max	65.3	66.7	69.7	69.2	64.3
Min	63.4	60.4	68.7	68.0	63.8

Based on the noise survey, the ambient property line background noise level CNEL ranges between about 63 dBA and 69 dBA. The lowest noise levels are found on the south side of the Refinery adjacent to Rosecrans Avenue (noise monitoring location 5), adjacent to the residential areas located on the south side of Rosecrans Avenue and near these residential/commercial areas west of the Refinery (noise monitoring location 2). The existing CNEL in the residential areas are about 6-643 dBA, which is in the “normally acceptable” to “conditionally acceptable” range for residential land use categories. The highest noise levels are found on the northern property line adjacent to El Segundo Boulevard (noise monitoring location 3), which is mostly commercial land uses. The existing CNEL in the vicinity of commercial areas to the north of the Refinery are considered to be “conditionally acceptable to “normally unacceptable” range for commercial land uses.

3.6.3 REGULATORY BACKGROUND

The noise guidelines and ordinances that are applicable to the Chevron Refinery are those adopted by the City of El Segundo and are summarized in Table 3-9. In addition, most community local noise elements contain land use compatibility standards required by the State of California. Figure 3-4 shows state land use categories and the recommended noise levels associated with each (California, 2003).

3.6.3.1 City of El Segundo

The Refinery is located within the City of El Segundo . El Segundo’s Municipal Code 7-2-4 (City of El Segundo, 1996) limits noise based on increases to the ambient sound level. El Segundo limits are specified for two zone types: residential and commercial/industrial. The properties adjacent to the Refinery in the City of El Segundo are a mix of commercial and industrial, with residential areas beyond the commercial and industrial areas. As summarized in Table 3-9, noise increases are limited in residential zones to five dBA above ambient (existing) sound level and eight dBA above ambient for commercial or industrial zones during both construction and operation.

TABLE 3-9

Local Noise Guidelines and Ordinances

City	Construction Limit	Operations Limit (exterior dBA unless noted)
El Segundo	Residential[1]: L_{eq}= 5 dBA over ambient noise level; Commercial/Industrial[1]: L_{eq}= 8 dBA over ambient noise level; OR Exempt if: Construction L_{50}= 65 dBA, and No construction noise occurs: 6:00 p.m. to 7:00 a.m., or Sundays and holidays	Residential[1]: L_{eq}= 5 dBA over ambient noise level; Commercial/Industrial[1]: L_{eq}= 8 dBA over ambient noise level
Manhattan Beach[2]	Construction allowed: Monday through Friday 7:30 a.m. to 6:00 p.m., Saturday 9:00 a.m. to 6:00 p.m.	Residential[1,3,4]: L_{eq}= 55 dBA (7 a.m.. to 10 p.m.) L_{eq}= 50 dBA (10 p.m. to 7 a.m.) Commercial[1,3,4]: Residential limits + 15 dBA Industrial[1,3,4]: Residential limits + 20 dBA

[1] Additional limits: $L_{50} = L_{eq}$; $L_{25} = L_{50}$ + 5 dBA; $L_{8.3} = L_{50}$ + 10 dBA; $L_{1.7} = L_{50}$ + 15 dBA; $L_{<1.7}$ or $L_{max} = L_{50}$ + 20 dBA

[2] The Refinery is located within the City of El Segundo and subject to the El Segundo Noise Ordinance. The Manhattan Beach Noise Ordinance is provided for reference only.

[3] If ambient noise exceeds limit then limit is increased to ambient noise

[4] Tonal or impulsive type noise also reduces limit by 5 dBA

L_x, - A-weighted sound level, L, that may not be exceeded more than “x” percent of any one hour time period

L_{eq} – Exterior equivalent sound level

L_{max} – Maximum A-weighted sound level

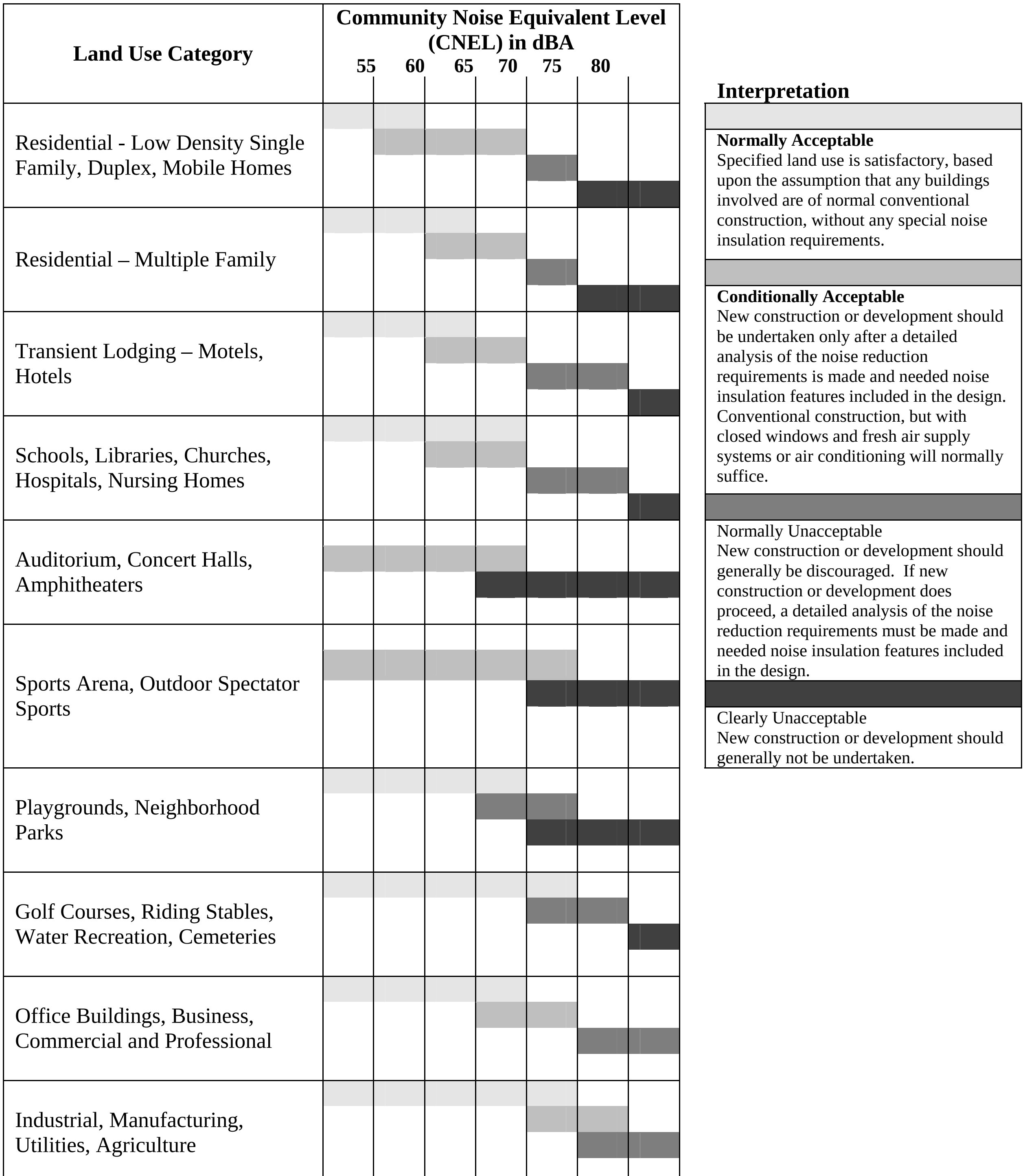
As specified in 7-2-10D of the Municipal Code, construction noise may be exempted from having to meet 7-2-4 requirements if it does not cause a disturbance at night (6:00 p.m. to 7:00 a.m.) or on Sundays or Federal holidays, and is less than 65 dBA at the receptor. However, since portions of the construction for the proposed project may occur at night, it will not be exempt from the requirements of Section 7-2-4 of El Segundo’s Municipal Code.

3.6.3.2 City of Manhattan Beach

The City of Manhattan Beach is located adjacent to the southern boundary of the Refinery. Section 5.48.160 of Chapter 5.48 (Noise Regulations) of the Manhattan Beach Municipal Codes (City of Manhattan Beach, 1999) limits operational noise to specific statistical sound levels, L_x, where “L” is the A-weighted sound level that may not be exceeded over “x”

FIGURE 3-4

Land Use Compatibility for Community Noise Environments



Source: State of California General Plan Guidelines percent of the measured time period. Specifically, the Manhattan Beach noise ordinance limits operational noise to a 60-minute L_{50}, L_{25}, $L_{8.3}$, $L_{1.7}$, and L_{max}. The Manhattan Beach noise ordinance also specifies limits for the exterior L_{eq}. The properties in the vicinity of the Refinery in the City of Manhattan Beach are primarily residential, with commercial development farther away from the Refinery. Noise limits for these zones are summarized in Table 3-9.

Section 5.48.060 limits construction activity within the city to Monday through Friday from 7:30 a.m. to 6:00 p.m. and Saturday from 9:00 a.m. to 6:00 p.m. but does not impose an actual noise limit during those times. No construction noise is permitted on Sunday. Under Section 5.48.250, construction activities are exempted fromthe other provisions of the noise ordinances. Thus, the City of Manhattan Beach Municipal Codes do not specify noise limits specifically for construction noise.

Since the Refinery is located within the boundaries of the City of El Segundo, the El Segundo Noise Ordinance applies to the proposed project.

3.7 SOLID/HAZARDOUS WASTE

3.7.1 Non-Hazardous Solid Waste

A total of 11 Class III ("household waste") active landfills and two transformation facilities (waste-to-energy) are located within Los Angeles County with a total capacity of 31,077 tpd and 1,811 tpd, respectively. In 2005, the residents and businesses of Los Angeles County disposed of approximately 12.3 million tons of solid waste per year at existing permitted land disposal and transformation facilities located in and out of the County. Of this amount, approximately 9.7 million tons were disposed of in local Class III landfills, 0.6 million tons were sent to transformation facilities, 2.2 million tons were exported to Class III landfills outside of Los Angeles County. An additional 170,000 tons were disposed of at permitted unclassified (inert) landfills. The disposal quantities for solid waste generated in Los Angeles County translate into an average disposal rate of approximately 33,367 tpd (six day week) county-wide: 31,077 tpd at Class III Landfills: 1,812 tpd at waste-to-energy facilities: 478 tpd at permitted unclassified landfills (LACDPW, 2007) (see Table 3-10).

As of January 2006, the total remaining permitted Class III landfill capacity in Los Angeles County is about 104 million tons (see Table 3-10). Based on the 2005 approximate average disposal rate of 31,000 tpd (six day week), excluding waste being imported to the County, the LACDPW anticipates that landfill capacity in the county could be exceeded in approximately 10.8 years. Because of community resistance to the extension of operating permits for existing facilities and to the opening of new landfills in the county, and the dwindling capacity of those landfills with operating permit time left, the exact date on which that capacity will be exceeded is uncertain. In order to make a realistic assessment of the adequacy of the remaining Class III disposal capacity, many factors beyond mere mathematical limits must be taken into consideration. For any given facility these factors include: expiration of the Land Use Permit; Waste Discharge Requirements Permit; Solid Waste Facilities Permit; air quality permits; restrictions on the acceptance of waste generated outside jurisdictional or wasteshed boundaries; permit restrictions on the amount

TABLE 3-10

LOS ANGELES COUNTY LANDFILL STATUS

LOS ANGELES COUNTY	Total Waste Disposed 2005 (tons)	2005 Average Tons per Day (tpd)	Average Tons per 6 Day Week	Permitted tons/day	Remaining Permitted Capacity (million tons) (as of 1/01/06)	Estimated Life Or Year of Closure[1]
CLASS III LANDFILLS						
Antelope Valley #1	371,000	1,189	7,134	1,400	10.21	26 years
Bradley[2]	270,000	864	5,184	10,000	0.09	Closed 4/07
Burbank (Burbank use only)	42,000	133	798	240	3.00	2053
Calabasas (Calabasas Watershed use only)	553,000	1,772	10,632	3,500	8.81	15 years
Chiquita Canyon	1,549,000	4,965	29,790	6,000	13.74	8 years
Lancaster	469,000	1,503	9,018	1,700	17.66	5 years[3]
Pebbly Beach (Avalon)	3,000	10	60	49	0.10	2033
Puente Hills #6	3,913,000	12,543	73,518	13,200	32.30	7 years
Scholl Canyon (Scholl Canyon Watershed use only)	453,000	1,452	8,712	3,400	6.80	14 years
Sunshine Canyon (County)	1,411,000	4,521	27,126	6,600	1.95	1 year[4]
Sunshine Canyon (City)[5]	571,000	1,831	10,986	5,500	5.33	4 years[4]
Savage Canyon - Whittier	92,000	294	1,764	350	4.60	2025
TOTALS	**9,697,000**	**31,077**	**184,722**	**51,939**	**104.59**	
UNCLASSIFIED LANDFILLS						
Azusa Land Reclamation Co.	164,000	460	2,760	6,500	36.54[6]	2025[7]
Peck Road Gravel Pit	6,000	18	108	1,210	9.79	Closed 1/08[7]
TOTALS	**170,000**	**478**	**2,868**	**7,710**	**46.33**	
TRANSFORMATION FACILITIES						
Commerce Refuse to-Energy Facility	101,000	325	1,950	1,000	466.64	15 years[8]
Southeast Resource Recovery Facility	484,000	1,487	8,922	2,240	1,602.45	15 years[8]
TOTALS	**585,000**	**1,812**	**10,872**	**3,240**	**2069.09**	

Sources: CIWMB web site: www.ciwmb.cs.gov/SWIS; *2005 Annual Report, LAC Countywide Integrated Waste Management Plan*, LACPDW, June 2007 (LACDPW, 2007).

Notes: (1) As January 1, 2007 as cited in LACPDW, 2007; (2)The Bradley landfill closed in April 2007; (3) Current CUP expires in August 2012; (4) On 2/6/07,the Board of Supervisors approved a new CUP establishing a 30-year life. Provided certain conditions are met, the total available capacity of the combined landfills is 74.3 million tons; (5) City of LA portion opened July 2005, currently operating at 4,400 tpd; (6) By Court order, on 10/2/96, the RWQCB ordered the Azusa Land Reclamation Landfill to stop accepting MSW. Permitted daily capacity of 6,500 tpd consists of 6,000 tpd of refuse and 500 tpd of inert waste. Facility currently accepts inert waste only; (7) per CIWMB web site: www.ciwmb.cs.gov/SWIS; (8) Assumed to remain operational during the 15-year planning period, LACPDW, 2007, Appendix E-2.1.

of waste that can be accepted daily or weekly, geographic barriers; and the amount of waste that can be handled on a daily basis due to limits of manpower and equipment (LACDPW, 2007). The LACSD is currently exploring out-of-county disposal options in addition to continuing negotiations to extend current operating permits.

The total remaining permitted inert waste capacity in Los Angeles County was estimated at approximately 46 million tons. Los Angeles County is planning two new inert waste facilities in Irwindale (United Rock Pit #3 and Irwindale Rock Plant D.S.). There is expected to be adequate disposal capacity at unclassified landfills and no inert landfill crisis currently exists. There are currently two waste-to-energy facilities (i.e., incinerators) in Los Angeles County with a combined permitted daily capacity of 1,800 tons (six-day week). It is expected that these two facilities will operate at their current permitted daily capacity until the equipment life of the waste-to-energy facilities (incinerators) is exhausted (LACDPW, 2007).The Los Angeles Integrated Waste Management Board (LAIWMB) 2005 Annual Report on the Countywide Summary Plan and Countywide Siting Element (LACDPW, 2007) reports on the expansion of the Puente Hill Landfill, which would extend its life by another 10 years. The Annual Report also proposes expansions of the Sunshine Canyon, Lancaster, Antelope Valley, and Peck Road landfills. The idea of transporting waste via railroad from the site of its generation to more remote or distant locations (some of them out of state) is being given serious consideration as part of waste disposal planning. It would provide jurisdictions in Los Angeles County with access to a greater array of landfills than would otherwise be accessible or cost effective. In theory, rail-haul has the potential to reduce labor costs, equipment, vehicle costs, and the amount of time typically associated with the transportation of waste to remote, non-urban locations by truck. Excluding proposed new or expanded facilities, current landfill capacity is expected to be sufficient to serve the county's landfill needs for the next 10.8 years (LADWP, 2007).

3.7.2 HAZARDOUS WASTE MANAGEMENT

Hazardous material, as defined in 40 CFR 261.20 and 22 CCR Article 9, is disposed of in Class I landfills. California has enacted strict legislation for regulating Class I landfills. The California Health and Safety Code requires Class I landfills to be equipped with liners, a leachate collection and removal system, and a ground water monitoring system.

There are no hazardous waste disposal sites within Los Angeles County. Hazardous waste generated at area facilities, which is not reused on-site, or recycled off-site, must be disposed of at a licensed hazardous waste disposal facility. Two such facilities in California are the CWMI's Kettleman Hills facility in King's County, and the Clean Harbors (formerly Safety-Kleen) facility in Buttonwillow (Kern County). Kettleman Hills receives an average of 2,700 tpd and has an estimated two million cubic yard capacity. The facility is expected to continue receiving wastes for approximately three years without an expansion, or 25 years with an expansion. The facility is in the process of permitting a landfill expansion which would increase the landfill's life by another five years. The facility operators would then seek a permit for development of a new landfill that would create another 15 years of life (Email Communication, Fred Paap, Chemical Waste Management Inc., September 2007). Buttonwillow receives approximately 960 tons of hazardous waste per day and has an approximate remaining capacity of approximately 8.8 million cubic yards. The expectant life of the Buttonwillow Landfill is approximately 40 years (Personal Communication, Marianna Buoni, Clean Harbors Buttonwillow, Inc., September 2007).

Hazardous waste also can be transported to permitted facilities outside of California. The nearest out-of-state landfills are U.S. Ecology, Inc., located in Beatty, Nevada; USPCI, Inc., in Murray, Utah; and Envirosafe Services of Idaho, Inc., in Mountain Home, Idaho. Incineration is provided at the following out-of-state facilities: Aptus, located in Aragonite, Utah; Aptus, located in Coffeyville, Kansas; Rollins Environmental Services, Inc., located in Deer Park, Texas and Baton Rouge, Louisiana; Chemical Waste Management, Inc., in Port Arthur, Texas; and Waste Research & Reclamation Co., Eau Claire, Wisconsin.

About 782 thousand tons of hazardous waste were generated in 2007 in Los Angeles County (see Table 3-11). The most common types of hazardous waste generated in the County include waste oil, organic solids, inorganic solid waste, contaminated soils, and asbestos-containing waste. Because of the population and economic base in southern California, a large portion of hazardous waste is generated within Los Angeles County. Not all wastes are disposed of in a hazardous waste facility or incinerator. Many of the wastes generated, including waste oil, are recycled within the Los Angeles Basin.

TABLE 3-11

Hazardous Waste Generation in Los Angeles County - 2007

Waste Name	Total tonnage of hazardous waste disposed
Waste Oil	268,445
Organic Solids	173,891
Inorganic Solid Waste	129,087
Contaminated Soils	82,683
Asbestos Waste	51,086
Aqueous Solution with Organic Residues	20,050
Unspecified Oil-Containing Waste	19,170
Unspecified Aqueous Solution	15,628
Oil/Water Separation Sludge	11,240
Off-spec, Aged, or Surplus Organics	10,266
TOTAL	**781,546**

(1) Source: hwts.dtsc.ca.gov/report_list.cfm, DTSC, 2008.

3.7.3 REGULATORY BACKGROUND

The California Environmental Protection Agency, DTSC is responsible for the permitting of transfer, disposal, and storage facilities. The DTSC conducts annual inspections of hazardous waste facilities. Other inspections can occur on an as-needed basis.
The California Department of Transportation sets standards for trucks in California. The regulations are enforced by the California Highway Patrol. Trucks transporting hazardous wastes are required to maintain a hazardous waste manifest and to register as hazardous waste haulers. The manifest is required to describe the contents of the material within the truck so that wastes can readily be identified in the event of a spill.

The California Integrated Waste Management Act of 1989 (AB939), as amended, requires each county to prepare a countywide siting element which identifies how the county and the cities within the county will address the need for 15 years of disposal (landfill and/or transformation) capacity to safely handle solid waste generated in the county which remains after recycling, composting, and other waste diversion activities. AB 939 has recognized that landfills and transformation facilities are necessary components of any integrated solid waste management system, and an essential component of the waste management hierarchy. AB 939 establishes a hierarchy of waste management practices in the following order and priority: (1) source reduction; (2) recycling and composting; and (3) environmentally safety transformation/land disposal.

The Los Angeles Countywide Siting Element addresses landfill disposal. The purpose of the Countywide Siting Element is to provide a planning mechanism to address the solid waste disposal capacity needed by the 88 cities in the Los Angeles County and unincorporated communities for each year of the 15-year planning period, through a combination of existing facilities, expansion of existing facilities, planned facilities, and other strategies. Other elements of waste management planning and practices include the Source Reduction and Recycling Element which is part of the Los Angeles County Integrated Waste Management Summary Plan (LACDWP, 2007).

Permit requirements, capacity, and surrounding land use are three of the dominant factors limiting the operations and life of landfills. Landfills are permitted by the local enforcement agencies with concurrence from the California Integrated Waste Management Board (CIWMB). Local agencies establish the maximum amount of solid waste which can be received by a landfill each day and the operational life of a landfill. Landfills are operated by both public and private entities (CIWMB, 2002a). Landfills in southern California are also subject to requirements of the SCAQMD as they pertain to gas collection systems, dust and nuisance impacts.

Chevron maintains a Source Reduction Evaluation Plan as required under the Hazardous Waste Source Reduction and Management Review Act of 1989 (SB14). The waste minimization strategies used at the Refinery include recycling, loss prevention, employee training programs, and waste segregation.

3.8 TRANSPORTATION AND TRAFFIC

The proposed project will occur at the Chevron Products Company El Segundo Refinery. Some improvements are also expected at nearby SCE and WBMWD facilities. The proposed modifications are entirely within the confines of the existing affected facilities. The existing transportation and traffic conditions adjacent to the Chevron Refinery are discussed below.

3.8.1 REGIONAL CIRCULATION

The Refinery is located at 324 West El Segundo Boulevard in the City of El Segundo. Regional transportation facilities in the vicinity of the project provide accessibility to the entire southern California region. The I-405 lies approximately one and one-quarter miles east of the Refinery and provides ramp connections at El Segundo Boulevard and Rosecrans Avenue. In addition, the I-105, and its related rail transit system are located approximately one mile north of the Refinery. Freeway interchanges to the regional arterial highway network provide access at regular intervals. El Segundo Boulevard, Sepulveda Boulevard and Rosecrans Avenue are key arterials servicing the area near the Refinery.

The I-405 is a north-south freeway facility located east of the El Segundo boundary. This freeway provides four travel lanes and one High-Occupancy Vehicle (HOV) lane in each direction between the LAX and the Harbor Freeway (I-110). The I-405 supports a heavy travel demand between residential areas and employment centers in the San Fernando Valley, West Los Angeles, Los Angeles Airport, and into Orange County. In addition to supporting the daily commute trips, heavy evening and weekend travel demand is caused by travel to and out of County destinations to the north and south. Surface street ramp access is available from El Segundo Boulevard, Rosecrans Avenue and La Cienega Boulevard. Daily traffic volumes on the San Diego Freeway along the segment bordering El Segundo, are approximately 280,000 vehicles per day (VPD) (City of El Segundo, 2004).

The I-105 is an east-west freeway located above and adjacent to Imperial Highway, at the northern boundary of the City of El Segundo. This 17-mile eight-lane facility, including an HOV lane traveling in each direction, connects LAX on the west, to the San Gabriel River Freeway (I-605) and the City of Norwalk on the east. A full interchange has been built for its intersection with the I-405. Access to the I-105 can be taken from the I-405 or directly to/from Nash Street, Douglas Street, Atwood Way or Imperial Highway in the City of El Segundo. Daily traffic volumes on the I-105 diminish towards its western terminus near Sepulveda Boulevard. Approximately 120,000 VPD travel this freeway between the I-405 and Douglas Street, with volumes dropping to less than 90,000 VPD at Sepulveda Boulevard, and finally to less than 25,000 VPD west of Sepulveda Boulevard (City of El Segundo, 2004).

3.8.2 LOCAL CIRCULATION

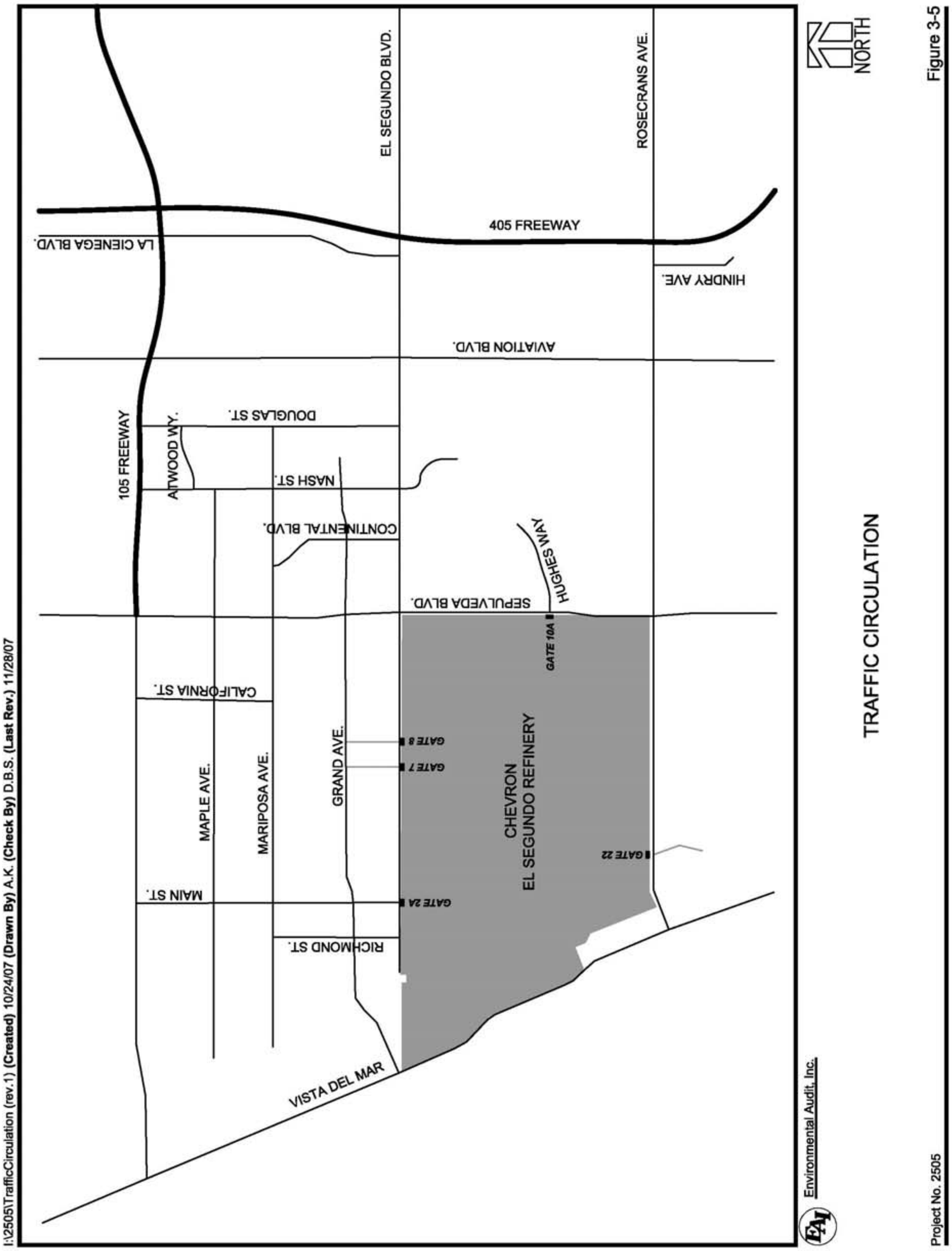
The Refinery occupies a rectangular shaped parcel of land and is bordered by El Segundo Boulevard to the north, Sepulveda Boulevard to the east, Rosecrans Avenue to the south and Vista Del Mar to the west (see Figure 3-5). Access to the Refinery is primarily from El Segundo Boulevard.

The City of El Segundo is served by an existing network of roadways. The existing street network is essentially a grid system of north/south and east/west roadways. The primary north/south roadways are: Aviation Boulevard; Douglas Street; Nash Street; Sepulveda Boulevard, Center Street; Main Street and Vista Del Mar. The primary east/west streets are: Imperial Highway; Maple Avenue, Mariposa Avenue; Grand Avenue; El Segundo Boulevard and Rosecrans Avenue. The City's roadway network is essentially established, with little or no opportunity to modify its basic configuration because of the developed pattern of land uses in the City (City of El Segundo, 2004).

El Segundo Boulevard, Sepulveda Boulevard, and Rosecrans Avenue are major highways with a function to connect traffic from collector streets to the major freeway systems as well as to provide access to adjacent land uses. Major highways move large volumes of automobiles, trucks and buses, and link principal elements within the City to other adjacent regions.

The area surrounding the Refinery is accessible via public transit from most South Bay Communities. The Los Angeles County Metropolitan Transportation Authority (MTA) provides several routes in the project vicinity. A number of MTA bus routes are routed throughout the city. Additionally, the Metro Green Line operates through the project area, linking the Refinery area with the continually expanding regional rail system. The Los Angeles Department of Transportation (LADOT), the City of Torrance Municipal Area Express (MAX), and the Torrance Transit also provide public transit services and commuter routes to and from the city (City of El Segundo, 2004a).

In addition to the vehicular system, the area surrounding the Refinery is serviced by a network of railroad facilities. This system provides an alternative mode of transportation for the distribution of goods and materials. The railroad network includes an extensive system of private railroads and several publicly-owned freight lines. The southern California Regional Rail Authority operates commuter rail systems in the Los Angeles area. Additionally, Amtrak provides inter-city service, principally between San Diego and San Luis Obispo. The Los Angeles area is served by two main-line freight railroads, the Burlington Northern Santa Fe and the Union Pacific Railroad. These freight railroads connect southern California with other U.S. regions, Mexico, and Canada via their connections with other railroads.


I:\2505\TrafficCirculation (rev.1) (Created) 10/24/07 (Drawn By) A.K. (Check By) D.B.S. (Last Rev.) 11/28/07
EL SEGUNDO BLVD.
ROSECRANS AVE.
405 FREEWAY
LA CIENEGA BLVD.
HINDRY AVE.
AVIATION BLVD.
DOUGLAS ST.
105 FREEWAY
ATWOOD WY.
NASH ST.
CONTINENTAL BLVD.
HUGHES WAY
SEPULVEDA BLVD.
GATE 10A
CALIFORNIA ST.
GRAND AVE.
GATE 8
GATE 7
MAPLE AVE.
MARIPOSA AVE.
CHEVRON
EL SEGUNDO REFINERY
GATE 22
MAIN ST.
GATE 2A
RICHMOND ST.
VISTA DEL MAR
NORTH
TRAFFIC CIRCULATION
Environmental Audit, Inc.
Project No. 2505
Figure 3-5

3.8.3 EXISTING TRAFFIC CONDITIONS

The operating characteristics of an intersection are defined in terms of the level of service (LOS), which describes the quality of traffic flow based on variations in traffic volume and other variables such as the number of signal phases. Intersections rated at LOS A to C operate well. Level C normally is taken as the design level in urban areas outside a regional core. Level D typically is the level for which a metropolitan area street system is designed. Level E represents volumes at or near the capacity of the highway which will result in possible stoppages of momentary duration and fairly unstable traffic flow. Level F occurs when a facility is overloaded and is characterized by stop-and-go (forced flow) traffic with stoppages of long duration.

Peak hour LOS analyses were developed for intersections in the vicinity of the Refinery (see Table 3-12). The LOS analysis indicates typical urban traffic conditions in the area surrounding the Refinery, with all intersections, except one, currently operating at Levels A to D during morning peak hours (7 am – 9 am). One intersection currently operates at LOS E during morning peak hours, Sepulveda/El Segundo Boulevard. The evening peak hour conditions (4 pm – 6 pm) show overloaded conditions (LOS F) at two intersections, operating near capacity (LOS E) at one intersection, operating at LOS C at one intersection, operating at LOS D at one intersection, and the remainder of the intersections currently operating at LOS A to B.

3.8.4 REGULATORY BACKGROUND

The Circulation Element, an Element of the El Segundo General Plan, was adopted in 1992. The Circulation Element is a required Element under Government Code Section 65302(b) and addresses the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals and other local public utilities and facilities, all correlated with the Land Use Element of the General Plan. The Circulation Element contains a Master Plan of Streets, as well as a series of polices designed to guide the future evolution of the City's roadway system. The Master Plan of Streets includes all major arterial roadways in the City. As an Element of the General Plan, the Circulation Element is connected to other City planning policies and designations, such as those reflected in the Land Use Element with respect to the planned location, type and density of land uses in the City. The Circulation Element also includes policies that identify intersection improvements to achieve LOS D or better at intersections in the City that include re-striping of lanes and addition of left turn, through and right turn lanes. The lane requirements are set forth in the adopted Circulation Element based upon the designations of the roadways that comprise the legs of the intersections (e.g., major arterial, secondary arterial, collector, etc.) (City of El Segundo, 2004).

TABLE 3-12

Existing Traffic Conditions

Intersection	Existing AM Peak Hour		Existing PM Peak Hour	
	V/C Ratio	LOS	V/C Ratio	LOS
1. Sepulveda (SR1) and El Segundo Blvd.	0.982	E	1.104	F
2. Sepulveda (SR1) and Rosecrans Ave.	0.894	D	1.070	F
3. Sepulveda (SR1) and Imperial Hwy.	0.7563	C	0.718	C
4. Aviation Blvd. and El Segundo Blvd.	0.873	D	0.968	E
5. Aviation Blvd. and Rosecrans Ave.	0.815	D	0.807	D
6. La Cienega Blvd. and I-405 SB on/off	0.655	B	0.609	B
7. La Cienega Blvd. and El Segundo Blvd.	0.655	B	0.677	B
8. I-405 SB on and El Segundo Blvd.	0.875	D	0.634	B
9. I-405 NB on/off and El Segundo Blvd.	0.775	C	0.535	A
10. I-405 SB off and Rosecrans Ave.	0.638	B	0.628	B
11. I-405 NB on/off and Rosecrans Ave.	0.639	B	0.618	B
12. I-405 SB on/off and Hindry Ave.	0.320	A	0.541	A
13. California St. and Imperial Hwy.	0.451	A	0.486	A
14. Main St. and Imperial Hwy.	0.672	B	0.639	B
15. Continental and Grand Ave.	0.319	A	0.277	A
16. Continental and Mariposa Ave.	0.411	A	0.415	A
17. Nash St. and Mariposa Ave.	0.332	A	0.344	A
18. Douglas St. and Mariposa Ave.	0.283	A	0.482	A
19. Douglas St. and Atwood Way	0.157	A	0.301	A

V/C ratios and associated LOS definitions are defined below)

V/C Ratio .00 - .60 = LOS A Free flow (very slight or no delay)
V/C Ratio .61 - .70 = LOS B Stable flow (slight delay)
V/C Ratio .71 - .80 = LOS C Stable flow (acceptable delay)
V/C Ratio .81 - .90 = LOS D Approaching unstable flow or operation (tolerable delay)
V/C Ratio .91 – 1.0 = LOS E Unstable flow (at maximum capacity; unacceptable delay)
V/C Ratio 1.0 or more = LOS F Forced flow (above maximum capacity; unacceptable delay)

The Draft EIR for the proposed Circulation Element Update is also subject to the Land Use Analysis program of the Congestion Management Program for Los Angeles County (CMP). The legislation establishing the requirement for counties to adopt a CMP was adopted in 1992 by the State of California and was last amended in 1997. The CMP is a state-mandated program designed to address urban congestion. The CMP is adopted by the designated Congestion Management Agency (MTA). The most recent version of the CMP was adopted by MTA in 2004 (MTA, 2004). The CMP analysis assesses potential impacts on the freeway network and key intersections in the system of surface streets. The CMP includes a system of highways and roadways with minimum LOS standards, transit standards, a trip reduction and travel demand management element, a program to analyze the impacts of local land use decisions on the regional transportation system, a capital improvement program, and a countywide computer model to evaluate traffic congestion and recommend relief strategies and actions. Proposed projects that have the potential to significantly impact the designated CMP network (mainline freeway segments and principal arterial streets and highways) are required to identify and to mitigate, where feasible and appropriate, their adverse effects on the network. If the LOS standards on CMP-monitored roadways are not maintained, local jurisdictions must prepare a "deficiency plan" which is in conformance with the Countywide CMP plan (City of El Segundo, 2004).

There is one CMP-designated arterial highway within the City of El Segundo: Sepulveda Boulevard. CMP intersections are defined as key intersections spread roughly two miles apart. The Sepulveda Boulevard/El Segundo Boulevard intersection is the only CMP-designated intersection in El Segundo (MTA, 2004).

Freeways are controlled access, high-speed roadways with grade-separated interchanges intended to expedite movement between distant areas in the region. Planning, design, construction and maintenance of freeways in California are the responsibility of the California Department of Transportation (CalTrans).

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CHAPTER 4

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 INTRODUCTION

This chapter assesses the potential environmental impacts of the construction and operation of the Chevron Products Company El Segundo Refinery PRO Project described in Chapter 2.

Chapter 4 evaluates those impacts that are considered potentially significant under the requirements of CEQA, for those environmental areas identified in the NOP/IS (see Appendix A). Specifically, an impact is considered significant under CEQA if it leads to a “substantial, or potentially substantial, adverse change in the environment.” Impacts from the proposed project fall within one of the following categories:

Beneficial – Impacts will have a positive effect on the resource.

No impact – There would be no impact to the identified resource as a result of the proposed project.

Adverse but not significant – Some impacts may result from the project; however, they are judged to be insignificant. Impacts are frequently considered insignificant when the changes are minor relative to the size of the available resource base or would not change an existing resource.

Potentially significant but mitigation measures reduce to insignificance – Significant adverse impacts may occur; however, with proper mitigation, the impacts can be reduced to insignificance.

Potentially significant and mitigation measures are not available to reduce to insignificance – Adverse impacts may occur that would be significant even after mitigation measures have been applied to lessen their severity.

4.2 AIR QUALITY

The NOP/IS (see Appendix A) determined the air quality impacts of the proposed project at the Chevron Products Company El Segundo Refinery as having the potential for significant adverse impacts. Project-specific and cumulative adverse air quality impacts associated with increased emissions of air contaminants (both criteria air pollutants and TACs) during the construction and operation phases of the proposed project have been evaluated in this EIR. Impacts to sensitive receptors have also been analyzed in the EIR. The air quality impacts at the El Segundo Refinery and the surrounding areas are provided in this section.

While the proposed project is expected to emit GHGs, emitting GHGs by a single project into the atmosphere is not itself necessarily an adverse environmental effect. Rather, it is the increased accumulation of GHGs from more than one project and many sources in the atmosphere that may result in global climate change. The resultant consequences of that climate change can cause adverse environmental effects. In virtually every project subject to CEQA review, a project's GHG emissions will be relatively small, even infinitesimal, within the scope of global or even statewide GHG emissions, and, as such, will almost certainly have no significant direct impact on climate change. The project GHG emissions are minimal when compared to statewide GHG emissions. Due to the complex physical, chemical, and atmospheric mechanisms involved in global climate change, it is likely impossible to identify the specific impact, if any, to global climate change from one project's incremental increase in global GHG emissions. As such, the project GHG emissions and the resulting significance of potential impacts are more properly assessed on a cumulative basis. Therefore, the environmental setting and the significance of potential impacts from the proposed project's GHG emissions is determined on a cumulative basis in Chapter 5 - Cumulative Impacts.

4.2.1 SIGNIFICANCE CRITERIA

To determine whether or not air quality impacts from the proposed project are significant, impacts will be evaluated and compared to the significance criteria in Table 4-1. If impacts equal or exceed any of the following criteria, they will be considered significant.

The SCAQMD makes significance determinations for construction impacts based on the maximum or peak daily emissions during the construction period, which provides a “worst-case” analysis of the construction emissions. Similarly, significance determinations for operational emissions are based on the maximum or peak daily allowable emissions during the operational phase.

Subsequent to the adoption of the SCAQMD CEQA Air Quality Handbook (SCAQMD, 1993), the SCAQMD adopted Regulation XX - RECLAIM, which fundamentally changed the framework of air quality rules and permits. The RECLAIM program is a pollution cap-and-trade program which applies to the largest sources of NOx and SOx emissions within the jurisdiction of the SCAQMD. RECLAIM facilities were given an initial emissions allocation that reflected their historical NOx or SOx usage, but that declines yearly to reduce total facility-wide emissions. Operators of RECLAIM facilities are also allowed to buy credits in lieu of reducing facility emissions or sell credits if they control emissions more than required. After implementation of the RECLAIM program, the SCAQMD staff examined how to apply the CEQA significance thresholds to RECLAIM facilities, recognizing that CEQA case law directs that the existing environmental setting include permits and approvals that entitle operators to conduct or continue certain activities. SCAQMD staff determined that the baseline should consist of the RECLAIM initial allocation for each RECLAIM facility, and that a proposed project would be considered significant if it would cause the facility’s emissions to exceed the

TABLE 4-1

Air Quality Significance Thresholds

Mass Daily Thresholds		
Pollutant	**Construction**	**Operation**
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
PM2.5	55 lbs/day	55 lbs/day
SOx	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
Toxic Air Contaminants (TACs) and Odor Thresholds		
TACs (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk ≥ 10 in 1 million Hazard Index ≥ 1.0 (project increment)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
Ambient Air Quality for Criteria Pollutants[(a)]		
NO_2 1-hour average annual average	In attainment; significant if project causes or contributes to an exceedance of any standard: 0.25 ppm (state) 0.053 ppm (federal)	
PM10 24-hour annual geometric mean annual arithmetic mean	10.4 $\mu g/m^3$ (recommended for construction)[(b)] 2.5 $\mu g/m^3$ (operation) 1.0 $\mu g/m^3$ 20 $\mu g/m^3$	
PM2.5 24-hour average	10.4 $\mu g/m^3$ (construction)[e] & 2.5 $\mu g/m^3$ (operation)	
Sulfate 24-hour average	1 $\mu g/m^3$	
CO 1-hour average 8-hour average	In attainment; significant if project causes or contributes to an exceedance of any standard: 20 ppm (state) 9.0 ppm (state/federal)	

(a) Ambient air quality thresholds for criteria pollutants based on SCAQMD Rule 1303, Table A-2 unless otherwise stated.

(b) Ambient air quality threshold based on SCAQMD Rule 403.

ppm = parts per million; $\mu g/m^3$ = microgram per cubic meter; mg/m^3 = milligram per cubic meter; lbs/day = pounds per day; ≥ greater than or equal to baseline plus the applicable significance thresholds. The SCAQMD has revised and updated the methodology for significance determination for RECLAIM facilities.

Air quality impacts for a RECLAIM facility are considered to be significant if the facility-wide incremental mass daily emissions for NOx and SOx exceed the CEQA significance threshold (i.e., 55 lbs/day for NOx or 150 lbs/day for SOx). The proposed project emissions are considered significant if:

$$(B_{5yr}/365) + I < (E_P + E_F)/365$$

Where:

B_{5yr} = Average facility-wide emissions for the previous five years of operational activity, which is the baseline.

I = Incremental emissions established as significant by the SCAQMD (55 lb/day NO_x or 150 lb/day SO_x).

E_P = Annual emissions increase associated with the proposed project.

E_F = Projected annual emissions for the facility in the year the proposed project will commence proposed operations.

Air quality impacts are considered to be significant if the incremental mass daily emissions for NOx and SOx from all proposed project sources, when added to the projected annual emissions for the facility for the year in which the project will commence operations (e.g., 2010 for Chevron), will be greater than the facility's five-year average emissions (i.e., baseline) plus the significance threshold (i.e., 55 lbs/day for NOx and 150 lbs/day for SOx). In order to make this calculation, the facility's five-year average annual emissions as well as the project's incremental annual emissions are converted to daily emissions by dividing by 365. As discussed in Chapter 3, a five-year Refinery baseline provides a reasonable period of time to take into consideration the variability of the refining operations, e.g., unit shutdowns for maintenance or repair, equipment replacement/repair, equipment failures, etc.

The significance determination methodology described above only applies to NOx and SOx emissions and not to pollutants (i.e., VOC, CO, PM10, and PM2.5) for which the SCAQMD does not regulate under the RECLAIM program. The level of emissions at which CEQA significance is triggered for NOx and SOx emissions at the Refinery ($(B_{5yr}/365) + I$) is calculated in Table 4-2.

TABLE 4-2

Determining Significance for NOx and SOx Pollutants at the Chevron El Segundo Refinery

Pollutant	B_{5yr} 5-Year Average (lbs/yr)[1]	$B_{5yr}/365$ 5-Year Average (lbs/day)	I Significance Threshold (lbs/day)	$B_{5yr}/365 + I$ (lbs/day)
NO_x	2,022,400	5,540.8	**55**	**5,596**
SO_x	1,757,200	4,814.2	**150**	**4,965**

(1) See Table 3-3.

4.2.2 ENVIRONMENTAL IMPACTS

4.2.2.1 Construction Emission Impacts

Regional Impacts

Construction emissions are expected from the following equipment and processes:

- Onsite Construction Equipment (dump trucks, backhoes, graders, etc.);
- Onsite and Offsite Vehicle Emissions, including Delivery Trucks and Worker Vehicles;
- Onsite Fugitive Dust Associated with Site Construction Activities;
- Onsite and Offsite Fugitive Dust Associated with Travel on Unpaved and Paved Roads; and,
- Onsite Architectural Coatings.

Construction emissions were calculated for peak day construction activities in each month construction is expected to occur. As shown in Figure 2-5, construction activities vary for the various portions of the proposed project, but construction activities overlap for a number of portions of the project. Therefore, peak day emission calculations, presented in Appendix B and summarized in Table 4-3, were based on the schedule presented in Figure 2-5. Daily construction emissions were calculated for the peak construction day activities. Peak day emissions are the sum of the highest daily emissions from employee vehicles, fugitive dust sources, construction equipment, and transport activities for the construction period. Peak construction emissions for all pollutants except PM10 and PM2.5 are expected to occur in January 2009 with peak PM10 and PM2.5 emissions expected to occur in August 2008 assuming that the project adheres to the schedule presented in Figure 2-5. Detailed construction emissions calculations are provided in Appendix B.

TABLE 4-3

Chevron El Segundo Refinery
Peak Construction Emissions[1]
(lbs/day)

ACTIVITY	CO	VOC	NOx	SOx	PM10	PM2.5[2]
Construction Equipment	372.32	117.85	671.58	0.66	30.79	17.86
Vehicle Emissions	336.67	34.60	82.69	0.38	2.34	1.36
Fugitive Dust From Construction[3]	--	--	--	--	128.25	74.39
Fugitive Road Dust[3]	--	--	--	--	15.63	9.07
Architectural Coatings[4]	--	--	--	--	--	--
Total Construction Emissions[5]	**708.99**	**152.45**	**754.27**	**1.04**	**177.01**	**102.36**
SCAQMD Threshold Level	550	75	100	150	150	55
Significant?	Yes	Yes	Yes	No	Yes	Yes

(1) Peak emissions for all pollutants predicted to occur during January 2009, except for PM10 and PM2.5 which occur in August 2008. Peak construction emissions are based on concurrent activities from the PRO Project and SCE and WBMWD upgrades.
(2) PM2.5 is determined using SCAQMD, 2006. Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 CEQA Significance Thresholds, SCAQMD, October 2006, https://www.aqmd.gov/ceqa/handbook/PM2_5/pm2_5ratio.xls
(3) Assumes application of water three times per day.
(4) Paint specifications for this project call for non-VOC containing coatings.
(5) The emissions in the table may differ slightly from those in Appendix B due to rounding.

Construction Equipment

On-site construction equipment will be a source of combustion emissions. Construction equipment may include backhoes, compressors, concrete saws, cranes, excavators, forklifts, front-end loaders, generators, roll-off trucks, tractors, water truck and welding machines. The equipment is assumed to be operational between two and ten hours per day. Construction workers are expected to be at the site for longer than eight hours per day, but including time for lunch and breaks, organization meetings, and so forth, construction equipment would not be expected to operate the entire time. Also, during peak construction periods, two work shifts are expected. The emission calculations assume more equipment operating per day, not more operating hours per piece of equipment. For example, instead of assuming that one crane will operate for 16 hours per day, the emission calculations assume two cranes will operate for eight hours per day. Emission factors for construction equipment were taken from the CEQA Air Quality Handbook (SCAQMD, 1993, Tables 9-8-A, 9-8-B, 9-8-C and 9-8-D) or Construction Equipment Emissions tables available on the SCAQMD webpage (http://aqmd.gov/

ceqa/hdbk.html). Estimated emissions from construction equipment used for construction activities are included in Table 4-3.

Vehicle Emissions

Vehicle emissions include construction workers' vehicles, pick up trucks, boom trucks, stakebed trucks, flatbed trucks and delivery trucks. Primary emissions generated will include combustion emissions from engines during idling and while operating. Emissions are based on the estimated number of trips per day and the round trip travel distances.

Construction emissions include emissions from construction worker vehicles traveling to and from the work site. Nine hundred workers are expected to be needed during the peak construction period (i.e., activity at all proposed units). Emission calculations were estimated assuming the 900 workers traveling to the site each weekday during January 2009, which is the month when all construction emissions except PM10 and PM2.5 are expected to be the highest (see Appendix B). Each worker commute vehicle is assumed to travel 16.2 miles (SCAG, 2000) to and from work each day, making two one-way trips per day. Emissions from employee vehicles are presented in Table 4-3. Emissions from employee vehicles were calculated using the EMFAC2007 emission factors developed by CARB.

All pickup trucks used for short trips within and near the Refinery are assumed to travel 10 miles per trip. Buses will be used for delivering workers from parking areas to the Refinery. All buses were assumed to travel 60 miles per day.

Medium and heavy diesel trucks include boom trucks, stakebed trucks, flatbed trucks and delivery trucks. Heavy heavy-duty semi trucks were also included in the project construction analysis. Primary emissions generated will include exhaust emissions from diesel engines while operating. Emission calculations were estimated assuming a maximum of 46 trucks traveling to the site each day during months with peak construction emissions. Emissions from trucks (both light-duty and heavy-duty) were calculated using the EMFAC2007 emission factors developed by CARB. Estimated emissions for all trucks are included in Table 4-3.

Fugitive Dust Associated with Site Construction Activities

Fugitive dust sources include grading, trenching, wind erosion and truck filling/dumping at the site to construct necessary foundations. During construction activities, water used as a dust suppressant will be applied in the construction area during grading, trenching, and earth-moving activities to control or reduce fugitive dust emissions pursuant to SCAQMD Rule 403. Application of water reduces PM emissions by a factor of approximately 34 to 68 percent (SCAQMD, 1993). It is assumed herein that one water application per day reduces PM emissions by 34 percent, two applications reduce emissions by 50 percent, and three applications reduce emissions by 68 percent. Fugitive dust suppression, often using water, is a standard operating practice and is one method of complying with SCAQMD Rule 403. Estimated peak controlled PM10 and PM2.5 emissions during peak construction activities for fugitive dust sources are 128.25 pounds per day and 74.39 pounds per day, respectively (see Table 4-3). The detailed emission calculations are provided in Appendix B.

Fugitive Dust Associated with Travel on Paved and Unpaved Roads

Vehicles and trucks traveling on paved and unpaved roads are also a source of fugitive emissions during the construction period. Fugitive dust emissions were also calculated for on-site cars, light-duty trucks, and buses. The fugitive emissions for trucks assume delivery trucks will travel on paved roads and water trucks will travel on unpaved roads. Emissions of dust caused by travel on paved roads were calculated using the U.S. EPA's, AP-42, Section 13.2.1 emission factor for travel on paved roads and using the CARB's Methodology 7.9 to determine the appropriate silt loading. No travel on unpaved roads is expected because the roads within the Refinery are paved. The estimated PM10 and PM2.5 emissions during peak construction activities (August 2008) from trucks and passenger autos for fugitive dust on paved roads are 15.63 pounds per day and 9.07 pounds per day, respectively (see Table 4-3 and Appendix B, Table B-4).

Architectural Coatings

The project specifications call for painting of vessels and piping with a paint that does not contain VOCs. As supported by extensive research with architectural coatings by the SCAQMD, there are sufficient industrial coatings formulated with high solids and zero VOCs to accommodate the project. Therefore, no VOC emissions would be expected from the use of architectural coatings during peak construction activities.

Miscellaneous Emissions

In addition to the construction-related emissions already identified for the proposed project, the project could generate emissions of VOC if contaminated soil is found and soil remediation activities are necessary. Emission estimates for VOC would be speculative at this time, however, because the levels of contamination are currently unknown. VOC contaminated soil is defined as soil which registers 50 parts per million or greater per the requirements of SCAQMD Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil. If VOC contamination is found, soil remediation must occur under an SCAQMD-approved Rule 1166 Plan to assure the control of fugitive emissions which generally includes covering soil piles with heavy plastic sheeting and watering activities to assure the soil remains moist. Soil remediation activities are under the jurisdiction of the RWQCB and it may be necessary for the RWQCB and SCAQMD to coordinate in order to assure air quality impacts are adequately mitigated.

Construction Emission Summary

Construction activities associated with the modifications to the Refinery would result in emissions of CO, VOC, NOx, SOx, PM10, and PM2.5. Construction emissions for the proposed project are summarized in Table 4-3, together with the SCAQMD's daily construction significance threshold levels. The construction phase of the Refinery's proposed project will exceed the significance thresholds for CO, VOC, NOx, PM10, and PM2.5. Therefore, unmitigated air quality impacts associated with construction activities are considered significant.

<u>Localized Construction Impacts</u>

The SCAQMD has developed Localized Significance Threshold (LST) Methodology to evaluate the potential localized impacts of criteria pollutants from construction activities (SCAQMD, 2003c). The LST Methodology requires that the emissions of criteria pollutants be evaluated for impacts on ambient air quality standards, including CO, NO_2, PM10, and PM2.5 associated with the project.

In order to determine the groundlevel concentrations, the U.S. EPA ISCST3 (Version 02035) air dispersion model was used to model the peak day construction emissions (see Table 4-3) and calculate the annual average and maximum 1-hour, 8-hour, and 24-hour concentrations. The details of the assumptions used in the modeling are provided in Appendix B.

To determine the significance of construction PM10 and PM2.5 emissions, project emissions are compared to 10.4 $\mu g/m^3$, which is comparable to the requirement in Rule 403. PM10 and PM2.5 are evaluated differently than CO and NO_2 because PM10 and PM2.5 in nearly the entire district exceed the state or federal PM10 and PM2.5 standards. For CO and NO_2, which are in attainment with all state and national standards, the CO 1-hour, CO 8-hour, NO_2 1-hour, and NO_2 annual average groundlevel concentrations from the proposed project are combined with the maximum ambient concentrations and compared to the most stringent ambient air quality standard. The results are shown in Table 4-4 (see Appendix B for more detailed calculations).

The LST analysis indicates that NO_2, CO, PM10, or PM2.5 emissions do not exceed the LST in Table 4-1 from construction activities associated with the proposed project. Therefore, the proposed project complies with the localized significance threshold methodology and no localized significant impacts on air quality during the construction period are expected.

4.2.2.2 Operational Emission Impacts

The proposed project operational emissions are evaluated in this section. Operational emissions include both stationary and mobile sources. Stationary sources include

TABLE 4-4

Localized Significance Threshold Evaluation for Construction Emissions

Criteria Pollutant	Averaging Period	Ambient Back-ground Conc. (ug/m^3)	Calculated Conc. (ug/m^3)	Total Conc. (ug/m^3)	Most Stringent Air Quality Standard (ug/m^3)	Localized Significance Threshold (ug/m^3)	Exceeds Threshold?
CO	1-hour	6896.4	179.1	7075.5	23000		No
	8-hour	5057.4	68.9	5126.3	10000		No
NO_2	1-hour	188.8	187.7	376.5	500		No
	Annual	29.3	4.7	34.0	100		No
PM10	24-hour		9.7			10.4	No
PM2.5	24-hour		<9.7(1)			10.4	No

(1) Since PM2.5 emissions are a fraction of PM 10 emissions and the significance thresholds are the same for PM10 and PM2.5, PM2.5 emissions were not modeled.

combustion sources and fugitive sources. Detailed operational emission calculations are provided in Appendix C. The total operational emissions from the proposed project are identified in Table 4-5. The primary sources of emissions are from new units, including sulfur processing facilities (i.e., SWS, SRU, and TGU) and a Vapor Recovery and Safety Flare System, and from modifications to existing Refinery units, including the No. 2 Crude Unit, No. 2 RSU, Minalk/Merox Unit, FCCU, Alkylation Unit, VRDS Unit, ISOMAX Unit, Cogen Train D Facilities, and the Railcar Loading/Unloading Rack, as well as new storage tanks. The proposed new units and modifications at the Refinery are expected to generate emissions primarily from the installation of fugitive components (e.g., pumps, valves, and flanges) with the exception of the new Cogen Train D, TGU, and Safety Flare, which will, in addition to fugitive emissions, generate criteria pollutant emissions from combustion and incineration. Equipment potentially impacted by the proposed project (upstream or downstream) were evaluated to determine if the proposed project would result in an emission increase, even though the equipment is operating within permit limits and no permit modification would be required. Due to the nature of Refinery operations, all equipment will fluctuate in activity levels. However, no other equipment, beyond those evaluated in the proposed project, were identified that would result in an increase in emissions strictly due to the proposed project. Emission increases are also expected due to increases in vehicle trips from mobile sources.

Combustion Sources

The proposed project contains three new combustion sources: the Cogen Train D, TGU, and Safety Flare. Combustion source emissions are calculated based on fuel feed rate and standard emission factors or emission factor guarantees provided by the manufacturer. Detailed emission calculations are presented in Appendix C.

TABLE 4-5

Chevron Products Company El Segundo Refinery
Stationary Source Operational Emissions
(lbs/day)

Sources	CO	VOC	NOx	SOx	PM10	PM2.5[1]
STATIONARY SOURCES:						
MODIFICATIONS						
No. 2 Crude Unit PRDs	--	10.3	--	--	--	--
No. 2 Residuum Stripper Unit PRDs	--	3.4	--	--	--	--
Minalk/Merox Unit PRDs	--	4.1	--	--	--	--
Waste Gas Compressors	--	0	--	--	--	--
FCCU	--	10.8	--	--	--	--
Alkylation Unit	--	15.8	--	--	--	--
VRDS Unit	--	22.6	--	--	--	--
ISOMAX Unit	--	26.7	-555.7[2]	--	--	
Cogen Train D	72.3	48.2	178.4	63.1	0[3]	0[3]
Railcar Loading/Unloading Rack	--	4.7	--	--	--	--
NEW UNITS						
Sulfur Recovery Facilities						
SWS	--	3.0	--	--	--	--
SRU	--	--	--	--	--	--
TGU	304.6	5.1	133.5	139.3	5.7	5.7
Vapor Recovery and Safety Flare System	2.3	3.2	8.4	0.1	0.5	0.5
Additional Storage Facilities	--	45.6	--	--	--	--
Cooling Tower	--	--	--	--	5.8	5.8[4]
Total Stationary Source Emission Increases[5]	**379.2**	**203.5**	**-235.4**	**202.5**	**12.0**	**12.0**
OFF-SITE EMISSION SOURCES:						
New Workers Commuting	3.8	0.4	0.4	<0.01	0.02	0.02
Fugitive Road Dust	--	--	--	--	0.15	0.01
Locomotive Engines	6.3	2.4	46.1	3.92	1.52	1.47
Total Off-Site Emission Increases:	**10.1**	**2.8**	**46.5**	**3.93**	**1.69**	**1.50**
Total Operational Emission Increases: [5]	**389.3**	**206.3**	**-188.9**	**206.4**	**13.7**	**13.6**

(1) PM2.5 is determined by ratio to PM10 using https://www.aqmd.gov/ceqa/handbook/PM2_5/pm2_5ratio.xls, Profiles ID #117, 118, 120, and 393.
(2) Existing ISOMAX furnaces will be retrofitted with low-NOx burners, which will decrease NOx emissions, with no change in firing rate and, thus, no changes in CO, SOx, PM10, or PM2.5 emissions are expected.
(3) Cogeneration Facilities (A, B, C, and D) and Aux. Boiler will be operated under existing permit limits for PM10. Therefore, the addition of Cogen Train D will have no increase in PM10 or PM2.5 emissions.
(4) Cooling tower emissions are assumed to be all PM2.5.
(5) Differences in totals as compared to Appendix C are due to rounding.

Fugitive Emissions

Fugitive emissions will also be associated with modifications at the Refinery. Fugitive VOC emission sources are from process equipment components such as valves, flanges, vents, pumps, drains, and compressors. The emission calculations herein are based on emission factors that are outlined in a Memorandum from the SCAQMD dated April 2,1999 (SCAQMD, 1999). That Memorandum provides the appropriate emission factors for fugitive sources that include BACT and lowest achievable emission reductions (LAER). Modifications to existing and new equipment are required to comply with BACT requirements in SCAQMD Rules 1303 or 2005 for RECLAIM equipment.

Additional documentation of the procedures used to calculate the emissions estimates is provided in Appendix C. All new and modified process components are required to conform to the SCAQMD's BACT Guidelines. The estimated emissions presented in Table 4-5 are based on preliminary design information with limited or no BACT applied. Final designs as permitted will include BACT components that will lower the emission estimates from those presented in Table 4-5. The BACT associated with each of the major project components is discussed below. Fugitive emission sources are also regulated under New Source Performance Standards (NSPS) Subpart GGG and SCAQMD Rule 1173.

Process Pumps: Sealless pumps will be used, to the extent feasible and commercially available, as BACT for pumps in light hydrocarbon service. For those instances where sealless pumps are deemed unacceptable, two types of double or tandem mechanical seals will be evaluated for use: (1) tandem mechanical seals that use a barrier fluid and a seal pot vented to a closed system; and (2) dry-running tandem mechanical seals vented to a closed system. The dry-running tandem mechanical seals are considered to be equivalent control technology since they control fugitive VOC emissions as well as the tandem mechanical seals with the barrier system. All pumps will be subject to an SCAQMD-approved inspection and maintenance program, as required under SCAQMD Rule 1173.

Process Valves: Bellow sealed valves will be installed on project components to reduce fugitive VOC emissions. The SCAQMD BACT/LAER guidelines indicate that leakless valves must be used, except for the following applications.

- Heavy hydrocarbon liquid service
- Control valves
- Instrument tubing/piping
- Installations where valve failure could pose a safety hazard (e.g. drain valves with stems in a horizontal position)
- Retrofit/special applications with space limitations
- Applications requiring torsional valve stem motion
- Valves not commercially available

- Components exclusively handling commercial natural gas
- Components exclusively handling fluids with a VOC concentration of ten percent by weight or less
- Components incorporated in lines while operating under negative pressure
- Lubricating fluids
- Components buried below ground
- Components handling liquids exclusively, if the weight percent evaporated is ten percent or less at 150 degrees Centigrade, as determined by ASTM Method D-86
- Pressure vacuum valves on storage tanks

For heavy hydrocarbon liquids and for applications where leakless valves cannot be used, valves of standard API/ANSI design will be used. Fugitive VOC emissions from light liquid valves will be monitored and controlled in accordance with an SCAQMD-approved inspection and maintenance program, as required under SCAQMD Rule 1173. Valves in gas/vapor and in light liquid service initially will be monitored on a monthly basis, in compliance with the Federal Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries (40 CFR Part 60, Subpart GGG). Valves that do not leak during two successive monthly inspections will revert to a quarterly inspection interval. New valves will be subject to a 500 ppm limit.

Process Drains: New process drain lines will be provided with two normally closed block valves in series, or a single block valve in series with a cap or plug as required under SCAQMD Rule 1173. New drain hubs (funnels) will be equipped with P-Traps and/or seal pots along with an SCAQMD-approved inspection and maintenance program, as required under SCAQMD Rule 1176.

Flanges: The use of flanged connections will be minimized to the extent practicable. Where required for maintenance or other routine operations, flanged connections will be designed in accordance with ANSI B16.5-1988, Pipe Flanges and Flanged Fittings. Fugitive emissions will be monitored and controlled in accordance with an approved inspection and maintenance program, as required under SCAQMD Rule 1173.

Pressure Relief Devices (PRDs): PRDs will be routed to the existing and new Refinery safety flare system, where required, to control VOC emissions.

In addition, emission offsets are required for newly permitted and modified permitted emission sources by SCAQMD Regulation XIII and/or Regulation XX. Emission offsets are required for all emission increases associated with stationary sources, thus, minimizing the impacts associated with emissions from stationary sources. Therefore, emission offsets will be required for emission increases greater than one pound from stationary sources.

Off-site emission sources are those that are related to the proposed project, but that would not be directly emitted from permitted equipment at the project site, i.e., trucks, worker commute trips, etc. The operation of the proposed project is expected to require 12 new workers, a reduction of two delivery trucks per day, and a maximum of 12 additional railcars at the facility on a daily basis. The emission increases associated with the increased off-site emission sources are shown in Table 4-5.

Total unmitigated operational emissions from the proposed project are summarized in Table 4-5. Unmitigated operational emissions are summarized in Table 4-6, together with the SCAQMD daily operational threshold levels. The operation of the project will exceed the significance thresholds for VOC. Therefore, the air quality impacts associated with operational emissions from the proposed project are significant. The VOC emissions are associated with modifications to the facility and the new storage tanks. Chevron will obtain offsets for the direct VOC emission increases as required by SCAQMD Rule 1303(b)(2)(A). Because VOC is a precursor to ozone, which is a regional pollutant, the VOC offsets, which are based on an established New Source Review program, will reduce the proposed project net contribution to VOC emissions to the 2.8 pounds per day emitted by the additional workers commuting, which is less than significant. The proposed project emissions for CO, NOx, SOx, PM10 and PM2.5 are less than significant.

TABLE 4-6

Chevron Products Company El Segundo Refinery
Stationary Source Operational Emissions Summary
(lbs/day)

Sources	CO	VOC	NOx	SOx	PM10	PM2.5(1)
Significance Determination for Facility-Wide Pollutants						
Project Emissions(1)	--	--	-188.9	206.4	--	--
Projected 2010 Emissions	--	--	4,087.7	1890.4	--	--
Total Facilty-Wide 2010 Emissions	--	--	3,898.8	2,096.8	--	--
5-Year Average + Significance Threshold(2)	--	--	**5,596**	**4,964**	--	--
Significant?	--	--	**NO**	**NO**	--	--
Significance Determination for All Project Non-Facility-Wide Pollutants						
Project Emissions	389.3	206.3	--	--	13.7	13.6
Significance Thresholds	**550**	**55**	--	--	**150**	**55**
Significant?	**NO**	**YES**	--	--	**NO**	**NO**
Emissions Following Mitigation	389.3	2.8(3)	--	--	13.7	13.6
Significant Following Mitigation?	**NO**	**NO**	--	--	**NO**	**NO**

(1) See Table 4-5.
(2) See Table 4-3.
(3) Emissions mitigated with emission offsets for stationary sources.

The 2010 Refinery projected emissions are based on historical operating conditions with projections on future firing rates, and considering the RECLAIM allocation. All of the major Refinery NOx and SOx emission sources are RECLAIM sources and subject to RECLAIM requirements. Other stationary sources are covered by permit requirements or applicable rules/regulations. For example, flares are not RECLAIM sources and flare emissions are not included as part of the RECLAIM allocation. However, flare emissions are regulated by SCAQMD's Rule 1118- Control of Emissions from Refinery Flares. In addition, the 2010 projected emissions include adjustments (either emission increases or decreases) for projects currently under construction, e.g., construction of the SCR on the FCCU.

4.2.2.3 CO Hot Spots

The potential for high concentration of CO emissions associated with truck/vehicle traffic was considered and evaluated per the requirements of the SCAQMD CEQA Air Quality Handbook (SCAQMD, 1993). The Handbook indicates that any project that could negatively impact levels of service at local intersections may create a CO hot spot and should be evaluated. The intersection of Aviation Boulevard and El Segundo Boulevard has a potential to have significant traffic impacts during the construction phase (see Section 4.8). A CO Hotspots Analysis was completed using the Bay Area Air Quality Management District Screening Method to assess the impacts of the traffic on CO ambient air quality. The screening analysis is a conservative method that is based on the traffic air quality impact model CALINE and thus is an appropriate method of analysis. The analysis is presented in Appendix B. The CO Hotspots Analysis resulted in CO concentrations of 5,656 $\mu g/m^3$ and 4,074 $\mu g/m^3$ for the one-hour and eight-hour averaging periods, respectively. The results are below the significance threshold established in Rule 1303 of 23,000 $\mu g/m^3$ and 10,000 μg/m for eight-hour averaging periods. Therefore, no significant adverse impacts to ambient air quality due to the traffic impact at the intersection are expected and no mitigation is required.

4.2.2.4 Impacts to Ambient Air Quality

Dispersion modeling was used to calculate ambient air concentrations of the criteria pollutants from the project sources which emit NOx, CO, PM10, and PM2.5 emissions and to determine the localized impacts. The ISCST3 model was used to predict the ambient concentrations for NOx, CO, and PM10 (VOC and SOx are not required to be modeled under SCAQMD Rule 1303, Appendix A because they don’t normally contribute to localized air quality impacts). Since PM2.5 emissions are a fraction of PM10 emissions and the significance thresholds are the same for PM10 and PM2.5, PM2.5 emissions were not modeled but were based on the modeling results for PM10.

A modeling file was used for NOx, CO, and PM10 with the appropriate averaging times. The emission rates, locations, and groundlevel concentrations are included in Appendix C. Averaging times modeled include 1, 8, and 24 hours and annual. The modeling source parameters are the same as those for the TACs discussed in the following subsection. The calculated impacts on ambient air concentrations of the modeled criteria pollutants are presented in Table 4-7.

Based on the ISCST3 model, the ground level concentrations of the criteria pollutants of concern will be below significance thresholds. Therefore, no significant adverse localized air quality impacts are anticipated to occur from the proposed project.

4.2.2.5 Toxic Air Contaminants

A health risk assessment (HRA) was performed to determine if emissions of TACs generated by the proposed project would exceed the SCAQMD thresholds of significance for cancer risk and hazard indices and is included as Volume II to this EIR. The following subsections outline the HRA prepared for the modifications to the Refinery. The results of the HRA will be used to evaluate the impacts of TACs from the proposed project. The HRA summarized herein for the proposed project evaluates the emission increases only from the Chevron PRO Project.

TABLE 4-7

RESULTS OF CRITERIA POLLUTANTS AIR QUALITY MODELING

Criteria Pollutant	Averaging Time	Significance Threshold	Calculated Concentrations for Chevron PRO Project(1)	Significant?
Nitrogen Dioxide	1-hour	500 μg/m^3	271.6 μg/m^3 (2)	No
	Annual	100 μg/m^3	30.7 μg/m^3 (2)	No
Carbon Monoxide	1-hour	23,000 μg/m^3	4,736.4 μg/m^3 (2)	No
	8-hour	10,000 μg/m^3	3,503.9 μg/m^3 (2)	No
Particulate Matter (PM10)	24-hour	2.5 μg/m^3	0.65 μg/m^3 (3)	No
	Annual (geometric mean)	1 μg/m^3	0.17 μg/m^3 (3)	No
Particulate Matter (PM2.5)(4)	24-hour	2.5 μg/m^3	<0.65 μg/m^3 (3)	No
	Annual (geometric mean)	1 μg/m^3	<0.17 μg/m^3 (3)	No

(1) Calculated concentrations are the project impact combined with the background ambient concentrations. See Appendix C for detailed calculations.
(2) Most stringent ambient air quality standard.
(3) From Table 4-1.
(4) PM2.5 emissions are a fraction of the PM10 emissions with the same thresholds. Therefore, since PM10 results are below the significance thresholds, PM2.5 will be also and are not significant.

HRA Methodology

The HRA has been prepared in accordance with the August 2003 Office of Environmental Health Hazard Assessment (OEHHA) Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments (OEHHA, 2003) and the October 2003 Air Resources Board Recommended Interim Risk Management Policy for Inhalation-based Residential Cancer Risk memo (CARB/OEHHA, 2003). The HRA includes a comprehensive analysis of the dispersion of certain AB2588-listed compounds into the environment, the potential for human exposure, and a quantitative assessment of individual health risks associated with the predicted levels of exposure. CARB Hotspots Analysis Reporting Program (HARP) model is the most appropriate model for determining the air quality impacts from the proposed project (CARB, 2005). The HARP model is well suited for refinery modeling since it can accommodate multiple sources and receptors. The HARP model combines the U.S. EPA Industrial Source Complex dispersion model with a risk calculation model based on the Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA, 2003). The model default values were modified to conform to the SCAQMD Supplemental Guidelines for Preparing Risk Assessment for AB2588 (SCAQMD, 2005).

Hazard Identification

The operation of the Refinery generates various air contaminants. Some of these chemical compounds are potentially carcinogenic, toxic, or hazardous, depending on concentration or duration of exposure. Numerous federal, state, and local regulatory agencies have developed lists of TACs. The list of potentially-emitted substances considered in the preparation of the HRA for the proposed project is identified in Appendix A-I of the CARB AB2588 requirements and by OEHHA. The AB2588 TACs emitted from the proposed project are shown in Table 4-8. Some of these pollutants were consolidated into one category, e.g., polycyclic aromatic hydrocarbons (PAHs). Health effects data are not available for all compounds. Therefore, a total of 38 TACs were included in the air dispersion modeling (see Table 4-8). For carcinogens, slope factors were used to compute cancer risk through inhalation. If the carcinogen is a multi-pathway pollutant, a potency slope was used for estimation of risk from non-inhalation pathways. For non-cancer health effects, reference exposure levels (REL) and acceptable oral doses (for multi-pathway pollutants) were used. The non-carcinogenic hazard indices were computed for chronic and acute exposures with their respective toxicological endpoints shown.

Emission Estimations and Sources

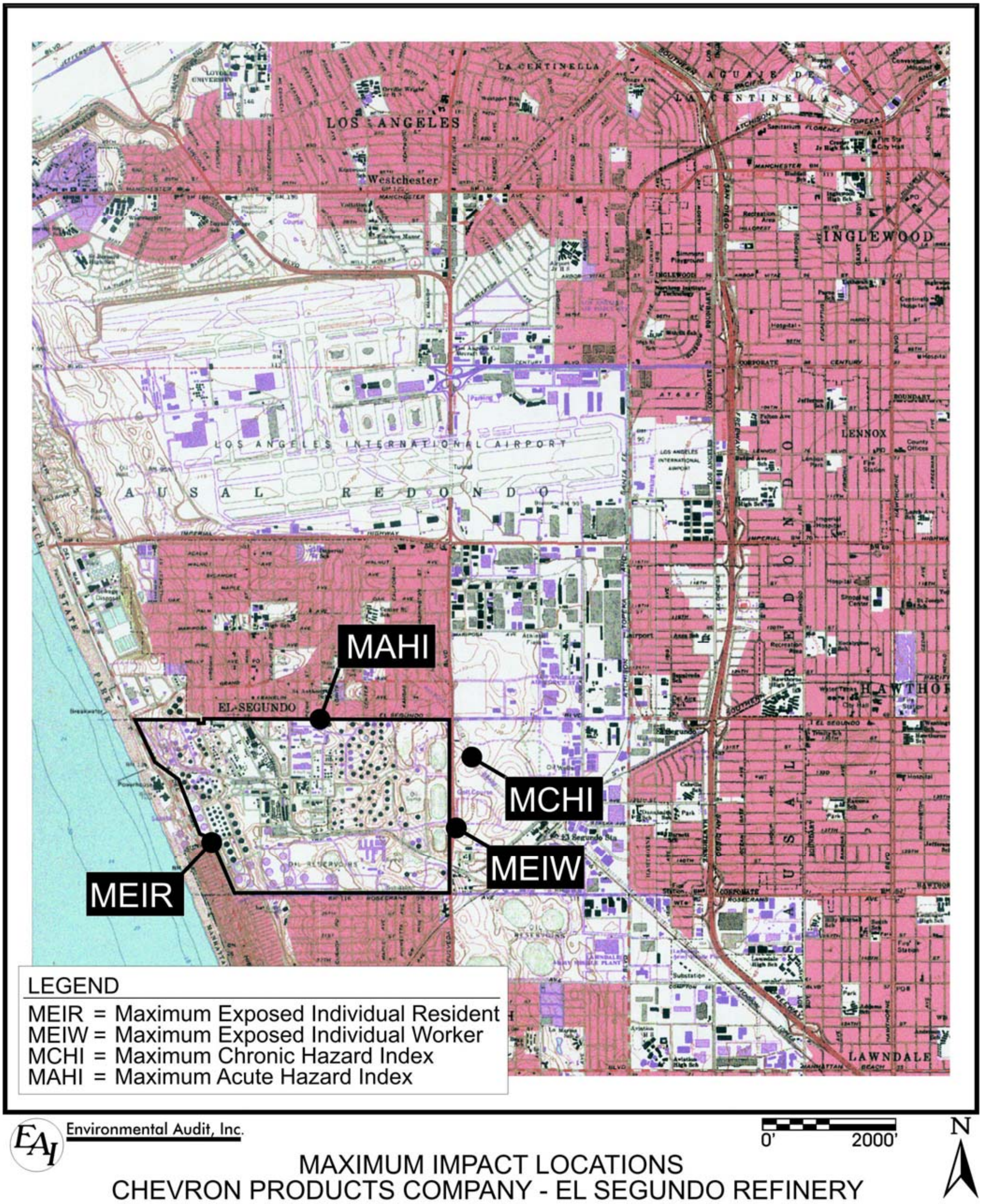
Emission rates for the proposed project are shown in Table 4-8. The emission rates for each source are provided in Appendix A of Volume II. Emission rates are based on operating 24 hours per day and 365 days per year.

TABLE 4-8

Maximum Refinery TAC Emissions Rates From the Proposed Project

CHEMICAL	Proposed Project	
	Emissions (lbs/hr)	Emissions (lbs/yr)
1,2,4-Trimethylbenzene[(1)]	1.94E-02	1.70E+02
1,3-Butadiene	1.30E-03	9.64E+00
Acetaldehyde	1.23E-02	1.08E+02
Acrolein	1.07E-04	9.34E-01
Ammonia	4.53E+00	3.97E+04
Benzene	2.11E-02	1.84E+02
Benzo[a]pyrene	2.64E-06	2.31E-02
Benzo[b]fluoranthene	3.44E-06	3.01E-02
Benzo[g,h,i]perylene	8.79E-06	7.70E-02
Cadmium	2.87E-04	2.52E+00
Carbon disulfide	1.37E-06	1.20E-02
Carbonyl sulfide	4.22E-06	3.70E-02
Chloroform	6.93E-07	6.07E-03
Chromium	2.29E-03	2.01E+01
Chromium(VI)	6.93E-07	6.07E-03
Cobalt	1.25E-04	1.10E+00
Copper	3.83E-03	3.36E+01
Cyclohexane	1.08E-02	9.46E+01
Ethyl benzene	2.00E-02	1.75E+02
Ethylene	5.30E-02	3.45E+02
Formaldehyde	3.50E-03	3.07E+01
Hexane	5.28E-02	4.63E+02
Hydrogen sulfide	1.09E-01	9.51E+02
Lead	6.47E-04	5.67E+00
Manganese	1.81E-03	1.59E+01
Mercury	3.20E-04	2.81E+00
Methane	8.48E-02	7.43E+02
Naphthalene	1.12E-02	9.79E+01
Nickel	1.47E-03	1.28E+01
PAHs	1.69E-05	1.48E-01
Phenol	4.05E-05	3.55E-01
Phosphorus	1.12E-02	9.82E+01
Propylene	1.73E-01	1.52E+03
Selenium	6.36E-04	5.57E+00
Toluene	6.41E-02	5.62E+02
Vanadium	7.20E-08	6.32E-04
Xylenes (mixed)	8.93E-02	7.82E+02
Zinc	1.68E-02	1.47E+02

(1) Was included in modeling but has no established health effects data.



MAXIMUM IMPACT LOCATIONS
CHEVRON PRODUCTS COMPANY - EL SEGUNDO REFINERY
PRODUCT RELIABILITY AND OPTIMIZATION PROJECT

Project No. 2505

Figure 4-1

N:\2505\Maximum Impact Points (HRA).cdr

VOC emission factors for fugitive components installed in conjunction with the proposed project were based on the SCAQMD's latest guidelines for fugitive components, assuming the use of BACT and an inspection and monitoring program (Jay Chen memo, SCAQMD, April 2, 1999). Speciation of VOC emissions was derived from speciation data used by the Refinery for annual emissions reporting and AB2588 reporting.

Carcinogenic Health Impacts

Maximum Exposed Individual Worker: The cancer risk estimates for the MEIW are shown in Table 4-9. Based on the air quality modeling and related assumptions, consistent with SCAQMD HRA policy, the cancer risk to the MEIW associated with the proposed project at the Refinery was calculated to be 0.22 x 10^{-6} or less than one in a million. This result does not exceed the cancer risk significance threshold of 10 per million (see Table 4-1); therefore, the carcinogenic impacts to the MEIW associated with the exposure to TACs from the proposed project are less than significant. Consistent with SCAQMD HRA policy, the MEIW is based on a 40-year exposure period. Workers are assumed to be exposed for eight hours a day, five days a week, 49 weeks a year, for 40 years. The project MEIW location is shown in Figure 4-1.

TABLE 4-9

Summary of Proposed Project Cancer Risk

EXPOSURE PATHWAY	Maximum Exposed Individual Resident	Maximum Exposed Individual Worker
Inhalation	3.05E-07	2.07E-07
Dermal	8.68E-09	9.38E-09
Soil Ingestion	1.39E-09	1.33E-09
Oral		
Ingestion of Home Grown Produce	1.11E-08	0.00E+00
Ingestion of Animal Products	0.00E+00	0.00E+00
Ingestion of Mother's Milk	0.00E+00	0.00E+00
Total Cancer Risk	**0.33E-06**	**0.22E-06**

Maximum Exposed Individual Resident: The cancer risk estimates for the MEIR are shown in Table 4-9. Based on the air quality modeling and related assumptions consistent with SCAQMD HRA policy, based on 70 year exposure, the cancer risk to the MEIR associated with the proposed project at the Refinery was calculated to be 0.33 x 10^{-6} or less than one in a million. This result does not exceed the cancer risk significance threshold of 10 per million (10 x 10^{-6}) (see Table 4-1); therefore, the carcinogenic impacts to the MEIR associated with exposure to TACs from the proposed project are less than significant. The project MEIR location is shown in Figure 4-1.

Cancer Burden: Typically, a one per million isopleth would be used in the HARP model as a study area to calculate excess cancer burden. Since the cancer risk was less than one per million, no one per million isopleth was prepared. Therefore, no excess cancer burden was required to be calculated.

Sensitive Receptors: Other types of sensitive receptors in addition to residences include schools, daycare facilities, and hospitals. The maximum incremental cancer risk increase for a sensitive receptor is 1.62×10^{-7}, which is substantially less than the cancer risk threshold of 10×10^{-6}. This occurs at St. Anthony's School, which is located about 600 feet north of the Refinery.

Ethyl Benzene Carcinogenic Risk: On November 14, 2007, OEHHA established ethyl benzene as a carcinogen. The HARP model has not been updated to reflect this change and does not allow the end user to modify the health risk values used in the model. Therefore, to estimate the impact from ethyl benzene the risk associated with the project benzene emissions was scaled to adjust for the ethyl benzene emission rate and the carcinogenic risk using ratios of emission rates and cancer potency slopes. For the MEIW, ethyl benzene is estimated to contribute 0.002×10^{-6}, which would adjust the cancer risk to 0.22×10^{-6} (no appreciable change). For the MEIR, ethyl benzene is estimated to contribute 0.02×10^{-6}, which would adjust the cancer risk to 0.35×10^{-6}.

Non-Carcinogenic Health Impacts: In the analyses of non-carcinogenic health effects, it is generally assumed that a threshold exists below which no health impacts are expected. The substances evaluated can produce health effects due to acute or chronic exposures, although the concentration required to produce such effects may vary greatly depending on the compound.

The types of non-cancer health effects resulting from exposure to compounds vary according to the substance, the magnitude of exposure, and the period of exposure. These health effects generally can be classified into acute exposures (short-term exposures) and chronic exposures (long-term exposures, generally years).

Maximum Acute Hazard Index (MAHI): The highest acute hazard index for the proposed project is estimated to be 0.0307 for the central nervous system. The acute health effects are based on maximum hourly emissions of TACs that have acute target endpoints. (See Volume II for further details.) The acute hazard index for the proposed project does not exceed the relevant significance threshold of 1.0 in Table 4-1; therefore, no significant adverse acute health impacts are expected. The maximum acute hazard index is located at the northern Refinery property line (see Figure 4-1).

Maximum Chronic Hazard Index (MCHI): The highest chronic hazard index for the proposed project is estimated to be 0.0066 for the reproductive system. (See Volume II for further details.) The chronic hazard index for the proposed project does not exceed the relevant significance threshold of 1.0 in Table 4-1; therefore, no significant adverse chronic health impacts are expected. The maximum chronic hazard index location is approximately 650 feet east of the Refinery northeast of the MEIW (see Figure 4-1).

4.2.2.6 Summary of Health Impacts

The health impacts related to air quality impacts have been evaluated in several ways. First, the short-term air quality impacts related to construction emissions were evaluated by comparing the peak day construction emissions to the SCAQMD mass daily significance thresholds. In the short-term, the air quality impacts related to construction emissions would exceed the SCAQMD significance thresholds for most pollutants and are considered an adverse significant air quality impact. In order to evaluate the health impacts associated with construction emissions, a LST analysis was also completed. The LST analysis modeled the peak onsite construction emissions to determine the groundlevel concentrations. The results of the LST analysis indicated that the short-term construction emissions would be below the applicable LST criteria. The LST significance criteria are based on the most stringent ambient air quality standard for NO_2, CO, PM10, and PM2.5, and the ambient air quality standards are based on health effects (see Table 3-1). Since construction of the proposed project is short-term and would not exceed the LST significance criteria for local ambient air quality for NO_2, CO, PM10, and PM2.5, no significant adverse health impacts associated with construction emissions are expected. The primarily health effects associated with exposure to NO_2, CO, PM10, and PM2.5 are respiratory impacts including decreased lung function, aggravation of chronic respiratory condition, and aggravation of heart disease conditions. No such adverse health impacts are expected during the construction phase of the proposed project.

Air quality modeling was also completed for the NO_2, CO, PM10, and PM2.5 emission increases associated with operation of the proposed project. The significance thresholds for modeling are based on the most stringent ambient air quality standards and the ambient air quality standards are based on health effects (see Table 3-1). Air quality modeling indicates that emission concentration increases associated with criteria pollutants due to the operation of the proposed project would be less than the applicable significance thresholds and less than ambient air quality standards. Therefore, health impacts associated with the operation of the proposed project are expected to be less than significant. The primary health effects associated with exposure to NO_2, CO, PM10, and PM2.5 are respiratory impacts including decreased lung function, aggravation of chronic respiratory conditions, and aggravation of heart disease conditions. The proposed project is not expected to exceed or contribute to an exceedence of the ambient air quality standards so no such adverse health impacts (respiratory impacts) are expected due to the operation of the proposed project.

Epidemiological analyses have consistently linked air pollution, especially PM, with excess mortality and morbidity. Health studies have shown both short-term and long-term exposures of ambient PM concentrations are directly associated with increased mortality and morbidity. To estimate potential air quality impacts from a particular facility, the ISC (Industrial Source Complex) model can be used to provide PM10 concentration levels at a set of receptor points. A concentration-response equation can be calculated on the modeled air quality impacts and changes in mortality to determine the relative change in mortality associated with the estimated changes in annual PM levels and estimate the potential for health impacts. For this calculation, it is assumed that all the PM10 is PM2.5. The log-linear form of the concentration response equation is:

$$\Delta \text{ Mortality} = y_0 (e^{\beta \Delta PM} - 1) * \text{population}$$

where

y_0 = county level all cause annual death rate per person for ages 30 and older,

β = PM2.5 coefficient from health study,

ΔPM = change in annual mean PM2.5 concentration, and

Population = population of ages 30 and older.

The resulting change in cases of mortality in a population age group living in a specific location with a given change in PM can then be calculated. By applying the census tract level for all census tracts within the modeling domain, the overall estimate in the change in mortality from PM emission of the facility is determined. Since the air quality analysis shows that the onsite PM emissions from the PRO Project do not have offsite consequences (i.e., no concentrations above the ambient air quality standards), the above modeling procedure is not required and, thus, no increase in morbidity or mortality rates or related health effects are anticipated.

The indirect PM emissions associated with the proposed project are limited to an increase in locomotive engines associated with additional deliveries to the Refinery. The emission increase is associated with adding railcars onto existing trains that currently visit the Refinery so the emissions are limited to the increased weight of the train on the locomotive engine, as opposed to an increase in the number of trains. The emissions from trains will be dispersed throughout the district and will not result in localized impacts (e.g., no increase in locomotive idling emissions). Same holds true for PM emissions from new worker vehicles commuting to the Refinery from their homes across the region, thus, dispersing the PM emissions throughout the district. Therefore, no significant air quality or related health impacts are expected due to the proposed project.

The long-term air quality impacts from exposure to toxics were evaluated through the preparation of an HRA. The HRA evaluated the emissions associated with the operation of the proposed project and compared them to carcinogenic and non-carcinogenic significance thresholds to determine potential health impacts. As demonstrated in the HRA, the carcinogenic and non-carcinogenic impacts for all receptors are expected to be less than the significance thresholds. Therefore, no significant adverse carcinogenic or non-carcinogenic health impacts associated with the operation of the proposed project are expected.

4.2.3 MITIGATION MEASURES

Feasible mitigation measures are required, if available, to minimize the significant air quality impacts associated with the construction phase of the proposed project as the emissions of certain pollutants are considered significant.

No mitigation measures are required for the operation phase because all emissions were determined to be less than significant, except for VOC emissions, which require offsets for stationary sources pursuant to SCAQMD Rule 1303. The offsets are based on an established New Source Review program. Operational VOC emissions from the proposed project that do not require offsets are from mobile source emissions (2.8 lbs/day), which alone are less than significant. Therefore, VOC emissions are mitigated to be less than significant.

Construction Mitigation Measures

The proposed project is expected to have significant adverse air quality impacts during the construction phase. Therefore, the following mitigation measures will be imposed on the project to reduce emissions associated with construction activities from heavy construction equipment and worker travel.

On-Road Mobile Sources:

A-1 Develop a Construction Emission Management Plan for the proposed project. The Plan shall include measures to minimize emissions from vehicles including, but not limited to consolidating truck deliveries, prohibiting truck idling in excess of five minutes, description of truck routing, description of deliveries including hours of delivery, description of entry/exit points, locations of parking, and construction schedule.

Off-Road Mobile Sources:

A-2 Prohibit construction equipment from idling longer than five minutes at the Refinery.

A-3 Use electricity or alternate fuels for on-site mobile equipment instead of diesel equipment to the extent feasible. The project has incorporated this measure to the extent predictable, but will continue to implement where opportunities arise.

A-4 Maintain construction equipment tuned up and with two to four degree retard diesel engine timing.

A-5 Use electric welders instead of gas or diesel welders in portions of the Refinery where electricity is available. The project has incorporated this measure to the extent predictable, but will continue to implement where opportunities arise.

A-6 Use on-site electricity rather than temporary power generators in portions of the Refinery where electricity is available.

A-7 Prior to construction, the project applicant will retrofit cranes of 200 hp and greater with diesel particulate filters that will reduce PM10 emissions. In addition, the project applicant will evaluate the feasibility of retrofitting the off-road construction equipment 50 to 200 hp that will be operating for significant periods. Retrofit technologies such as selective catalytic reduction, oxidation catalysts, air enhancement technologies, etc., will be evaluated. Such technologies will be required if they are commercially available and can feasibly be retrofitted onto construction equipment.

A-8 Suspend use of all construction activities that generate air pollutant emissions during first stage smog alerts.

<u>PM10 Emissions from Grading, Open Storage Piles, and Unpaved Roads:</u>

A-9 Develop a fugitive dust emission control plan. Measures to be included in the plan include, but are not limited to the following: (1) water active construction site three times per day, except during periods of rainfall. Watering construction sites two times per day complies with SCAQMD Rule 403 and provides about a 50 percent emission reduction. Watering construction sites three times per day will reduce PM10 and PM2.5 emissions by an additional 18 percent (total control of 68 percent). These control efficiencies were reflected in the project emission calculations so no further emission reduction credit has been taken into account herein; (2) enclose, cover, water twice daily, or apply approved soil binders according to manufacturer's specifications to exposed piles (i.e., gravel, dirt and sand) with a five percent or greater silt content. Implementation of this mitigation measure would reduce PM10 and PM2.5 emissions 30 to 74 percent (SCAQMD, 1993); and (3) suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 miles per hour. The emission reductions associated with this mitigation measure cannot be quantified (SCAQMD, 1993).

Other Mitigation Measures

During the course of construction, process units with combustion sources will be shutdown to accomplish the project modifications. Therefore, varying emission reductions will occur. Emission reductions will vary depending on the number of units that are shutdown concurrently. Therefore, while the reductions are quantifiable, the emission reductions do not directly offset peak construction emissions and are not being accumulated as mitigation emissions reductions. Table 4-10 shows the ranges of emission reductions from not operating refinery equipment that are expected to occur during the construction period. Unit shutdowns will vary during the construction period, with a wide range of emission reductions.

TABLE 4-10
EMISSION REDUCTIONS FROM UNIT SHUTDOWNS DURING CONSTRUCTION
(lbs/day)

Pollutant	Range of Emissions Reduction
CO	18 – 2,302
NOx	32 – 1,658
SOx	2 – 848
VOC	4 – 1,858
PM10	4 - 258

Other mitigation measures were considered but were rejected because they would not further mitigate the potential significant impacts. These mitigation measures include: (1) provide temporary traffic control during all phases of construction activities (traffic safety hazards have not been identified); (2) implement a shuttle service to and from retail services during lunch hours (most workers eat lunch on-site and lunch trucks will visit the construction site); (3) use methanol, natural gas, propane or butane powered construction equipment (equipment is not CARB-certified or commercially available); and (4) pave unpaved roads (most Refinery roads are already paved).

4.2.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Construction emissions for the proposed project for CO, VOCs, NOx, PM10, and PM2.5 are expected to remain significant following mitigation. The construction emissions associated with SOx are expected to remain less than significant following mitigation. Construction emissions are expected to be short-term and they will be eliminated following completion of the construction phase.

The mitigation measures are expected to result in additional emission reductions and reduce the potentially adverse significant impacts associated with PM10 and PM2.5

emissions however, sufficient emission reductions are not expected to reduce the significant CO, VOC, NOx, PM10, and PM2.5 emissions to less than significant. SOx emissions would remain less than significant prior to mitigation.

Localized significant impacts from construction activities were analyzed for NO_2, CO, PM10, and PM2.5. The construction activities associated with the proposed project are not expected to cause a significant adverse impact on ambient air quality and no mitigation would be required. The analysis concluded that construction emissions of NO_2, CO, PM10 and PM2.5 would not exceed applicable LSTs (Table 4-1).

Traffic impacts were analyzed for potential impact to CO ambient air quality and determined that no significant change in the ambient CO air quality is expected as a result of the proposed project. Therefore, the proposed project is not expected to cause CO hotspots and no significant adverse impact on ambient air quality is expected.

The operational impacts of the proposed project are expected to have significant VOC impacts. The proposed project is not expected to have significant impacts to CO, NOx, SOx, PM10, or PM2.5 during operation. VOC emissions are offset for stationary sources pursuant to SCAQMD Rule 1303. The VOC offsets will reduce the proposed project net contribution to VOC emissions to 2.8 pounds per day emitted by the additional workers commuting, which is less than significant. Therefore, after mitigation the proposed project is not expected to cause a potentially significant adverse impact on air quality.

Ambient air quality modeling indicates that the project emissions of NO_2, CO, PM10, and PM2.5 during operation of the proposed project will be below ambient air quality standards. Therefore, the operation of the proposed project is not expected to cause a significant adverse impact on ambient air quality.

The proposed project was analyzed for cancer and non-cancer human health impacts and determined to be less than significant. The estimated cancer risk due to the operation of the proposed project is expected to be less than the significance criterion of 10 per million. The chronic hazard index and the acute hazard index are both below 1.0. Therefore, the proposed project is not expected to cause a potentially significant adverse impact associated with exposure to toxic air contaminants.

4.3 ENERGY

The NOP/IS (see Appendix A) determined the increased electrical demand associated with the proposed project at the Chevron Products Company El Segundo Refinery as having the potential for significant adverse energy impacts. The NOP/IS concluded that potential increased demand for natural gas from the proposed project would not be significant. No comment letters were received disputing this conclusion. Therefore, energy resource impacts with respect to electricity are evaluated in this section.

4.3.1 SIGNIFICANCE CRITERIA

The proposed impacts on energy resources would be considered significant if the following occurs:

- The project requires new off-site energy supply facilities and distribution infrastructure or capacity enhancing alterations to existing facilities.

4.3.2 ENVIRONMENTAL IMPACTS

The proposed project includes equipment that will require additional electricity and produce electricity. The equipment that will require additional electricity as part of the proposed project includes the new FCCU main blower and new pumps, new pumps in the ISOMAX Unit, new compressors in the VRDS and hydrogen compression facilities, and the new equipment associated with the Sulfur Recovery Facilities. The estimated increase in electricity demand associated with the proposed new equipment is about 29.9 MW. Modifications to SCE and WBMWD facilities are not expected to create additional electrical demand.

The Refinery currently operates Cogeneration Facilities to supply most of the electricity and steam used by processing equipment. To supplement electrical needs, electricity is currently purchased from offsite sources (e.g., SCE). The existing Cogeneration Facilities are proposed to be expanded by an additional 49.9 MW and will operate on either natural gas and/or refinery fuel gas. The expansion to the Cogeneration Facilities will allow the Refinery to produce the electricity required to operate the proposed new equipment and to supply most of the electricity demand required to operate the Refinery, so that electricity purchases from SCE will be substantially reduced. Therefore, the long-term impacts on the region's electricity supply are considered to be beneficial because Chevron will be reducing demand for electricity from the grid, while efficiently producing additional energy onsite (see also GHG discussion in Chapter 5).

For a short period of time, Chevron expects that it will need to purchase additional electricity from SCE before Cogen Train D is on-line. Chevron expects that the new FCCU main air blower will be installed and operational in about July 2009, as well as other aspects of the proposed project and the modifications to the Cogeneration Facilities will not be completed until about November 2009. Therefore, there will be about a four to five month period that Chevron may be required to purchase additional electricity from SCE (i.e., slightly less than 29.9 MW). Chevron has discussed this issue with SCE and SCE has indicated that they can supply the increased electrical demand for the period of time that Cogen Train D is under construction. Therefore, based on the above, the short-term impacts on electrical supply are considered to be less than significant.

4.3.3 MITIGATION MEASURES

No significant impacts associated with energy resources are expected from the proposed project during construction or operational phases, so no mitigation measures are required.

4.3.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With the new Cogen Train D, the proposed project is expected to generate sufficient electricity to substantially reduce Chevron's demand for electricity from the grid so that no significant energy impacts are expected.

4.4 HAZARDS AND HAZARDOUS MATERIAL

The NOP/IS (see Appendix A) determined that the proposed project at the Chevron Products Company El Segundo Refinery has the potential to generate significant adverse hazards and hazardous materials impacts. The hazards and hazardous material impacts from the PRO Project are evaluated in this section.

4.4.1 SIGNIFICANCE CRITERIA

Hazards and hazardous materials impacts would be considered significant if the following occurs:

Non-compliance with any applicable design code or regulation.

Non-conformance to National Fire Protection Association standards.

Non-conformance to regulations or generally accepted industry practices related to operating policy and procedures concerning the design, construction, security, leak detection, spill containment or fire protection.

Greater exposure to hazardous chemicals in concentrations equal to or greater than the Emergency Response Planning Guideline (ERPG) 2 levels.

Greater exposure to radiant heat exposures in excess of 1,600 British Thermal Units (Btu)/(hr-ft^2) (the level that creates second degree burns on unprotected skin).

Greater overpressure exposure that exceeds one pound per square inch (gauge) (psig) (the level that would result in partial demolition of houses)

Flash fire hazard zones that exceed the lower flammable limit (LFL) (the level that would result in a flash fire in the event a flammable vapor cloud was ignited).

4.4.2 ENVIRONMENTAL IMPACTS

A hazard analysis was conducted for the proposed new and modified units, which is summarized in Table 4-11. The details of the hazard analysis are included in Appendix D.

TABLE 4-11

Maximum Hazard Distances for Maximum Credible Event in Each Process Unit(1)

Process Unit/ Release	Status of Potential Hazard (E) Existing (M) Modified (N) New	Maximum Distance (ft) from Center of Unit to			
		Flash Fire (LFL)	Explosion Overpressure	Pool/Torch Fire Thermal Radiation	H_2S Gas Concentration
			1.0 psig	1,600 Btu/(hr ft^2)	30 ppm
FCCU	E	730	--	--	--
	M	755	--	--	--
VRDS	E	--	--	380	--
	M	--	--	130	--
ISOMAX	E	1,145	--	--	--
	M	830	--	--	--
COGEN	E	--	--	70	--
	N	--	--	105	--
SRF	E	--	--	--	5,580
	N	--	--	--	4,390
H2COMP	E	--	135	--	--
	N	--	135	--	--
TANK	E	--	--	340	--
	N	--	--	340	--
SPHERE	E	--	--	5,300	--
	N	--	--	4,750	--
RAILCAR UNLOADING	E	--	--	4,700	--
	N	--	--	4,700	--

(1) See Appendix D for detailed hazard analysis report.
Proposed new units are compared to existing comparable units that are located in the vicinity of the proposed new unit, e.g., Cogen Train D was compared to the existing cogen units.

Table 4-11 lists the potential hazards (fires, explosion overpressure, thermal radiation, or release of H_2S) from the new or modified units associated with the proposed project and the results of the modeling for these hazards. Hazard impact results are shown for existing equipment, modified equipment, and new equipment. For each potential release, the distance to the significance threshold level was determined before and after the proposed project modifications (where applicable). For new units, the distance to the threshold level for each release was determined. Most of the proposed modifications do not affect the size or the location of the largest potential release for the specific unit. In other words, most of the potential releases, which would result in the largest hazard zones, already exist for many of the units.

With the maximum hazard zones defined for each release, the units can be divided into three categories dependent on their potential to impact the public. The categories are defined as follows:

- **Units and Terminals No Potential Existing or Post-Project Off-Site Impacts** (i.e., no new hazard zones would be generated): The process units that fall into this category include the FCCU, VRDS Unit, Cogen Train D Facilities, Hydrogen Compression Facilities, and storage tanks.

- **Units and Terminals with Potential Existing or Post-Project Off-Site Impacts, But Post-Project Impacts Are Less Than or Equal to Existing Impacts:** The units that fall into this category include the ISOMAX Unit, Sulfur Recovery Facilities, the LPG Sphere, and the railcar unloading facilities.

- **Units with Potential Off-Site Impacts** (i.e., the post-project impacts are larger than the existing impacts so that impacts have the potential to migrate off-site): There are no units that fall into this category.

The conclusions are driven by the nature of the PRO Project in that the replacement of some equipment with more reliable and efficient equipment has little to do with the potential consequence if a release occurs. The consequences are driven by the process conditions at the time of release and the PRO Project is not expected to significantly change those conditions. The consequences of a release will be the same irrespective of the cause of the release (e.g., human error, equipment failure, sabotage, terrorism, natural disaster, or civil uprising). None of the new or modified units have the ability to create a hazard that could extend further off-site. The details of the analysis are included in Appendix D. Historically, catastrophic events involving hazardous materials at refineries are infrequent events, thus, the probability of an occurrence is small. It should be noted that existing maintenance inspections and extensive safety measures and training will further reduce the probability of a catastrophic or hazardous event. Therefore, the potential hazard impacts associated with the proposed project are considered to be less than significant because significance thresholds would not be exceeded. Operation of the proposed project will not involve the use of flammable substances or hazardous materials that are not currently used at the Refinery nor will it involve the use of flammable substances in locations where they are not currently used.

Regulatory Compliance

The proposed project modifications will require compliance with various regulations, including OSHA regulations (29 CFR Part 1910) that require the preparation of a fire prevention plan, and 20 CFR Part 1910 and Title 8 of California Code of Regulations that require prevention programs to protect workers that handle toxic, flammable, reactive, or explosive materials.

Section 112 (r) of the Clean Air Act Amendments of 1990 [42 U.S.C. 7401 et. Seq.] and Article 2, Chapter 6.95 of the California Health and Safety Code require facilities that handle listed regulated substances to develop RMPs to prevent accidental releases of these substances. The Refinery has prepared an RMP for the existing Refinery which may need to be revised to incorporate the changes associated with the proposed project. The HMT Act is the federal legislation that regulates transportation of hazardous materials.

Under federal OSHA, regulations have been promulgated that require the preparation and implementation of a PSM Program (40 CFR Part 1910, Section 119, and Title 8 of the California Code of Regulations, Section 5189). A PSM Program that meets the requirements of the regulations and is appropriately implemented is intended to prevent or minimize the consequences of a release involving a toxic, reactive, flammable, or explosive chemical and their potential impacts on workers and the surrounding community. The primary components of a PSM Program include written safety information; performance of process safety analysis; detailed operating procedures; training; and pre-start up safety review for new and modified facilities.

The Refinery will comply with all applicable design codes and regulations, conform to National Fire Protection Association standards, and conform to policies and procedures concerning leak detection containment and fire protection. Therefore, no significant adverse compliance impacts are expected.

Impacts on Water Quality

A spill of any of the hazardous materials (generally petroleum products and by-products from the refining process) used and stored at the Refinery could occur under upset conditions, e.g., earthquake, tank rupture, and tank overflow. Spills also could occur from corrosion of containers, piping and process equipment; and leaks from seals or gaskets at pumps and flanges. A major earthquake would be a potential cause of a large spill or release. Other causes could include human or mechanical error. Construction of the vessels, and foundations in accordance with the Uniform Building Code Zone 4 requirements helps structures to resist major earthquakes without collapse, but result in some structural and non-structural damage following a major earthquake. The Refinery has emergency spill containment equipment and would implement the spill control measures in the event of an earthquake. Storage tanks have secondary containment capable of containing 110 percent of the contents of the storage tanks. Therefore, the rupture of a tank would be collected within the containment system and pumped to an appropriate storage tank.

Spills at the Refinery facilities would generally be collected within containment facilities. Large spills outside of containment areas at the Refinery are expected to be captured by the Refinery drainage system where it could be controlled. Spilled material would be collected and pumped to an appropriate tank, or sent off-site if the materials cannot be used on-site. Because of the containment system, spills are not expected to migrate from the facility and potential adverse water quality hazard impacts are considered to be less than significant.

Transportation Hazards

The transportation of hazardous materials can result in offsite releases through accidents or equipment failure. The materials currently transported to and from the Refinery include sulfur, oxygen, and ammonia. However, the proposed project is not expected to cause an increase in the amount of hazardous materials transported to or from the Refinery by truck. The proposed project is expected to reduce the generation and transport of aqueous ammonia from the Refinery, reducing the transportation hazards related to ammonia. The proposed project is expected to increase the number of railcars by 12 per day of LPG and CARB gasoline blending components. However, these materials are currently shipped and received on a daily basis, so there are no new hazards associated with the increase in railcar deliveries. Therefore, no increase in transportation hazards is expected from the proposed project.

4.4.3 MITIGATION MEASURES

No significant hazard or hazardous materials impacts are expected from the proposed project, so no mitigation measures are required.

4.4.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project impacts on hazards and hazardous materials are expected to be less than significant.

4.5 HYDROLOGY AND WATER QUALITY

The NOP/IS (see Appendix A) determined the hydrology and water quality impacts of the proposed project at the Chevron Products Company El Segundo Refinery were potentially significant for wastewater treatment facilities and water supply facilities. The potential adverse impacts of the proposed project on wastewater treatment facilities and water supply facilities will be evaluated in this section.

4.5.1 SIGNIFICANCE CRITERIA

The proposed project impacts on hydrology and water quality would be considered significant if the following occurs:

Water Demand:

- The project would exceed the capacity of the existing potable water supply to meet the increased demands of the project; or
- The project increases demand for potable water by more than five million gallons per day.

Water Quality:

- The project will cause degradation or depletion of ground water substantially affecting current or future uses;
- The project will cause the degradation of surface water substantially affecting current or future uses;
- The project would result in a violation of NPDES permit requirements; or
- The project would exceed the capacities of existing or proposed wastewater treatment facilities and the sanitary sewer system.

4.5.2 ENVIRONMENTAL IMPACTS

4.5.2.1 Water Supply

The Refinery currently uses about 2.6 million gpd of fresh/potable water and about 7.4 millions gpd of reclaimed water. The proposed project is expected to require about 400 gpm (about 576,000 gpd) of water for cooling purposes and about 120 gpm (about 172,800 gpd) of boiler feed water. Therefore, the proposed project will increase the water demand at the Refinery by about 520 gpm or about 748,800 gpd.

The proposed project will require the installation of additional eye washes and emergency showers that require potable water near the new units. However, no increase in potable water use is expected as the proposed project is not expected to increase employee emergencies or the number of times that eye washes or emergency showers would need to be used.

The proposed PRO Project includes modifications to the WBMWD utilities to allow the increased production of recycled water that will be used for cooling tower purposes and boiler feed water. All of the increased water use associated with the proposed project (about 748,800 gpd) will be reclaimed water supplied by the WBMWD. Therefore, the proposed project will not result in an increase in the use of potable water, but will only result in an increase in the use of recycled water.

Based on the above, no increase in the use of potable water is expected so no significant impacts to the water supply are expected due to implementation of the proposed project. The proposed project is expected to result in an increase in the use of and production of reclaimed water of about 748,800 gpd. Therefore, no significant impact to the water supply is expected due to implementation of the proposed project.

4.5.2.2 Wastewater Discharges

The Refinery currently discharges approximately seven million gpd of treated wastewater to the Santa Monica Bay. It is expected that the proposed PRO Project will increase the wastewater to the segregated system by about 15 gpm or 21,600 gpd due to increased water injection rates at the ISOMAX Unit. The Project will result in an additional 140 gpm or 201,600 gpd to the unsegregated system associated with blowdown from the new cooling tower, the new heat recovery steam generator at the Cogen Train D and heat recovery boilers at the new SRU and TGU. The total increase in wastewater is about 223,200 gpd.

The volume of wastewater discharged from the Refinery is a fraction of the supply water used as a result of water losses during processing activities (e.g., cooling tower evaporation, steam injection to combustors for NOx reduction at the Cogeneration facilities, and incidental steam losses). The wastewater discharged to the segregated system will continue to be treated using gravity separators, DAF unit, activated sludge units, and auxiliary IAF treatment facilities. The wastewater discharged to the unsegregated system will continue to be treated using API separator and IAF units in compliance with the NPDES permit requirements. Both systems have sufficient capacity to treat the incremental increase in wastewater produced from the proposed project without modifying the existing NPDES permit. Treated wastewater is tested to assure that it complies with the limitations in the NPDES permit prior to being discharged. If the wastewater does not comply with applicable limitations, it is re-treated. Therefore, the proposed project is not expected to change the quality of wastewater produced by the Refinery and no significant impact on water quality is expected.

Under its NPDES Permit, the Chevron Refinery is authorized to discharge up to 8.8 million gpd of treated wastewater during dry weather and up to 23 million gpd during wet weather to the Santa Monica Bay, near Dockweiler State Beach in El Segundo. Currently, the Refinery discharges approximately seven million gpd of treated wastewater during dry weather and approximately 21.5 million gpd during wet weather. Following project completion, the total volume of wastewater discharged would be about 7,223,200 gpd (approximately a three percent increase) during dry weather and 21.7 million gpd during wet weather, which are within the capacities of the existing permit. Therefore, no significant impact associated with wastewater discharge is expected from the proposed project.

4.5.3 MITIGATION MEASURES

No significant impacts associated with water demand and wastewater discharge are expected from the proposed project, so no mitigation measures are required.

4.5.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project impacts on hydrology and water quality are expected to be less than significant.

4.6 NOISE

The NOP/IS (see Appendix A) determined that the proposed project at the Chevron Products Company El Segundo Refinery has the potential to generate significant adverse noise impacts. Potential noise impacts are evaluated in this section.

4.6.1 SIGNIFICANCE CRITERIA

The proposed impacts on noise would be considered significant if the following occurs:

> The project causes construction noise levels to exceed local noise ordinances or, if the noise threshold is currently exceeded, the project increases ambient noise levels by more than three decibels (dBA) at the site boundary.
>
> The project causes construction noise levels that exceed federal OSHA noise standards for workers.
>
> The project's operational noise levels would exceed the local noise ordinances at the site boundary or, if the noise threshold is currently exceeded, project noise sources increase ambient noise levels by more than three dBA at the site boundary.

4.6.2 ENVIRONMENTAL IMPACTS

4.6.2.1 Construction Impacts

Heavy construction equipment is required during construction activities associated with the proposed project. The highest noise impacts from construction will be during installation of new and modified process units. Examples of noise levels from construction equipment are presented in Table 4-12. These noise sources will operate primarily during daylight hours and will be a source of noise over the approximately one and a half year construction period, with the exception of three months during unit turnaround when two shifts will operate from 5:00 p.m. to 3:30 a.m.

The estimated noise level during installation of new and modified process units at the Refinery is expected to be an average of about 85 dBA at 50 feet from the center of

TABLE 4-12

Construction Noise Sources

EQUIPMENT	TYPICAL RANGE (decibels)(1)	ANALYSIS VALUE (decibels)(2)
Truck	82-95	82
Front Loader	73-86	82
Backhoe	73-95	80
Vibrator	68-82	80
Air Compressor	85-91	85
Saws	72-82	80
Jackhammers	81-98	85
Pumps	68-72	70
Generators	71-83	85
Compressors	75-87	85
Concrete Mixers	75-88	75
Concrete Pumps	81-85	85
Pile Driving (peaks)	95-107	95
Tractor	77-98	85
Scrapers, Graders	80-93	80
Pavers	85-88	75
Cranes	75-89	85

1. City of Los Angeles, 1998. Levels are in dBA at 50-foot reference distance. These values are based on a range of equipment and operating conditions.
2. Analysis values are intended to reflect noise levels from equipment in good condition, with appropriate mufflers, air intake silencers, etc. In addition, these values assume averaging of sound level over all directions from the listed piece of equipment.

construction activity for each unit. The construction activities will occur throughout the Refinery as shown in Figure 2-3. Using an estimated six dBA reduction for every doubling of distance, the noise levels at various locations surrounding the Refinery are estimated in Table 4-13. Most of the construction noise sources will be located near ground level, so the noise levels are expected to attenuate to a greater extent than analyzed herein as a result of existing structures. Noise attenuation due to existing structures has not been included in the analysis.

The construction activities at the Refinery will be normally carried out during the daytime from Monday to Friday, with the exception of three months when two construction shifts will be needed. Because of the nature of the construction activities, the types, number, operation time and loudness of construction equipment will vary throughout the construction period. As a result, the sound level associated with construction will change as construction progresses. Construction noise sources will be temporary and will cease following construction activities. Noise levels are not expected

TABLE 4-13

Project Construction Noise Levels

Location(1)	Baseline Noise Levels (decibels)(2)	Distance to Noise Sampling Location from Closest Construction Activities (feet)	Construction Sound Level at Noise Sampling Location (decibels)	Total Sound Level at Noise Sampling Location (decibels)(3)	Increased Noise Levels at Noise Sampling Locations due to Construction Activities (decibels)
1	64.0	1,800	55	64.5	0.5
2	63.3	3,600	49	63.5	0.2
3	69.0	600	64	70.2	1.2
4	68.7	1,200	58	69.1	0.4
5	63.9	1,200	58	64.9	1.0

(1) Refers to the noise monitoring locations identified in Figure 3-3.
(2) Includes all ambient noise sources. Noise levels are from Table 3-7.
(3) The total sound level was calculated using the following formula: $T_{sl}=10\log_{10}(10^{Bsl/10} + 10^{Csl/10})$ where T_{sl} = the total sound level (dBA); B_{sl} = baseline sound level (dBA); and C_{sl} = construction sound level (dBA)

to noticeably increase during construction activities (either during the daytime or nighttime) because noise level increases during construction activities are not expected to exceed 1.2 dBA (see Table 4-13). A noise increase of less than three dBA is generally not noticeable to humans.

The noise levels from the construction equipment at the Refinery are expected to be within the allowable noise levels established by the City of El Segundo noise ordinance (see Table 3-9), i.e., the proposed project is not expected to increase the noise levels in commercial/industrial areas by eight dBA or the noise levels in residential areas by five dBA. The noise levels during the construction phase are generally expected to be similar to current noise levels and no significant (audible) increase in noise levels is expected. No significant noise impacts related to project construction are expected. Therefore, the proposed project noise impacts during the construction phase are expected to be less than significant.

Workers exposed to noise sources in excess of 90 dBA for an eight-hour period will be required to wear hearing protection devices that conform to OSHA/NIOSH standards. Since the maximum noise levels during construction activities are expected to be 85 decibels or less, no significant impact to workers during construction activities is expected.

4.6.2.2 Operational Impacts

The proposed project will add equipment to the existing Refinery so that there will be additional noise sources at the facility. Additional noise sources associated with the proposed project generally include process equipment components such as control valves, vents, pumps, and compressors. Additional noise sources at the Refinery are expected to include the following:

- New gas turbine and related equipment associated with the new Cogen Train D;
- New cooling tower and pumps associated with modifications to the SRU and Alkylation Unit;
- New pumps and compressors associated with the safety flare vapor recovery system;
- New pumps, ejectors, and compressors associated with the modifications to the ISOMAX Unit;
- New pumps, blowers, and compressor associated with the SRU and TGU; and
- Pumps and compressors associated with the SWS and new storage tanks.

Refinery operations are continuous over a 24-hour period. In order to evaluate the potential noise impacts associated with the proposed project, a three dimensional noise model of the PRO Project was created using the noise modeling software SoundPlan. The maximum noise level of new equipment added to the Refinery was estimated based on the Chevron El Segundo Refinery Equipment Noise Specification which is 80 dBA to 85 dBA at three feet. These noise specifications will be enforced and included as part of the equipment purchase agreement for all new and modified equipment. The PRO Project noise levels for individual pieces of equipment were modeled, assuming that all major noise sources to be installed as part of the proposed project were operating simultaneously. Thus the noise impacts are conservative and considered “worst-case” (see Appendix E). The estimated noise levels associated with the proposed project operation are summarized in Table 4-14. Based on the noise model, noise generated by project equipment would increase the overall noise levels at the Refinery by a maximum of about 1.3 dBA (when compared to baseline conditions), which is below the significant impact level of an increase of three decibels. Therefore, no significant noise impacts related to project operation are expected. The noise levels in the area following completion of the proposed project are expected to be about the same as the current levels. However, as part of ongoing community relations, Chevron will be applying noise attenuation (e.g., noise barriers and mufflers) for some newly installed equipment to minimize the potential increase in noise as part of the proposed PRO Project.

TABLE 4-14

Ambient Noise Levels

Community Noise Equivalent Level	Noise Levels at Each Monitoring Location (CNEL in dBA)				
	1	2	3	4	5
Current Ambient CNEL	63.4	60.4	68.7	68.0	63.8
Predicted PRO Project CNEL	47.6	47.2	62.5	58.9	59.4
Current Ambient CNEL + Predicted PRO Project CNEL	63.5	60.6	69.7	68.5	65.1
Net Project Change in CNEL	0.1	0.2	1.0	0.5	1.3
Significant?	No	No	No	No	No

4.6.3 MITIGATION MEASURES

No significant impacts associated with noise are expected from the proposed project during construction or operational phases, so no mitigation measures are required.

4.6.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project is not expected to generate significant adverse impacts noise impacts during construction or operation.

4.7 SOLID AND HAZARDOUS WASTE

The NOP/IS (see Appendix A) determined that the solid/hazardous waste impacts of the proposed project at the Chevron Products Company El Segundo Refinery as having the potential to generate significant adverse solid/hazardous waste generation impacts that could adversely affect disposal facilities. The solid/hazardous waste impacts of the proposed project are analyzed in this section.

4.7.1 SIGNIFICANCE CRITERIA

The proposed impacts on solid and hazardous waste would be considered significant if the following occurs:

- The project results in the generation and disposal of hazardous and non-hazardous waste that exceeds the capacity of designated landfills.

- The project would violate applicable federal, state, and local statutes and regulations related to solid and hazardous wastes.

4.7.2 SOLID AND HAZARDOUS WASTE IMPACTS

4.7.2.1 Construction Impacts

Solid Waste: There would be an increase in the generation of non-hazardous wastes as a result of the demolition of existing structures, grading to provide foundations for new structures, and installing new structures. Based on the amounts of non-hazardous waste generated during construction for previous Refinery modification projects, Chevron estimates that, during the construction of the PRO Project at the Refinery, approximately 1,075 tons of municipal (non-hazardous) solid waste would be generated over a 26-month period. This waste will include approximately 300 tons of non-asbestos insulation, 660 tons of broken concrete, and 115 tons of clean trash and debris.

Solid waste generated during construction of the proposed project will be stored on the Refinery property prior to disposal at one of the landfills in Los Angeles County. Shipments of solid waste to the landfills would be scheduled to avoid exceeding the landfills' permitted daily capacities. The landfills in Los Angeles County have the capacity to accept the waste produced during the construction phase of the proposed project on a one-time basis (see Table 3-10).

Construction activities could uncover hydrocarbon-contaminated soils, given the heavily industrialized nature of the Refinery facilities and the fact that refining activities have been conducted at the site for a number of years. If contaminated soils are encountered during the excavation phase of the proposed project, the soils will be removed for proper decontamination and disposal in accordance with SCAQMD's Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil, and in accordance with a source-specific Clean Up and Abatement Order from the RWQCB for the Refinery. Contaminated soil could be considered either non-hazardous or hazardous waste, depending on the nature and levels of contaminants in the soil. A total of approximately 43,350 cubic yards of soil, with a weight of approximately 52,000 tons, is estimated to be excavated over a total of eighteen months as a result of construction activities for the proposed project. Chevron estimates that a total of approximately 5,900 tons of contaminated soil may be excavated, based on preliminary soil borings. If the entire amount of contaminated soil were considered to be a non-hazardous waste, an additional 5,900 tons of non-hazardous waste would be generated during construction for the proposed project. As a result, the total amount of solid waste generated would be approximately 6,975 tons, which include the contaminated soil and the municipal solid waste.

Hazardous Waste: Construction of the proposed project is anticipated to generate approximately 1,200 tons of hazardous waste, including approximately 730 tons of contaminated trash and debris, 400 tons of sand blasting residue, 60 tons of contaminated metal, and approximately three tons each of paints/solvents and asbestos. Chevron estimates that a maximum of approximately one ton per day of hazardous waste will be generated during the peak construction period.

Additionally, as discussed previously, Chevron estimates that a total of approximately 5,900 tons of contaminated soil may be excavated during construction of the proposed project. If all of the contaminated soil were classified as a hazardous waste, an additional 5,900 tons of hazardous waste would be generated, and the total amount generated would be approximately 7,100 tons of hazardous waste (0.06 percent of permitted capacity).

As indicated in the discussion in subsection 3.7.2, there is adequate capacity at the two Class I landfills in California approved to accept hazardous waste from the proposed project. Together, the two hazardous waste landfills in California have 10.8 million cubic yards of permitted available capacity, which will accommodate the waste generated by the proposed project during the construction phase. In addition, other hazardous waste facilities are located out-of-state. Therefore, the generation of 1,200 to 7,100 tons of potentially hazardous waste is not considered a significant impact.

4.7.2.2 Operational Impacts

As with the current operations at the Refinery, wastes generated by the operation of the proposed project will also be managed and/or disposed of in compliance with applicable federal, state, and local statutes and regulations. The proposed new and modified equipment associated with the proposed project will perform the similar functions as the existing equipment. The proposed project is expected to require increased amounts of catalyst and generate increased amounts of catalyst waste (e.g., associated with the proposed modifications to the ISOMAX Unit, Cogen Train D, and SRU/TGU). The ISOMAX Unit is expected to require about 108 additional tons of catalyst per year. The volume of SRU/TGU catalysts use is currently unknown but the catalysts are expected to require changing every five years. As with the current procedures at the Refinery, the additional amounts of recovered catalyst will be transported for recycling offsite, so no increase in waste disposal of catalyst is expected. Therefore, the proposed project is not expected to result in significant impacts on solid/hazardous waste during project operations.

4.7.3 MITIGATION MEASURES

No significant impacts associated with solid and hazardous waste are expected from the proposed project during construction or operational phases, so no mitigation measures are required.

4.7.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The impacts of the proposed project on solid/hazardous waste facilities are expected to be less than significant.

4.8 TRANSPORTATION AND TRAFFIC

The NOP/IS (see Appendix A) determined that the proposed project at the Chevron Products Company El Segundo Refinery has the potential to generate significant adverse transportation and traffic impacts. The traffic impacts associated with the construction and operational phases of the proposed project are potentially significant and the impacts on the transportation system are evaluated in this section.

4.8.1 SIGNIFICANCE CRITERIA

The proposed project will occur at the Chevron Products Company El Segundo Refinery. The proposed impacts on transportation and traffic would be considered significant if the following occurs:

- Peak period levels on major arterials within the vicinity of the proposed project sites are disrupted to a point where intersections with a LOS of C or worse are reduced to the next lower LOS, as a result of the projects for more than one month.
- An intersection's volume to capacity ratio increases by 0.02 (two percent) or more when the LOS is already D, E or F for more than one month.
- A major roadway is closed to all through traffic, and no alternate route is available.
- There is an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system.
- The demand for parking facilities is substantially increased.
- Substantial alterations to current circulation or movement patterns of people and goods are induced.
- Water borne, rail car or air traffic is substantially altered.
- Traffic hazards to motor vehicles, bicyclists or pedestrians are substantially increased.

4.8.2 ENVIRONMENTAL IMPACTS

4.8.2.1 Construction Impacts

Construction of the proposed project will generate additional traffic from construction personnel commuting to and from the site, as well as the transportation of construction materials and equipment to the Refinery. Construction work shifts are expected to last about ten hours per day during most portions of the construction schedule. However, during certain Refinery unit shutdown periods (e.g., March and October 2009), two construction shifts are expected. The first shift is scheduled to operate from 6:30 a.m. to 5:00 p.m. and the second shift is scheduled to operate from 5:00 p.m. to 3:30 a.m. Construction workers will be assigned parking lot locations to minimize searching for parking. Construction activities include the delivery of project-related equipment to the Refinery.

The morning peak hour of the adjacent street system surrounding the Refinery is 7:00 a.m. to 9:00 a.m. Because the daytime construction shift starts at 6:30 a.m., worker traffic attributable to project construction will not affect the morning peak hour. The evening peak period is 4:00 p.m. to 6:00 p.m.; therefore, construction related traffic will be leaving and arriving during the evening peak hour and potentially impacting traffic during the evening peak hour. Therefore, the traffic analysis was completed for the evening peak hour only (see Appendix F).

Sufficient parking for the peak estimate of 900 workers is not available at the Chevron Refinery. Chevron estimates that about 340 parking spaces will be available at the Refinery. The additional 500 to 600 workers will park at offsite locations and be transported by bus to the Refinery reducing the traffic impacts at the intersections adjacent to the Refinery. The locations of the off-site parking locations will vary depending on the time of the year. In order to provide a conservative analysis, it is assumed that most of the construction personnel would commute to the site alone in private automobiles even though Chevron would encourage construction contractor’s employees to organize carpools. Two different traffic scenarios were evaluated referred to as the Winter and Summer Scenarios, using the assumptions described in the following subsections for the winter and summer time.

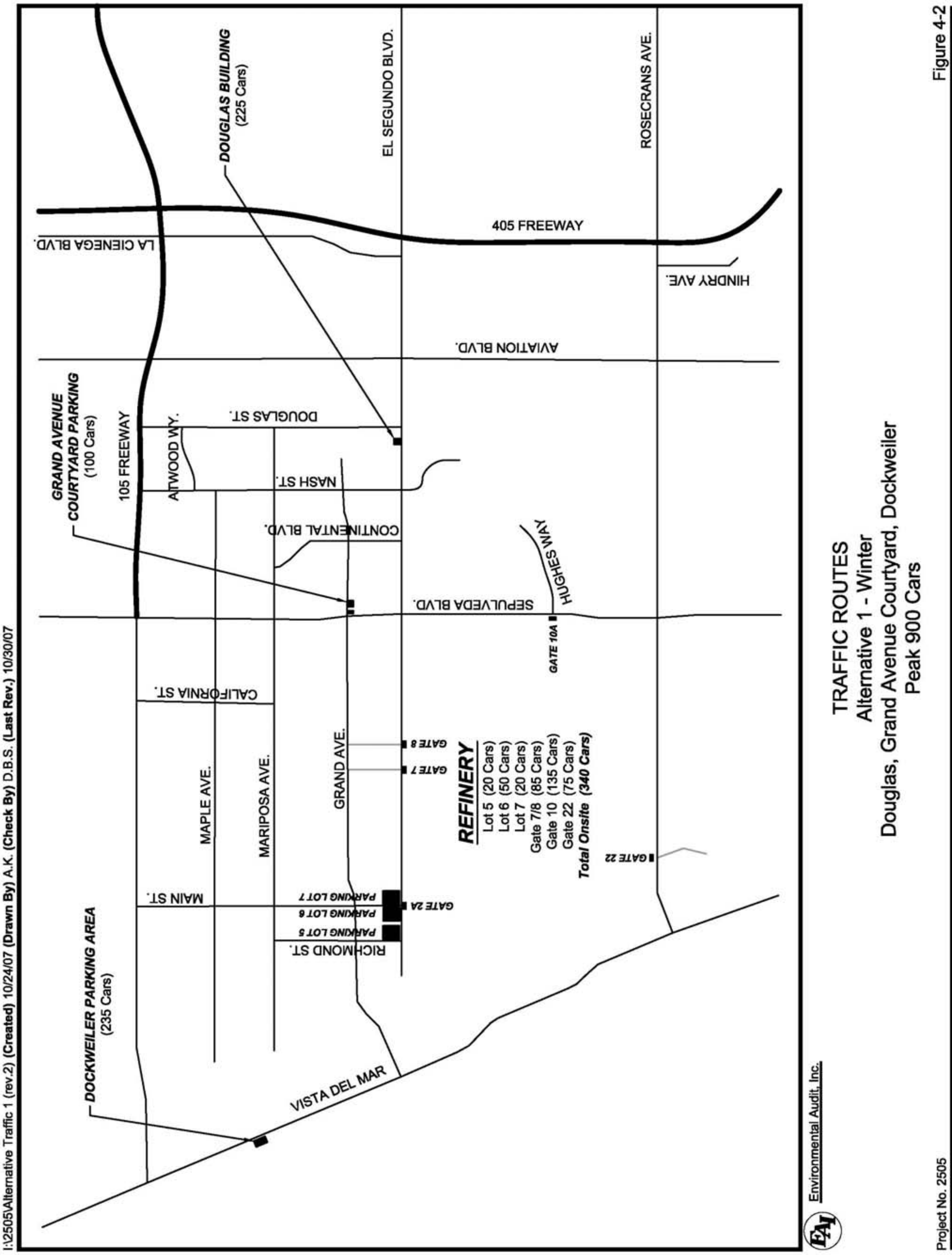
Winter Scenario: During the non-summer months (September through May), Chevron construction workers will use the Dockweiler Beach parking area (about 235 vehicles), and two other contract lots:

- The Grand Avenue Courtyard parking structure located on Grand Avenue, east of Sepulveda Boulevard (about 100 vehicles); and

- The Douglas Building parking structure, located on El Segundo Boulevard, west of Douglas Street (about 225 vehicles) (see Figure 4-2).

A traffic analysis was completed for the Winter Scenario assuming that 900 additional construction workers would be required at the Refinery and would use the three parking areas described above (see Appendix F for further details of the traffic analysis). Construction workers will be transported by bus from these locations to the Refinery.

The traffic impacts from the proposed project plus the existing traffic for the Winter Scenario are summarized in Table 4-15. Based on the analysis, the proposed project is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DOUGLAS BUILDING
(225 Cars)
EL SEGUNDO BLVD.
ROSECRANS AVE.
405 FREEWAY
LA CIENEGA BLVD.
HINDRY AVE.
AVIATION BLVD.
GRAND AVENUE
COURTYARD PARKING
(100 Cars)
105 FREEWAY
DOUGLAS ST.
ATWOOD WY.
NASH ST.
CONTINENTAL BLVD.
HUGHES WAY
SEPULVEDA BLVD.
GATE 10A
CALIFORNIA ST.
GRAND AVE.
MAPLE AVE.
MARIPOSA AVE.
GATE 8
GATE 7
REFINERY
Lot 5 (20 Cars)
Lot 6 (50 Cars)
Lot 7 (20 Cars)
Gate 7/8 (85 Cars)
Gate 10 (135 Cars)
Gate 22 (75 Cars)
Total Onsite (340 Cars)
GATE 22
MAIN ST.
PARKING LOT 7
PARKING LOT 6
PARKING LOT 5
GATE 2A
RICHMOND ST.
DOCKWEILER PARKING AREA
(235 Cars)
VISTA DEL MAR
Environmental Audit, Inc.
TRAFFIC ROUTES
Alternative 1 - Winter
Douglas, Grand Avenue Courtyard, Dockweiler
Peak 900 Cars
Figure 4-2
Project No. 2505

TABLE 4-15

Chevron Refinery Construction Traffic Impacts Level of Service Analysis and Volume-To-Capacity Ratios (Winter)

INTERSECTION	BASELINE		IMPACTS		
	PM LOS	Peak Hour V/C	PM LOS	Peak Hour V/C	Change in V/C
Sepulveda Blvd. and El Segundo Blvd.	F	1.104	F	1.115	+0.011
Sepulveda Blvd. and Rosecrans Ave.	F	1.070	F	1.086	+0.016
Sepulveda Blvd. and Imperial Hwy.	C	0.718	C	0.722	+0.004
Aviation Blvd. and El Segundo Blvd.	E	0.968	F	1.017	+0.049*
Aviation Blvd. and Rosecrans Ave.	D	0.807	D	0.824	+0.017
La Cienega Blvd. and I-405 SB ramps	B	0.609	B	0.609	+0.000
La Cienega Blvd. and El Segundo Blvd.	B	0.677	C	0.722	+0.045
I-405 SB on-ramp and El Segundo Blvd.	B	0.634	B	0.679	+0.045
I-405 NB ramps and El Segundo Blvd.	A	0.535	A	0.541	+0.006
I-405 SB off-ramp and Rosecrans Ave.	B	0.628	B	0.628	+0.000
I-405 NB ramps and Rosecrans Ave.	B	0.618	B	0.637	+0.019
I-405 SB ramps and Hindry Ave.	A	0.541	A	0.561	+0.020
California St. and Imperial Hwy.	A	0.486	A	0.544	+0.058
Main St. and Imperial Hwy.	B	0.639	B	0.688	+0.049
Continental Blvd. and Grand Ave.	A	0.277	A	0.330	+0.053
Continental Blvd. and Mariposa Ave.	A	0.415	A	0.415	+0.000
Nash St. and Mariposa Ave.	A	0.344	A	0.375	+0.031
Douglas St. and Mariposa Ave.	A	0.482	A	0.524	+0.042
Douglas St. and Atwood Way	A	0.301	A	0.333	+0.032

* Potentially significant traffic impact

expected to result in potentially significant impacts at one intersection, Aviation Boulevard/El Segundo Boulevard. The proposed project is expected to change the LOS at this intersection from E to F. Further, the proposed project would increase the volume to capacity ratio about 0.049 (about 4.9 percent) which exceeds the significance criterion of 0.02 at any intersection with an LOS of D, E, or F. The intersections of Sepulveda Boulevard/El Segundo Boulevard, and Sepulveda Boulevard/Rosecrans Avenue are expected to remain LOS F. In addition, the proposed project will not increase the volume to capacity ratio at these two intersections by 0.02 or more. Most of the other intersections near the Refinery are expected to remain at LOS A, B or C.

To address potential impacts on the freeway system, four segments along the I-105 and I-405 freeways in the project vicinity were examined as the regional freeway segments most likely to be impacted. Traffic volumes attributable to construction worker commuting for the proposed project were analyzed as an incremental increase to the existing freeway conditions. The LOS values used for freeway segment analyses are estimated by calculating the demand-to-capacity (D/C) ratio and identified by the corresponding LOS definitions. The existing and existing-plus-project freeway conditions are summarized in Table 4-16.

TABLE 4-16

Proposed Project Impact on Surrounding Freeways (Winter)

No.	Freeway Segment	Dir.	Peak Hour	Freeway Capacity[a]	Existing Conditions		Existing + Project Conditions				
					D/C Ratio	LOS	Project Traffic	Peak Hour Volume	D/C Ratio	LOS	Project Impact
1	I-105 between Sepulveda Blvd. and Douglas St.	EB	AM	8,000	0.443	B	0	3,540	0.443	B	0.000
		EB	PM	8,000	0.425	B	419	3,819	0.477	B	0.052
		WB	AM	8,000	0.420	B	0	3,360	0.420	B	0.000
		WB	PM	8,000	0.510	B	0	4,080	0.510	B	0.000
2	I-105 between Douglas St. and I-405 interchange	EB	AM	8,000	0.631	C	0	5,050	0.631	C	0.000
		EB	PM	8,000	0.610	C	419	5,299	0.662	C	0.052
		WB	AM	8,000	0.599	C	0	4,790	0.599	C	0.000
		WB	PM	8,000	0.729	C	0	5,830	0.729	C	0.000
3	I-405 between Rosecrans Av. And El Segundo Blvd.	NB	AM	9,600	1.090	F(0)	0	10,460	1.090	F(0)	0.000
		NB	PM	9,600	1.051	F(0)	98	10,188	1.061	F(0)	0.010
		SB	AM	9,600	1.033	F(0)	0	9,920	1.033	F(0)	0.000
		SB	PM	9,600	1.258	F(1)	228	12,308	1.282	F(1)	0.024*
4	I-405 between El Segundo Blvd. and I-105 interchange	NB	AM	9,600	0.854	D	0	8,200	0.854	D	0.000
		NB	PM	9,600	0.824	D	214	8,124	0.846	D	0.022*
		SB	AM	9,600	0.810	D	0	7,780	0.810	D	0.000
		SB	PM	9,600	0.986	E	135	9,605	1.001	E	0.014

*Potentially significant traffic impact

D/C Ratio	LOS	D/C Ratio	LOS
.00 - .35	A	1.01 – 1.25	F(0)
.36 - .54	B	1.26 - .1.35	F(1)
.55 - .77	C	1.36 – 1.45	F(2)
.78 - .93	D	Above 1.45	F(3)
.94 – 1.00	E		

LOS F(1) through F(3) represent severe congestion (travel speeds less than 25 mph for more than one hour).

[a] Includes HOV lane
[b] D/C Ratio = Demand to Capacity Ratio
Source: See Appendix B for details on the traffic analysis.

As shown in Table 4-16, construction worker traffic for the proposed project will not cause the LOS on any of the four freeway segments to degrade to level D. However, the proposed project may cause an increase of 0.02 or more for two freeway segments operating at LOS D, E, or F during the construction phase. The southbound lanes of the I-405 between Rosecrans Avenue and El Segundo Boulevard operate at LOS F and the proposed project could increase traffic by about 0.024 during the construction phase. Further, the northbound lanes of I-405 between El Segundo Boulevard and I-105 interchange operate at LOS D and the proposed project could increase traffic by about 0.022 during the construction phase. Therefore, construction worker traffic for the proposed project could result in significant adverse impacts on freeways in the vicinity of the Refinery.

Summer Scenario: During the summer months (June through August), the Dockweiler Beach parking area is not available for project-related construction worker parking. Chevron will continue to park about 340 vehicles at the Refinery and use three other contract lots:

- The Grand Avenue Courtyard parking structure located on Grand Avenue, east of Sepulveda Boulevard (about 100 vehicles);
- The Douglas Building parking structure, located on El Segundo Boulevard, west of Douglas street (about 225 vehicles); and
- The Pacific Towers Parking Structure located near the corner of Grand Avenue and Sepulveda Boulevard (about 35 vehicles) (see Figure 4-3).

A traffic analysis was completed for the Summer Scenario because fewer workers are expected to be required and the Dockweiler parking area is unavailable for construction worker parking during the summer months. A maximum of 700 additional construction workers are expected to be required at the Refinery under the Summer Scenario and would use the parking lots described above (see Appendix F for further details of the traffic analysis). The construction workers will be transported by bus from these parking locations to the Refinery (see Figure 4-3).

The traffic impacts from the proposed project plus the existing traffic for the Summer Scenario are summarized in Table 4-17. Based on the analysis, the proposed project is expected to result in potentially significant adverse impacts at one intersection, Aviation Boulevard/El Segundo Boulevard. The proposed project is expected to change the LOS at this intersection from E to F. Further, the proposed project would increase the volume to capacity ratio about 0.049 (about 4.9 percent) which exceeds the significance criterion of 0.02 at any intersection with a LOS of D, E, or F. The intersections of Sepulveda Boulevard/El Segundo Boulevard, and Sepulveda Boulevard/Rosecrans Avenue are expected to remain LOS F. In addition, the proposed project will not increase the volume to capacity ratio at these two intersections by 0.02 or more. Most of the other intersections near the Refinery are expected to remain at LOS A, B or C.

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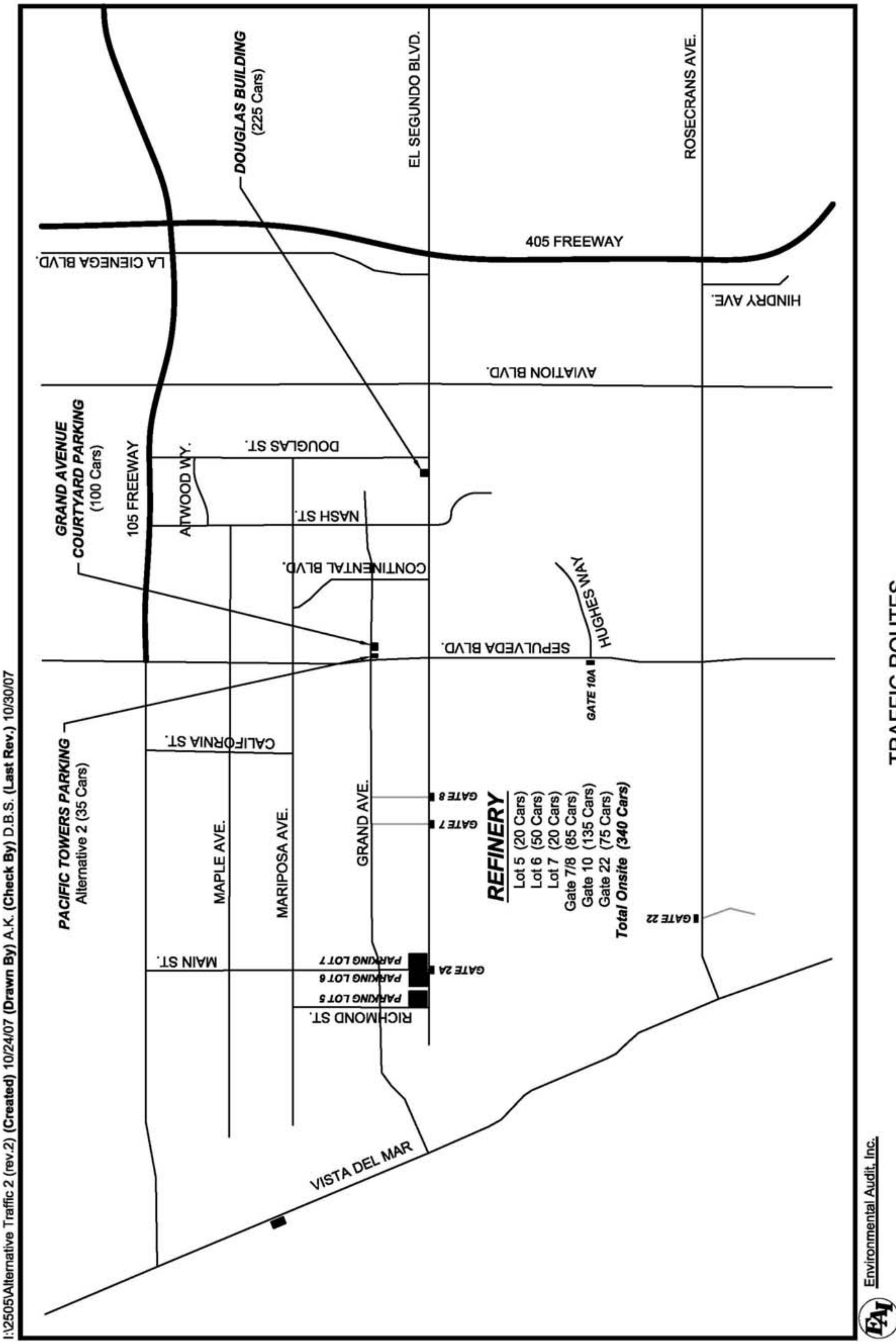

TRAFFIC ROUTES
Alternative 2 - Summer
Douglas, Grand Avenue Courtyard, Pacific Towers
Peak 700 Cars

Figure 4-3

Project No. 2505

TABLE 4-17

Chevron Refinery Construction Traffic Impacts Level of Service Analysis and Volume-To-Capacity Ratios (Summer)

INTERSECTION	BASELINE		IMPACTS		
	PM LOS	Peak Hour V/C	PM LOS	Peak Hour V/C	Change in V/C
Sepulveda Blvd. and El Segundo Blvd.	F	1.104	F	1.115	+0.011
Sepulveda Blvd. and Rosecrans Ave.	F	1.070	F	1.086	+0.016
Sepulveda Blvd. and Imperial Hwy.	C	0.718	C	0.722	+0.004
Aviation Blvd. and El Segundo Blvd.	E	0.968	F	1.017	+0.049*
Aviation Blvd. and Rosecrans Ave.	D	0.804	D	0.824	+0.017
La Cienega Blvd. and I-405 SB ramps	B	0.609	B	0.609	+0.000
La Cienega Blvd. and El Segundo Blvd.	B	0.677	C	0.722	+0.045
I-405 SB on-ramp and El Segundo Blvd.	B	0.634	B	0.679	+0.045
I-405 NB ramps and El Segundo Blvd.	A	0.535	A	0.541	+0.006
I-405 SB off-ramp and Rosecrans Ave.	B	0.628	B	0.628	+0.000
I-405 NB ramps and Rosecrans Ave.	B	0.618	B	0.637	+0.019
I-405 SB ramps and Hindry Ave.	A	0.541	A	0.561	+0.020
California St. and Imperial Hwy.	A	0.486	A	0.496	+0.010
Main St. and Imperial Hwy.	B	0.639	B	0.639	+0.000
Continental Blvd. and Grand Ave.	A	0.277	A	0.352	+0.075
Continental Blvd. and Mariposa Ave.	A	0.415	A	0.415	+0.000
Nash St. and Mariposa Ave.	A	0.344	A	0.386	+0.042
Douglas St. and Mariposa Ave.	A	0.482	A	0.539	+0.057
Douglas St. and Atwood Way	A	0.301	A	0.311	+0.043

* Potentially significant traffic impact

The four segments along the I-105 and I-405 freeways in the project vicinity were also examined during the Summer Scenario as the regional freeway segments most likely to be impacted. The existing and existing-plus-project freeway conditions are summarized in Table 4-18 for the Summer Scenario.

As shown in Table 4-18, construction worker traffic for the proposed project will not cause the LOS on any of the four freeway segments to degrade to level D. The proposed project may cause an increase of 0.02 at one freeway segment operating at LOS D, E, or F. The northbound lanes of I-405 between El Segundo Boulevard and I-105 interchange operate at LOS D during the evening peak hour and the proposed project could increase traffic by about 0.022 during the construction phase. Therefore, construction worker traffic for the proposed project could result in significant adverse impacts on freeways in the vicinity of the Refinery.

TABLE 4-18

Proposed Project Impact on Surrounding Freeways (Summer)

No.	Freeway Segment	Dir.	Peak Hour	Freeway Capacity[a]	Existing Conditions		Existing + Project Conditions				
					D/C Ratio	LOS	Project Traffic	Peak Hour Volume	D/C Ratio	LOS	Project Impact
1	I-105 between Sepulveda Blvd. and Douglas St.	EB	AM	8,000	0.443	B	0	3,540	0.443	B	0.000
		EB	PM	8,000	0.425	B	219	3,619	0.452	B	0.027
		WB	AM	8,000	0.420	B	0	3,360	0.420	B	0.000
		WB	PM	8,000	0.510	B	0	4,080	0.510	B	0.000
2	I-105 between Douglas St. and I-405 interchange	EB	AM	8,000	0.631	C	0	5,050	0.631	C	0.000
		EB	PM	8,000	0.610	C	219	5,099	0.637	C	0.027
		WB	AM	8,000	0.599	C	0	4,790	0.599	C	0.000
		WB	PM	8,000	0.729	C	0	5,830	0.729	C	0.000
3	I-405 between Rosecrans Av. And El Segundo Blvd.	NB	AM	9,600	1.090	F(0)	0	10,460	1.090	F(0)	0.000
		NB	PM	9,600	1.051	F(0)	98	10,188	1.061	F(0)	0.010
		SB	AM	9,600	1.033	F(0)	0	9,920	1.033	F(0)	0.000
		SB	PM	9,600	1.258	F(1)	158	12,238	1.275	F(1)	0.016
4	I-405 between El Segundo Blvd. and I-105 interchange	NB	AM	9,600	0.854	D	0	8,200	0.854	D	0.000
		NB	PM	9,600	0.824	D	214	8,124	0.846	D	0.022*
		SB	AM	9,600	0.810	D	0	7,780	0.810	D	0.000
		SB	PM	9,600	0.986	E	65	9,535	0.993	E	0.007

*Potentially significant traffic impact

D/C Ratio	LOS	D/C Ratio	LOS
.00 - .35	A	1.01 – 1.25	F(0)
.36 - .54	B	1.26 - .1.35	F(1)
.55 - .77	C	1.36 – 1.45	F(2)
.78 - .93	D	Above 1.45	F(3)
.94 – 1.00	E		

LOS F(1) through F(3) represent severe congestion (travel speeds less than 25 mph for more than one hour).

[a] Includes HOV lane
[b] D/C Ratio = Demand to Capacity Ratio
Source: See Appendix B for details on the traffic analysis.

Based on the above traffic analysis, the construction phase of the proposed project could result in potentially significant traffic impacts at one intersection (Aviation Boulevard and El Segundo Boulevard) during both the Winter and Summer Scenarios. In addition, traffic impacts are also potentially significant for the southbound lanes of the I-405 between Rosecrans Avenue and El Segundo Boulevard and the northbound lanes of I-405 between El Segundo Boulevard and I-105 interchange. Therefore, the proposed project may result in significant adverse traffic impacts during the construction phase.

4.8.2.2 Operational Impacts

The proposed project is expected to require an additional 12 permanent workers at the Refinery, generating an additional 24 trips per day. In addition to workers, the proposed project is expected to alter the volume of truck traffic at the Refinery. The proposed project will result in increased use of sulfuric acid, catalyst, cooling tower chemicals, amine solution, etc., which will require an increase of one to two truck trips per month. The proposed project is also expected to result in an increase in LPG and sulfur transported by truck from the Refinery of about one per day and two per day, respectively (about 90 truck trips per month). However, the proposed project is expected to reduce the production and sales of aqueous ammonia from the Refinery by about five trucks per day. Therefore, the proposed project is expected to result in a net decrease in truck traffic of about two trucks per day (when accounting for the increased use of other materials). Given that 900 construction worker commute trips per day do not create significant adverse volume to capacity ratio impacts at intersections in the vicinity of the refinery, 12 additional worker commute trips during operation would also not create significant traffic impacts. Similarly, although construction traffic from the proposed project will adversely affect one intersection and two I-405 freeway segments during the winter scenario, an increase of 12 operational worker commute trips is not expected to increase the volume to capacity ratio by 0.02 or more at the Aviation Boulevard/El Segundo Boulevard intersection or the demand-to-capacity ratio by 0.02 or more at the two I-405 segments. Therefore, no significant adverse impacts on traffic are expected due to the operation of the Chevron PRO Project.

4.8.3 MITIGATION MEASURES

Feasible mitigation measures are required to address significant traffic impacts during the construction phase of the proposed project. Because of the temporary nature of the construction traffic, and the inability to change the number of workers needed as well as vehicle emissions, feasible mitigation measures are limited. Chevron is using off-site parking structures and transporting workers to the Refinery during peak construction activities to minimize traffic impacts at intersections adjacent to the Refinery. In addition, the construction work shift is scheduled to begin at 6:30 am so that traffic impacts during the morning peak hour will be avoided. Chevron will encourage ridesharing to reduce single occupancy vehicle trips as well as public transit use. Preferential parking for rideshare vehicles will be provided for construction workers. The traffic analysis assumes that no ridesharing will occur, i.e., average vehicle ridership (AVR) equals 1.0, and, therefore, provides a worst-case estimate of project impacts. However, ridesharing during construction activities is common and will help decrease traffic impacts. The AVR in the Basin is approximately 1.34. The amount of ridesharing that will occur cannot be predicted so traffic impacts are assumed to remain significant.

As part of the proposed project, Chevron will specify in construction contracts for the proposed project that construction workers comply with requirements to use specific travel routes. Construction workers that park in the Pacific Towers and Grand Avenue Courtyard parking structures will be requested to access the structures via the 105 Freeway to Sepulveda Boulevard. In addition, construction workers that access Dockweiler beach will be required to use the 105 Freeway to Vista Del Mar. Both of these requirements will avoid the more congested intersections in the area of the Refinery. Chevron has implemented other measures such as: (1) posting signs in parking lot reminding workers of the travel route requirement; (2) reminding workers with fliers and through announcements by shuttle bus drivers; and (3) occasional visual audits for worker compliance. No other feasible mitigation measures have been identified.

4.8.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project includes measures that are expected to reduce traffic impacts during the construction phase and no further feasible mitigation measures were identified. However, construction traffic impacts are expected to remain significant. The construction traffic impacts will cease following completion of the construction phase. The traffic impacts associated with the operational phase of the proposed project are expected to be less than significant.

4.9 GROWTH INDUCING IMPACTS

CEQA defines growth-inducing impacts as those impacts of a proposed project that "could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects, which would remove obstacles to population growth" (CEQA Guidelines §15126.2(d)).

The proposed project is not expected to foster population growth in the area, nor will additional housing or infrastructure be required. The project involves the modification of existing industrial facilities. No new services will be required; therefore, no infrastructure development or improvement will be required, and no population growth will be encouraged as a result of the project. It is expected that construction workers necessary to build new, or modify existing equipment will be largely drawn from the existing workforce pool in southern California. Further, operation of the proposed project is expected to require 12 additional Refinery workers, which can also be drawn from the existing workforce in southern California.

The proposed Refinery modifications are associated with enhancing safety or optimizing the operation of the existing Refinery. The proposed project will not cause an increase in crude throughput and is not expected to result in growth-inducing impacts.

4.10 SIGNIFICANT ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED AND SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

CEQA requires an EIR to discuss significant environmental effects (CEQA Guidelines §15126.2(b)) and irreversible environmental changes (CEQA Guidelines §15126.2(c)), which would result from a proposed project, should it be implemented. Significant adverse impacts are impacts that would exceed established threshold levels (e.g., air emissions would exceed SCAQMD established threshold levels). Irreversible changes include a large commitment of nonrenewable resources, committing future generations to specific uses of the environment (e.g., converting open spaces into urban development), or enduring environmental damage due to an accident.

It was determined that implementation of the proposed project would result in potentially significant adverse impacts on air quality during construction. These emissions are temporary and will cease following completion of construction activities. Operational air quality impacts of both criteria pollutants and TACs are not expected to have a significant adverse impact on the environment. The analysis in this EIR only describes the potential emission increases associated with the proposed project. The emission reductions associated with connecting PRDs to vapor recovery are also expected to reduce potential criteria and TAC emissions. Following completion of the construction phase, the proposed project is not expected to result in significant air quality impacts. Therefore, the proposed project is not expected to have long-term adverse environmental impacts on air quality.

Traffic levels are expected to increase during construction and generate potentially significant adverse traffic impacts. Feasible mitigation measures are expected to reduce traffic impacts but not to a level of less than significant. Operational traffic levels are expected to remain essentially the same as existing levels. Therefore, no significant adverse impacts for traffic are expected during operation of the proposed project.

The proposed project involves modifications to an existing Refinery, located within an industrial area, which has been operating since 1911. Therefore, there is no major commitment of nonrenewable resources or changes that would commit future generations to specific uses of the environment associated with the Chevron PRO Project.

4.11 ENVIRONMENTAL EFFECTS NOT FOUND TO BE SIGNIFICANT

The environmental effects of the Chevron El Segundo Refinery PRO Project are identified and discussed in detail in the preceding portions of Chapter 4 of this EIR and in the Initial Study (see Appendix A) per the requirements of the CEQA Guidelines (§15128). The following topics of analysis in this EIR were found to have no potentially significant adverse effects, after mitigation:

Air Quality during project operation
Energy
Hazards and Hazardous Materials
Hydrology and Water Quality
Noise
Solid and Hazardous Waste
Transportation/Traffic during project operation

The following topics of analysis were found to have no potentially significant adverse effects in the Initial Study (see Appendix A):

Aesthetics
Agriculture Resources
Biological Resources
Cultural Resources
Geology/Soils
Land Use/Planning
Mineral Resources
Population/Housing
Public Services
Recreation

Potentially significant adverse impacts were identified for air quality and transportation/traffic associated with construction activities (only).

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CHAPTER 5

CUMULATIVE IMPACTS

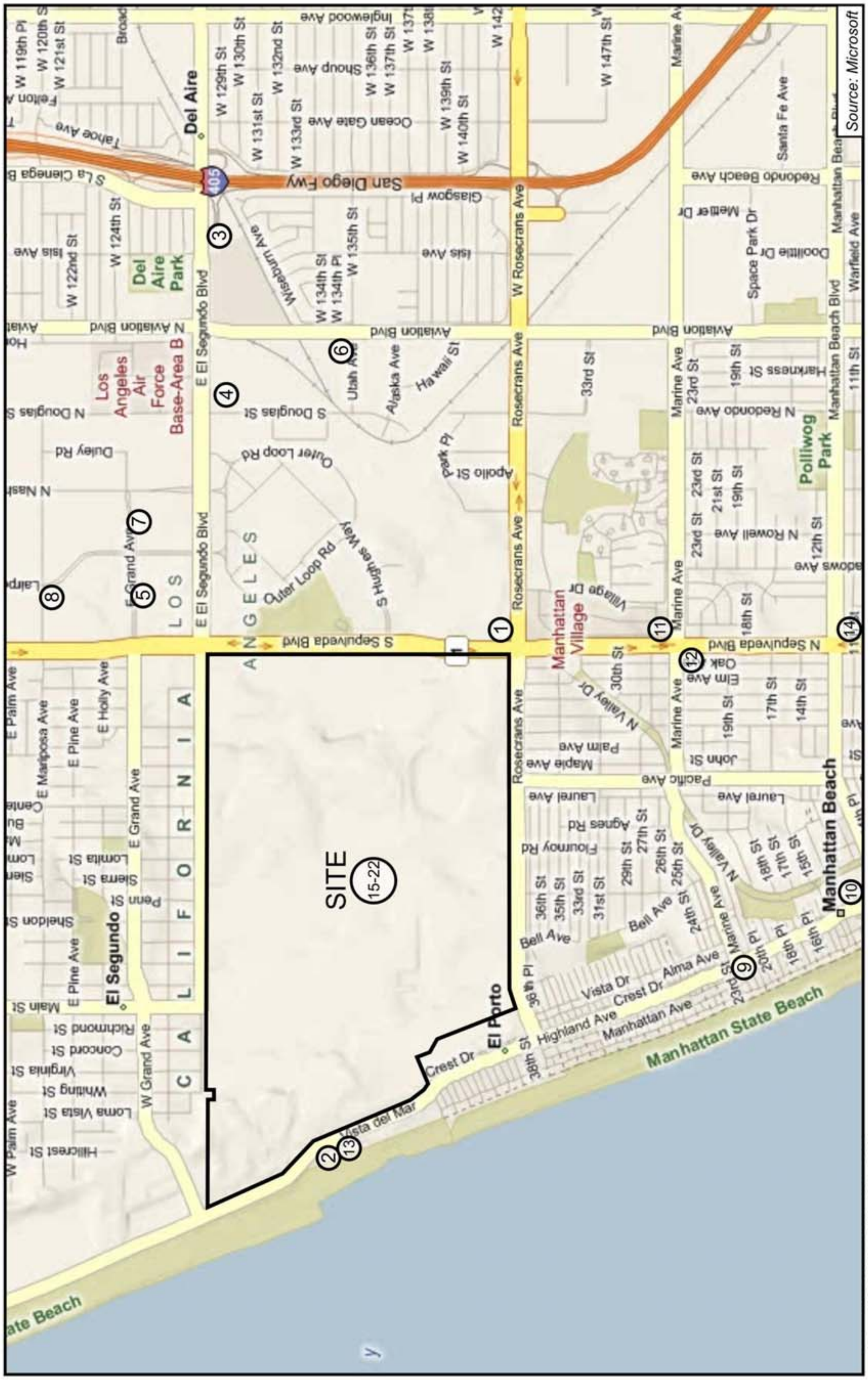
5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

CEQA Guideline §15130(a) requires an EIR to discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in §15065(a)(3). There are a number of projects proposed for development in the vicinity of the Refinery, which may contribute cumulative impacts to those generated by the proposed PRO Project. These include other refinery and industrial projects, and projects planned in the Cities of El Segundo and Manhattan Beach. Figure 5-1 shows the locations of the cumulative projects. The discussion below lists projects which are reasonably expected to proceed in the foreseeable future, i.e., project information has been submitted to a public agency. Cumulative construction impacts were evaluated herein if the major portion of construction is expected to occur during the same construction period as the Chevron PRO Project.

Public agencies were contacted to obtain information on projects within the El Segundo and Manhattan Beach areas. As part of the cumulative impact analysis, the SCAQMD typically includes projects within about a one mile of the proposed project. Figure 5-1 identifies by number the location of each of the projects discussed below. The numbers are used to identify the related projects throughout the discussion of cumulative impacts. Local impacts were assumed to include projects which would occur within the same timeframe as the Chevron PRO Project and which are within a one-mile radius of the Refinery site. These projects generally include other refinery projects and projects in near-by cities. A number of construction projects are proposed at the LAX. Although the Chevron El Segundo Refinery is located south of LAX, the proposed projects at LAX are located about two miles away and outside of the scope of the cumulative analysis for this EIR. Further, because of the distance no overlap in related impacts is expected. For example, the projects are separated by about two miles so that construction traffic associated with the Chevron proposed PRO Project is expected to remain south of the I-105 Freeway, while the traffic associated with the LAX projects would remain north of the I-105 Freeway, thereby affecting different intersections. Construction impacts on air quality are generally localized and there is sufficient distance between projects located over one mile away from the Refinery to avoid cumulative impacts.

Some of the resources affected by the proposed Chevron Refinery project would primarily occur during the construction phase, e.g., traffic. Other impacts would primarily occur during the operational phase, e.g., hazards. Still other impacts would occur during both phases, e.g., air quality and noise.



CHEVRON EL SEGUNDO REFINERY
Cumulative Project Locations

Figure 5-1

Project No. 2505
N:\2505-1\CumulativeProjectLocations (rev.1).cdr

5.1.1 RELATED PROJECTS

Proposed projects within the general El Segundo/Manhattan Beach area that could contribute to cumulative impacts are described below.

5.1.1.1 Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development (#1)

The proposed Sepulveda/Rosecrans Site Rezoning would encompass a change in the City of El Segundo's General Plan land use designation for, and rezoning of, approximately 70.8 acres of an approximate 110 gross-acre site located at the northeastern corner of the intersection of Sepulveda Boulevard and Rosecrans Avenue. The Plaza El Segundo project is a proposed retail center that would implement the amended General Plan land use designation and new zoning designation within a portion of the proposed Sepulveda/Rosecrans Rezoning Site. The proposed Sepulveda/Rosecrans rezoning would permit up to 850,000 square feet of commercial development within the site. Approximately 20.4 gross acres would retain their current Light Industrial zoning and 3.8 acres would remain Heavy Industrial. The Plaza El Segundo development would consist of approximately 43.3 gross acres of retail space and is located adjacent to the southeast corner of the Refinery. The shopping center would contain large retail stores, specialty retail, and other uses such as a fitness center/spa and restaurants (both fast food and sit down). This is the closest major project to the Refinery. Because of its size and its proximity to the proposed project, it is likely that it would have the greatest potential to generate cumulative impacts. Therefore, environmental impacts from the Plaza El Segundo project were evaluated in detail in the cumulative impacts analysis for the proposed project.

5.1.1.2 El Segundo Power Plant Project (#2)

El Segundo Power II LLC is proposing to replace the existing El Segundo Generating Station Units 1 and 2 with a natural gas-fired combined cycle electric generation facility. The project is located at 301 Vista Del Mar, El Segundo and consists of approximately 33 acres. This site is adjacent to the northwest corner of the Chevron Refinery.

The new combined cycle facility would generate approximately 291 megawatts more than the old units were capable of generating. The project will use SCR, a dry, low NOx combustor and an oxidation catalyst system to reduce emissions. The project will not require new off-site transmission lines or natural gas pipelines. The new units will use the existing seawater cooling system without modifying the intake or outfall structures and lines, and without modifying the flow rates and capacity. New pipelines include two water supply lines occupying a single trench in El Segundo city streets and a sanitary discharge pipeline within Manhattan Beach City streets. An ammonia pipeline will be installed in the adjacent Chevron marine terminal property to deliver ammonia to the site for SCR. This project has not yet been constructed and is on hold. In order to provide a conservative ("worst-case") estimate of cumulative impacts, construction activities will be assumed to occur concurrently with the Chevron PRO Project.

5.1.1.3 L.A. Air Force Base Projects– Area A (#3) & Area B (#4)

The Air Force has pursued an innovative business practice as a means of upgrading facilities on Los Angeles Air Force Base (LAAFB), known as the Systems Acquisition Management Support (SAMS) Complex. This project involved trading government-owned land in the Los Angeles area in exchange for the design and construction of new facilities at LAAFB. The Fiscal Year 2001 Defense Authorization Act allows the Air Force to transfer portions of the base to a private developer in exchange for construction of new seismically stable facilities that will better protect the LAAFB workforce and promote efficiency in operations.

The areas of LAAFB affected by this project are situated on four parcels totaling about 113 acres and located one mile south of LAX. Two of these projects are located within one mile of the Chevron Refinery. LAAFB is the home of the Space and Missile Systems Center (SMC), a research, development and contracting organization of the United States Air Force. LAAFB has no airfield, nor any flight operations capability or requirement.

- Area A: about 42 acres located at 2400 East El Segundo Blvd. in El Segundo, CA; consists of six two-story and one six-story office buildings totaling about 835,000 square feet; much of Area A is landscaped with many large shade trees creating a campus-like setting.
- Area B: about 52 acres located near Area A at the intersection of El Segundo Blvd and Douglas Avenue (west of Aviation Blvd.) in El Segundo; contains facilities for support of Air Force personnel assigned to SMC, as well as support of military retirees. Area B houses base support functions such as the 61st Air Base Group headquarters, Medical Clinic, Base Exchange and Commissary. Area B is also the designated location of the SAMS Complex.
- The Lawndale Annex 3 and Sun Valley Properties are located outside the one-mile radius of the Chevron Refinery and will not be considered in this cumulative evaluation.

The Air Force will move all government workers to Area B, freeing up Area A, Annex 3 and Sun Valley to be transferred to a developer for private development. The outdated facilities and buildings occupied by the Air Force at Area A and Annex 3 do not meet current fire codes or seismic standards. These buildings have been or are in the process of being replaced at a reconfigured Area B with approximately 560,000 square feet of new administrative and special purpose facilities. The project allows the Air Force to dispose up to 865,000 square feet of substandard buildings and occupy a modern and efficient complex. The concept could eliminate a requirement for 130 to 150 million dollars in military construction projects. It is also estimated that right-sizing LAAFB will save over three million dollars annually in operations and maintenance costs. The Air

Force also wishes to minimize disruption of its workers currently located on those portions of LAAFB that would be provided for private development. Therefore, demolition of these structures has been and will continue to be coordinated with new private developments so the disruption to the Air Force operations is held to a minimum.

It is projected that Area A will be developed with 525 condominiums and Area B will be developed with 600,000 - 800,000 square feet of warehousing, private offices, the Base Exchange, a health club and medical offices (City of Manhattan Beach, 2007).

Due to the proximity of this project to the Refinery and because of its size, it is likely that it would have potential to generate cumulative impacts. Therefore, environmental impacts from the LAAFB project were evaluated in detail in the cumulative impacts analysis for the proposed project.

5.1.1.4 Other Projects in the Cities of El Segundo and Manhattan Beach (#5-14)

There are other projects in the Cities of El Segundo and Manhattan Beach that are in the planning phase and which could add to cumulative impacts. A review of the websites of both Cities, and correspondence with the City of Manhattan Beach planning department, identified eight such projects. Although limited information is available on most of these projects, the available relevant information pertaining to these projects is presented in Table 5-1. The projects with available information to provide a project description are discussed below. For some projects, the only information available is that on the project size (i.e., those in Table 5-1) and CEQA documents are not available for these projects. Cumulative impacts for these projects will be evaluated to the extent feasible using default assumptions.

5.1.1.5 Other Capital Projects at the Chevron Refinery (#15-22)

Chevron has several capital projects scheduled for construction. Table 5-2 provides a list of unrelated projects at the Chevron Refinery whose construction may overlap with the proposed project. Of these projects, the only project for which a CEQA document has currently been prepared is the FCC SCR project. The other projects are either exempt from CEQA or are not far enough along in the planning process for a CEQA document to be prepared.

TABLE 5-1

Other Related Projects in the Cities of El Segundo and Manhattan Beach[1]

Map No.	Address/Location	Size in units	Project Description	Distance from Proposed Project
5	1950 Grand Ave., El Segundo	93,569 square feet	Office Building	< 1/4 mile
6	Electronics Superstore, Aviation Blvd./ Utah Ave.., El Segundo	152,504 square feet	Commercial building to take the place of existing R&D, office and warehouse.	< 1 mile
7	2151 E. Grand Ave., El Segundo	125,000 square feet	Office Building	< ½ mile
8	455/475 Continental Blvd., El Segundo	4 buildings totaling 530,000 square feet	Three office buildings and one R&D Center	< ½ mile
9	2201 Highland Ave, Manhattan Beach	1,600 square feet	Retail/Restaurant & 2 DU condominium	< 1 mile
10	1300 Highland Ave., Manhattan Beach	15,000 square feet	Mixed use office/ commercial	< 1 ½ miles
11	NE corner of Sepulveda Blvd. & Marine Ave., Manhattan Beach	52,174 square feet	Commercial (Manhattan Village Shopping Center)	< ½ mile
12	2200 Sepulveda Ave., Manhattan Beach	29,000 square feet	Office Building	< 1 mile
13	DWP Right-of-Way (Dunes)	N/A	Public Use Green Belt	< ½ mile
14	1100 Manhattan Beach Boulevard, Manhattan Beach	13,396 square feet	Retail Pharmacy	About one mile

(1) Source: City of Manhattan Beach, e-mail correspondence with Laurie B. Jester, October 2007.

TABLE 5-2

Other Chevron Capital Projects

Map No.	Project Name	Project Scope	Est. Construction Start Date	Est. Construction End Date
15	Houdry Compressor Replacement	Replace compressors K-2002/2003/2004 with new compressors.	7/10/2007	8/31/2007
16	ISOMAX New Compressors	Install 2 new compressors to augment the existing eductors	7/10/2007	11/30/2008
17	FCC SCR(1)	Install 2 parallel SCRs at the FCC for NOx control to meet limits required by the NSR consent decree	9/1/2007	6/30/2008
18	Refinery Optimization Center (ROC)	Construct a new centralized Refinery control center east of the Main Building	12/2007	12/2009
19	No. 2 Crude/Resid Cutpoint	Install new heat exchangers and new ejector; demolish and replace one vessel	9/2007	9/31/2008
20	LPG Rack Segregation	Install new liquid separators; Replace existing vessels with larger ones; Reroute pressure safety valves to ISOMAX Relief	3/2008	8/2008
21	T-943 New Jet Tank Construction	Construct a new 150 feet diameter by 64 feet high jet tank	3/2008	3/2009
22	Purchasing Building - Remodeling	Remodel a 3-story building to turn into office spaces.	3/2008	10/2008

(1) A negative declaration was prepared for this project. See SCAQMD 2007a. CEQA documents have not been prepared for the other proposed projects.

5.2 AIR QUALITY

5.2.1 CONSTRUCTION IMPACTS

Currently, the Basin is designated non-attainment for ozone, PM10, and PM2.5. Construction activities for some of the projects described in Section 5.1 have the potential to overlap with the proposed Chevron project and result in a short-term significant impact on air quality (see Table 5-3). The proposed Chevron project could result in significant construction emissions for CO, VOC, NOx, PM10, and PM2.5 during the construction period (see Table 4-3). Therefore, the air quality impacts associated with construction activities are considered significant.

The projects identified in Table 5-3 have the potential for construction activities that overlap with the construction activities for the proposed Chevron project. Table 5-3 summarizes the available construction emissions data for the related projects. On a cumulative basis, construction emissions would exceed the thresholds established by the SCAQMD for CO, VOC, NOx, and PM10 assuming they occur at the same time. Table

TABLE 5-3

Cumulative Construction Air Quality Impacts
(pounds per day)

No.	Project	Type of Project	Estimated Emissions				
			CO	VOC	NOx	SOx	PM10
	Proposed Chevron Process Reliability & Optimization Project [(1)]	Refinery	708.99	152.45	754.27	1.04	177.01
1	Sepulveda/Rosecrans Site Rezoning & Plaza El Segundo Development[(2)]	Commercial/Mixed use	576	235	431	0	27
2	El Segundo Power Plant[(3)]	Industrial	1029.00	117.05	443.56	16.31	52.14
3	LA Air Force Base Area A[(4)]	Mixed use	82.52	81.12	58.55	0.08	60.09
4	LA Air Force Base Area B[(4)]	Mixed use	132.87	399.66	96.12	0.16	67.03
5	1950 Grand Ave., El Segundo[(4)]	Office Building	32.39	158.67	39.16	0.01	9.07
6	Electronics Superstore, Aviation Blvd./ Utah Ave.., El Segundo[(4)]	Commercial	37.46	106.51	39.91	0.02	13.81
7	2151 E. Grand Ave., El Segundo[(4)]	Office Building	35.33	100.21	40.18	0.02	11.61
8	455/475 Continental Blvd., El Segundo[(4)]	Office Building and R&D Center	70.46	263.78	47.12	0.06	45.08
9	2201 Highland Ave, Manhattan Beach[(4)]	Commercial	14.77	7.04	28.07	0	1.84
10	1300 Highland Ave., Manhattan Beach[(4)]	Commercial/Offices	15.76	22.87	28.07	0	2.62
11	NE corner of Sepulveda Blvd. & Marine Ave., Manhattan Beach[(4)]	Commercial	19.25	41.53	28.07	0.01	5.67
12	2200 Sepulveda Ave., Manhattan Beach[(4)]	Medical Offices	17.06	42.93	28.07	0.01	3.76
14	1100 Manhattan Beach Boulevard, Manhattan Beach[(4)]	Retail	15.70	27.54	28.07	0	2.55
15	Houdry Compressor Replacement[(5)]	Refinery	90.09	24.33	108.42	0.12	15.05
16	ISOMAX New Compressors[(5)]	Refinery	90.09	24.33	108.42	0.12	15.05
17	FCC SCR[(6)]	Refinery	235.81	32.41	94.53	0.21	10.32

TABLE 5-3 (concluded)

No.	Project	Type of Project	Estimated Emissions				
			CO	**VOC**	**NOx**	**SOx**	**PM10**
19	No.2 Crude/Resid Cutpoint(5)	Refinery	95.25	19.99	95.36	0.12	8.51
20	LPG Rack Segregation(5)	Refinery	13.63	2.69	13.96	0.02	4.63
21	T-943 New Jet Tank Construction(5)	Refinery	13.63	2.69	13.96	0.02	4.63
		Total Emissions	3,326	1,863	2,525	18	537
		SCAQMD Thresholds	550	75	100	150	150
		Significant	**Yes**	**Yes**	**Yes**	**No**	**Yes**

(1) See Table 4-3; (2) City of El Segundo, 2004a; (3) CEC, 2002; (4) Emission estimates were estimated using the URBEMIS 2007 model, which provides PM2.5 emission estimates. However, PM2.5 emission have not been calculated for all projects and therefore, PM2.5 emissions have not been tabulated; (5) Emissions estimated through project specific data; and (6) SCAQMD, 2007a.

5-3 does not provide emission estimates of PM2.5 because PM2.5 emissions have not been calculated and are not available for most projects.

Due to the variety in the list of cumulative projects and various emission calculation methodologies, it is difficult to estimate emissions of PM2.5. Nonetheless, it is assumed that the cumulative emissions of PM2.5 are significant for the following reasons. A large portion of PM10 consists of PM2.5 and the significance threshold for PM2.5 is much lower than PM10 (55 pounds per day versus 150 pounds per day). Further, the cumulative emissions of PM10 are an estimated 540 pounds per day, which is well over the significance threshold of 150 pounds per day. Therefore, it is expected that cumulative PM2.5 emissions will exceed the SCAQMD CEQA significance threshold of 55 pounds per day and are also significant. Mitigation measures to reduce air emissions associated with construction activities are necessary primarily to control emissions from heavy construction equipment and worker travel.

5.2.2 OPERATIONAL EMISSIONS IMPACTS

During operation, some of the projects are expected to reduce overall air pollutant emissions. However, there are regional increases for certain air pollutants (see Table 5-4). Direct stationary emission sources are generally subject to regulation. The emissions associated with the operational phase of the proposed Chevron project are shown in Chapter 4, Table 4-4. The operation of the Chevron project will not exceed the SCAQMD thresholds, after mitigation, so no significant air quality impacts are expected from the proposed project.

TABLE 5-4

Cumulative Operational Air Quality Impacts (pounds per day)

No.	Project	Type of Project	Estimated Emissions				
			CO	VOC	NOx	SOx	PM10
	Proposed Chevron Process Reliability & Optimization Project [1]	Refinery	389.3	2.8	-188.9	206.4	13.7
2	El Segundo Power Plant[2]	Industrial	14,210.96	1,114.28	2,782.64	167.31	1,837.09
3	LA Air Force Base Area A[3]	Mixed use	416.68	66.70	53.08	0.35	11.05
4	LA Air Force Base Area B[3]	Mixed use	1339.04	134.93	163.04	1.11	179.26
5	1950 Grand Ave., El Segundo[3]	Office Building	109.00	10.60	13.25	0.09	14.58
6	Electronics Superstore, Aviation Blvd./ Utah Ave., El Segundo[3]	Commercial	450.3	47.04	55.35	0.37	59.06
7	2151 E. Grand Ave., El Segundo[3]	Office Building	145.08	14.11	17.69	0.12	19.47
8	455/475 Continental Blvd., El Segundo[3]	Office Building and R&D Center	609.94	59.41	75.95	0.51	82.58
9	2201 Highland Ave, Manhattan Beach	Commercial	15.23	1.71	1.50	0.01	1.51
10	1300 Highland Ave., Manhattan Beach[3]	Commercial/Offices	21.15	1.98	2.40	0.02	2.66
11	NE corner of Sepulveda Blvd. & Marine Ave., Manhattan Beach[3]	Commercial	148.04	15.48	18.10	0.12	19.27
12	2200 Sepulveda Ave., Manhattan Beach[3]	Medical Offices	34.88	3.37	4.12	0.03	4.52
14	1100 Manhattan Beach Boulevard, Manhattan Beach[3]	Retail	80.3	8.18	9.57	0.06	2.06
15	Houdry Compressor Replacement[4]	Refinery	0.00	0.00	0.00	0.00	0.00
16	ISOMAX New Compressors[4]	Refinery	0.00	13.6	0.00	0.00	0.00
17	FCC SCR[4]	Refinery	0.00	0.00	0.00	0.00	0.00
18	ROC[3]	Office Building	25.95	2.31	3.03	0.02	3.4

TABLE 5-4 (cont'd)

No.	Project	Type of Project	Estimated Emissions				
			CO	VOC	NOx	SOx	PM10
19	No.2 Crude/Resid Cutpoint[(4)]	Refinery	0.00	6.8	0.00	0.00	0.00
21	T-943 New Jet Tank Construction[(4)]	Refinery	0.00	5.9	0.00	0.00	0.00
		Total Emissions	17,996	1,509	3,011	377	2,250
		SCAQMD Thresholds	550	55	55	150	150
		Significant	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

(1) See Tables 4-4 and 4-5; (2) CEC, 2002; (3) Emission estimates were estimated using the URBEMIS 2007 model; and (4) Emissions estimated through project specific data.

Air quality impacts associated with cumulative projects are shown in Table 5-4. Emission estimates are not available for all projects; for those projects default emission factors were used when possible, i.e., the type of land use and size of the development are available. For certain projects, operational emissions were expected to result in a decrease or no increase in emissions (e.g., Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development) and those projects have been omitted from Table 5-4. Cumulative air quality impacts are expected to exceed the SCAQMD mass emission thresholds for CO, VOC, NOx, SOx, and PM10. As explained in Section 5.2.1, PM2.5 emissions are also expected to be significant. Therefore, the cumulative air quality impacts for CO, VOC, NOx, SOx, PM10, and PM2.5 are expected to be significant.

5.2.3 TOXIC AIR CONTAMINANTS

The impacts from TACs are localized impacts. As indicated in Table 5-1, most related projects are located at sufficient distances that potential toxic air contaminant impacts would not overlap with Chevron's PRO Project. The proposed project impacts on health effects associated with exposure to TACs is expected to be below the CEQA significance thresholds and, therefore, less than significant. The proposed project impacts on cancer risk to the MEIR and MEIW were estimated to be 0.33 per million and 0.22 per million, respectively, which is well below the significance threshold of 10 per million. The acute and chronic health indices were estimated to be 0.031 and 0.007 respectively, which is well below the significance threshold of one (1.0). Therefore, the proposed project impacts are not expected to contribute to cumulative impacts and are not considered to be cumulatively considerable. The other Refinery projects are small projects and will not generate substantial quantities of TACs. Cumulative impacts of TACs on health are expected to be less than significant.

The only other major industrial project in the area that is likely to emit TACs is the El Segundo Power Plant Redevelopment Project. A health risk assessment for this project was completed (CEC, 2002). The cancer risk to the maximum exposed individual was calculated to be 0.94 per million. The maximum acute and chronic health indices were estimated to be 0.01 and 0.02, respectively. The potential overlap of the El Segundo Power Plant and the Chevron PRO Project would be well below the significance criteria of 10 per million for carcinogenic risk and 1.0 for the acute and chronic hazard indices. The other cumulative projects are commercial and residential project and are not expected to be major contributors to TAC emissions. Cumulative impacts of TACs on health are expected to be less than significant.

5.2.4 GREENHOUSE GASES

5.2.4.1 Environmental Setting

Global climate change refers to changes in average climatic conditions on the earth as a whole, including temperature, wind patterns, precipitation and storms. Global warming, a related concept, is the observed increase in average temperature of the earth's surface and atmosphere. One identified cause of global warming is an increase of GHGs in the atmosphere. The six major GHGs identified by the Kyoto Protocol are CO_2, methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), haloalkanes (HFCs), and perfluorocarbons (PFCs). The GHGs absorb longwave radiant energy reflected by the earth, which warms the atmosphere. GHGs also radiate longwave radiation both upward to space and back down toward the surface of the earth. The downward part of this longwave radiation absorbed by the atmosphere is known as the "greenhouse effect." Some studies indicate that the potential effects of global climate change may include rising surface temperatures, loss in snow pack, sea level rise, more extreme heat days per year, and more drought years.

Events and activities, such as the industrial revolution and the increased combustion of fossil fuels (e.g., gasoline, diesel, coal, etc.), have heavily contributed to the increase in atmospheric levels of GHGs. As reported by the CEC, California contributes 1.4 percent of the global and 6.2 percent of the national GHGs emissions (CEC, 2004). The GHG inventory for California is presented in Table 5-5 (CARB, 2007). Approximately 80 percent of GHGs in California are from fossil fuel combustion and over 70 percent of GHG emissions are carbon dioxide emissions (see Table 5-5).

In response to growing scientific and political concern regarding global climate change, California has recently adopted a series of laws to reduce both the level of GHGs in the atmosphere and to reduce emissions of GHGs from commercial and private activities within the state. In September 2002, Governor Gray Davis signed Assembly Bill (AB) 1493, requiring the development and adoption of regulations to achieve "the maximum feasible reduction of greenhouse gases" emitted by noncommercial passenger vehicles, light-duty trucks, and other vehicles used primarily for personal transportation in the State. Setting emission standards on automobiles is normally the responsibility of the U.S. EPA. The Federal Clean Air Act, however, allows California to set a state-specific emission standard on automobiles if it first obtains a waiver from the U.S. EPA. On December 19, 2007 the U.S. EPA denied California's request for a waiver. In response, California sued the U.S. EPA claiming that the denial was not based on the scientific data.

TABLE 5-5

California GHG Emissions and Sinks Summary
(Million metric tons of CO_2 equivalence)

Categories Included in the Inventory	1990	2004
ENERGY	**386.41**	**420.91**
Fuel Combustion Activities	**381.16**	**416.29**
Energy Industries	157.33	166.43
Manufacturing Industries & Construction	24.24	19.45
Transport	150.02	181.95
Other Sectors	48.19	46.29
Non-Specified	1.38	2.16
Fugitive Emissions from Fuels	**5.25**	**4.62**
Oil and Natural Gas	2.94	2.54
Other Emissions from Energy Production	2.31	2.07
INDUSTRIAL PROCESSES & PRODUCT USE	**18.34**	**30.78**
Mineral Industry	4.85	5.90
Chemical Industry	2.34	1.32
Non-Energy Products from Fuels & Solvent Use	2.29	1.37
Electronics Industry	0.59	0.88
Product Uses as Substitutes for Ozone Depleting Substances	0.04	13.97
Other Product Manufacture & Use Other	3.18	1.60
Other	5.05	5.74
AGRICULTURE, FORESTRY, & OTHER LAND USE	**19.11**	**23.28**
Livestock	11.67	13.92
Land	0.19	0.19
Aggregate Sources & Non-CO_2 Emissions Sources on Land	7.26	9.17
WASTE	**9.42**	**9.44**
Solid Waste Disposal	6.26	5.62
Wastewater Treatment & Discharge	3.17	3.82
EMISSION SUMMARY		
Gross California Emissions	**433.29**	**484.4**
Sinks and Sequestrations	**-6.69**	**-4.66**
Net California Emissions	**426.60**	**479.74**

Source: CARB, 2007.

In June 2005, Governor Schwarzenegger signed Executive Order S-3-05, which established GHG emissions reduction targets for the state, as well as a process to ensure that the targets are met. As a result of this executive order, the California Climate Action Team (CAT), led by the Secretary of the California State Environmental Protection Agency (CalEPA), was formed. The CAT published its report in March 2006, in which it laid out several recommendations and strategies for reducing GHG emissions and reaching the targets established in the executive order.[1] The greenhouse gas targets are:

- By 2010, reduce to 2000 emission levels;
- By 2020, reduce to 1990 emission levels; and,
- By 2050, reduce to 80 percent below 1990 levels.

In September 2006, Governor Schwarzenegger signed California's Global Warming Solutions Act of 2006 (AB32). AB32 will require CARB to:

- Establish a statewide GHG emissions cap for 2020, based on 1990 emissions, by January 1, 2008;
- Adopt mandatory reporting rules for significant sources of GHG emissions by January 1, 2008;
- Adopt an emissions reduction plan by January 1, 2009, indicating how emissions reductions will be achieved via regulations, market mechanisms, and other actions; and,
- Adopt regulations to achieve the maximum technologically feasible and cost-effective reductions of GHGs by January 1, 2011.

SB1368, a companion bill to AB32, requires the California Public Utilities Commission (CPUC) and the CEC to establish GHG emission performance standards for the generation of electricity, whether generated inside the State or generated outside and then imported into California. SB1368 provides a mechanism for reducing the emissions of electricity providers, thereby assisting CARB to meet its mandate under AB32. On January 25, 2007, the CPUC adopted an interim GHG Emissions Performance Standard (EPS), which is a facility-based emissions standard requiring that all new long-term commitments for baseload generation to serve California consumers be with power plants that have GHG emissions no greater than a combined cycle gas turbine plant. That level is established at 1,100 pounds of CO_2 per megawatt-hour (MW-hr). Further, on May 23, 2007, the CEC adopted regulations that establish and implement an EPS of 1,100 pounds of CO_2 per MW-hr (see CEC order No. 07-523-7).

California Senate Bill 97 (SB97), passed in August 2007, is designed to work in conjunction with CEQA and AB32. SB97 requires the California Office of Planning and Research (OPR) to prepare and develop guidelines for the mitigation of GHG emissions or the effects thereof, including but not limited to, effects associated with transportation

1 California Climate Action Team. Climate Action Team Report to Governor Schwarzenegger and the Legislature, 2006.

and energy consumption. These guidelines must be transmitted to the Resources Agency by July 1, 2009, to be certified and adopted by January 1, 2010. The OPR and the Resources Agency shall periodically update these guidelines to incorporate new information or criteria established by CARB pursuant to AB32. SB97 will apply to any EIR, negative declaration, mitigated negative declaration, or other document required by CEQA, prepared for a limited number of types of projects, which has not been finalized. SB 97 will be automatically repealed January 1, 2010.

There has also been activity at the Federal level on the regulation of GHGs. In *Massachusetts v. Environmental Protection Agency* (Docket No. 05–1120), argued November 29, 2006 and decided April 2, 2007, the U.S. Supreme Court held that not only did the U.S. EPA have authority to regulate greenhouse gases, but that the U.S. EPA's reasons for not regulating greenhouse gases did not fit the statutory requirements. The U.S. Supreme Court ruled that CO_2 and other greenhouse gases are pollutants under the Clean Air Act, which U.S. EPA must regulate if it determines they pose an endangerment to public health or welfare. To date, the U.S. EPA has not made such a finding or developed a regulatory program for greenhouse gas emissions.

The SCAQMD adopted a "Policy on Global Warming and Stratospheric Ozone Depletion" on April 6, 1990. The policy commits the SCAQMD to consider global impacts in rulemaking and in drafting revisions to the AQMP. In March 1992, the SCAQMD Governing Board reaffirmed this policy and adopted amendments to the policy to include the following directives:

- phase out the use and corresponding emissions of chlorofluorocarbons (CFCs), methyl chloroform (1,1,1-trichloroethane or TCA), carbon tetrachloride, and halons by December 1995;
- phase out the large quantity use and corresponding emissions of hydrochlorofluorocarbons (HCFCs) by the year 2000;
- develop recycling regulations for HCFCs (e.g., SCAQMD Rules 1411 and 1415);
- develop an emissions inventory and control strategy for methyl bromide; and,
- support the adoption of a California greenhouse gas emission reduction goal.

The legislative and regulatory activity detailed above is expected to require significant development and implementation of energy efficient technologies and shifting of energy production to renewable sources.

Chevron has reported its verified GHG emissions (all six GHGs, as applicable) to the California Climate Action Registry (CCAR) for the years 2004-2006. Chevron’s emissions (2004-2006) reported to CCAR for all Chevron’s sources within California, were approximately 13.1 million metric tons per year. According to the California Air

Resources Board's inventory of emissions, the total statewide net GHG emissions in 2004 were approximately 480 million metric tons per year of CO_2 equivalent emissions. Chevron's global emissions have been estimated to be about 61.9 million metric tons in 2006. Global emissions of GHGs in 1990 were estimated by the Intergovernmental Panel on Climate Change to be 32,100 million metric tons of CO_2 equivalent (CO_2e) emissions.

The two-year average GHG emissions from the El Segundo Refinery for 2005-2006 were calculated to be 3.588 million metric tons (see Table 5-6). The major source of emissions is combustion of fuel in heaters and boilers. Other sources of GHG emissions include fuel combustion in the cogeneration units, combustion of coke in the FCCU, and the carbon dioxide vent in the Hydrogen Plant.

TABLE 5-6

Chevron El Segundo Refinery
Greenhouse Gas Emissions Summary

GHG Emissions	2005 (million metric tons)	2006 (million metric tons)	2-Year Average Emission Rate (million metric tons)
All Refinery Sources	3.559	3.613	3.588

5.2.4.2 Significance Criteria

The analysis of GHGs is a much different analysis than the analysis of criteria pollutants for the following reasons. For criteria pollutants, significance thresholds are based on daily emissions because attainment or non-attainment is based on daily exceedances of applicable ambient air quality standards. Further, several ambient air quality standards are based on relatively short-term exposure effects on human health, e.g., one-hour and eight-hour. Since the half-life of CO_2 is approximately 100 years, for example, the effects of GHGs are longer-term, affecting global climate over a relatively long time frame. As a result, the SCAQMD's current position is to evaluate GHG effects over a longer timeframe than a single day.

While direct GHG emissions can be calculated, the emissions cannot be precisely correlated with specific impacts based on currently available science. Climate change is a global phenomenon, making it difficult to develop the scientific tools and policy needed to select a CEQA significance threshold for climate change or GHG emissions. Refinery projects will be subject to any regulations developed under AB32 as determined by CARB. As there are currently no emission significance thresholds to assess GHG emission effects on climate change, the SCAQMD does not currently have a "significance threshold" to determine whether a project will have a significant impact on global warming or climate change. In the absence of regulatory guidance, and before the resolution of various legal challenges related to global climate change analysis and the selection of significance thresholds, a significance determination will be made on a case-by-case basis.

GHGs do not have human health effects like criteria pollutants. Rather, it is the increased accumulation of GHGs in the atmosphere that may result in global climate change. Due to the complexity of conditions and interactions affecting global climate change, it is not possible to predict the specific impact, if any, attributable to GHG emissions associated with a single project. Furthermore, the proposed project's GHG emissions will be small relative to total global or even statewide GHG emissions. Thus, the significance of potential impacts from GHG emissions related to the proposed project has been analyzed for long-term operations on a cumulative basis, as discussed further below.

5.2.4.3 Environmental Impacts

Reporting indirect GHG emissions is a requirement of the California Climate Action Registry reporting program and CARB staff has considered extensively the value of indirect emissions in a mandatory reporting program. CARB believes that indirect energy usage provides a more complete picture of the emissions footprint of a facility. "As facilities consider changes that would affect their emissions – addition of a cogeneration unit to boost overall efficiency even as it increases direct emissions, for example – the relative impact on total (direct plus indirect) emissions by the facility should be monitored. Annually reported indirect energy usage also aids the conservation awareness of the facility and provides information" to CARB to be considered for future strategies by the industrial sector. For these reasons, CARB has proposed requiring the calculation of direct and indirect GHG emissions as part of the AB32 reporting requirements (CARB, 2007a). Therefore, direct and indirect emissions have been calculated for the proposed PRO Project.

Project GHG Emissions

The new and modified equipment built as part of the Chevron PRO Project has been evaluated for all GHG emission sources, including both energy supplied via purchased conventional power generation and with energy supplied by the installation of more energy efficient cogeneration power (combined power and steam generation). The PRO Project as proposed is estimated to result in an increase of 0.194 million metric tons/year of GHG (see Table 5-7) with GHG emission increases generated from Cogen Train D, the tail gas treating unit, and the pilots on the new flare.

Chevron evaluated the electrical needs of the PRO Project and determined that the proposed project would require about 29.9 MW of electricity plus additional steam to operate the proposed new and modified units. The business-as-usual approach would be to purchase the additional electricity from the local provider (SCE). If the Refinery were to continue to rely on SCE for electricity, a new 330 mmBtu/hr boiler would be required to generate additional steam needed for the PRO Project and other Refinery activities.

The GHG emissions that would be generated under the business-as-usual approach are estimated to be about 0.281 million metric tons per year, as summarized in Table 5-8.

TABLE 5-7

Chevron PRO Project with Purchased Power
GHG Emissions Summary[1]

Equipment	Fuel Input (mmBtu/hr) [2]	GHG Emissions (metric tons/yr)
New Cogen Train D[3]	653.2	290,075
Elimination of Purchased Electricity[4]	-200	-91,007
Tail Gas Treating Unit Incinerator[5]		42,600
Purge, Gas Pilots on New Safety Flare	0.95	431
Curtailment of Auxiliary Boiler[4]	-105.9	-48,189
PRO Project (metric tons/yr)		**193,910**
PRO Project (million metric tons/yr)		**0.194**

1. See Appendix C for detailed emission calculations - includes all applicable GHG emissions, i.e., CO_2, N_2O, and methane.
2. mmBtu/hr – million British Thermal Units per hour
3. 49.9 MW to supply power for the PRO Project and replaced purchased power for existing operations.
4. Average of 2005-2006 purchases reported in verified GHG reports.
5. CO_2 emissions based on material balance.

TABLE 5-8

Chevron PRO Project GHG Emissions Summary
Business-as-Usual Approach without Cogen Train D[1]

Equipment	Fuel Input (mmBtu/hr) [2]	GHG Emissions (metric tons/yr)
Tail Gas Unit Incinerator[3]		42,600
Purge Gas Pilots on New Safety Flare	0.95	431
SCE Supplied Power – Purchased Electricity[4]	299.0	136,056
New Fired Boiler	330.2	150,252
Curtailment of Auxiliary Boiler[5]	-105.9	-48,189
PRO Project (metric tons/yr)		**281,150**
PRO Project (million metric tons/yr)		**0.281**

1. See Appendix C for detailed emission calculations - includes all applicable GHG emissions, i.e., CO_2, N_2O, and methane..
2. mmBtu/hr – million British Thermal Units per hour
3. CO_2 emissions based on material balance.
4. PRO Project energy demand of 29.9 MW.
5. Average of 2005-2006 purchases reported in verified GHG report

Instead of business-as-usual, Chevron is proposing to install a new 49.9 MW cogeneration unit to supply the additional electricity and steam, and to reduce the amount of electricity purchased from the local provider, i.e., following project completion, Chevron will reduce the amount of electricity currently purchased from SCE by about 20

MW. With the installation of the 49.9 MW Cogen Train D, Chevron expects to supply most of the electricity used at the Refinery under normal operating conditions. Further, the steam required by the proposed project and other refinery activities can be generated by the Cogen Train D so that no new boiler is required and the use of the existing auxiliary boiler can be reduced under normal operating conditions.

Although the operation of the new Cogen Train D will result in an increase in GHG emissions at the Refinery, the new Cogen Train D will eliminate the purchase of electricity from less energy efficient sources. The new Cogen Train D will displace the existing average of 20 MW of purchased power along with the additional power needs of the proposed project and will also supply steam so that operation of an existing auxiliary boiler will be limited when the Cogeneration Facilities are in operation. Therefore, it is estimated that the PRO Project with the Cogen Train D would generate about 0.089 million metric tons/yr (0.281 – 0.192) less GHG emissions than the PRO Project with a new boiler plus SCE supplied power, i.e, business-as-usual.

Considerations in Determining Significance of Greenhouse Gas Emissions

As stated previously, the SCAQMD has not yet established significance criteria for GHG emissions. Few, if any, other public agencies in California have established significance criteria for GHG emissions. In its CEQA and Climate Change white paper, CAPCOA has identified a number of potential approaches for determining the significance of GHG emissions in CEQA documents. Some of the approaches recommended by CAPCOA are summarized in the following subsections. In addition, the following discussions show how Chevron’s proposed PRO Project would compare to these approaches.

CAPCOA's Green List: CAPCOA has suggested that lead agencies should develop a “Green List of Projects” that is consistent with the goals of AB32. Such as list would allow agencies to encourage projects that are providing overall GHG emission benefits and complying with the goals of AB32. The suggested projects for inclusion on the Green List are as follows:

- Wind farm for generation of wind-powered electricity.
- Extension of transit lines to currently developed, but under-served communities.
- Development of high-density infill projects with easily accessible mass transit.
- Small hydroelectric power plants (5 MW or less).
- Cogeneration plants with a capacity of 50 MW or less at existing facilities.
- Increase in bus service or conversion to bus rapid transit service along an existing bus line.
- Projects with LEED “Platinum” rating.
- Expansion of recycling facilities within existing urban areas.
- Recycled water projects that reduce energy consumption related to water supplies that service existing development.
- Development of bicycle, pedestrian or zero emission transportation infrastructure to serve existing regions (CAPCOA, 2008).

The new Cogen Train D is, in itself, one of the preeminent technologies for minimizing GHG emissions included on CAPCOA's "Green List of Projects." Cogeneration is far more efficient (in both energy and GHG emissions), than separate generation of electricity (either by a simple cycle gas turbine or utility boilers) and steam.

As noted by CAPCOA, cogeneration plants are consistent with the goals of AB32 because they are much more efficient in generating electricity at the site where it is used, thus, minimizing energy losses associated with the transmission and distribution of electricity. Installing Cogen Train D as part of the PRO Project is consistent with CAPCOA's Green List of Projects and, thus, the goals of AB32.

CPUC and CEC Efficiency Standards: Using energy efficiency as a potential measure for determining the significance of a project's GHG emissions would be consistent with state law and policy. Assembly Bill 2021 (2006) requires the CEC to develop statewide energy efficiency potential estimates and targets for California's investor-owned and publicly owned utilities. AB2021 provides "that all load serving entities procure all cost-effective energy efficiency measures so that the state can meet the goal of reducing total forecasted electrical consumption by ten percent in ten years."[2] AB2021 also explicitly states that "energy efficiency programs will ameliorate air quality problems throughout the state and will also reduce harmful greenhouse gas emissions," and labels energy efficiency measures as "an essential component of the state's plan to meet the Governor's greenhouse gas reduction targets established in Executive Order S-3-05."[3]

In a recent staff report on the implementation of AB2021, the CEC recognized that energy efficiency measures are an essential component of the state's plan to meet AB32's GHG reduction goal, not only because electricity production is a significant source of GHG emissions, but also because energy efficiency is an attractive opportunity for reducing GHG emissions that is both emissions-free and often the lowest cost energy resource option (CEC, 2007).[4]

The use of energy efficiency as a potential significance measure allows recognition of a project's overall reductions in GHG emissions compared to a business-as-usual approach or that might not otherwise be apparent by focusing on the total energy use picture. For example, a facility could implement efficiency measures that increase direct GHG emissions at the source while correspondingly reducing total GHG emissions by boosting overall efficiency. Thus, using energy efficiency as a means of measuring significance not only furthers the goals of AB32, but it also incentivizes companies to adopt measures that increase energy efficiency and thus reduce GHG emissions.

[2] AB 2021, Sec. 1(a) (2006).

[3] *Id.*, Secs. 1(c), (d).

[4] See California Energy Commission, Draft Staff Report, Statewide Energy Efficiency Potential Estimates and Targets for California Utilities (Aug. 2007).

The PRO Project would eliminate 20 MW of existing demand from the SCE system by installing cogeneration technology, which is much more efficient. Cogeneration is generally substantially more energy efficient than energy generation alone. In a cogeneration facility, the waste heat from the electricity generating process is captured and used to produce high- and low-pressure steam, which can then be used as a heat source for industrial purposes. By harnessing heat that would otherwise be wasted, cogeneration technology provides greater conversion efficiencies than traditional generation methods and offers unique opportunities to reduce GHG emissions by increasing a facility's overall efficiency. Furthermore, the heat by-product is available for use without the need for the further burning of a primary fuel. Cogeneration offers the best use of valuable fossil fuels, combining high efficiency and low emissions, with reduced transmission losses due to being situated close to the end user.

Moreover, the CPUC and CEC have established EPS for the generation of electricity. To evaluate compliance with the standard, the electrical and thermal output of Cogen Train D was calculated and compared to the emissions performance standard (see Table 5-9). As shown in Table 5-9, the efficiency of the Cogen Train D is estimated to be 591 pounds of CO_2e per MW-hr which is well below the emissions performance standard of 1,100 pounds of CO_2 per MW-hr. Therefore, the proposed Cogen Train D will be more energy efficient than required by CPUC and CEC standards, generating lower CO_2 emissions per MW-hr than required by CPUC and CEC standards.

Comparison of Chevron El Segundo Refinery Greenhouse Gas Emissions 1990 to 2010

The proposed project employing the more energy efficient power and steam generation of a cogeneration plant rather than installing a boiler (business-as-usual) is expected to result in lower GHG emissions when compared to conventional purchased power. Further, as shown in Table 5-10, the GHG emissions from the Chevron Refinery are expected to be less in 2010, when the PRO Project becomes operational, than they were in 1990 as explained in the following paragraphs.

For comparison purposes and consistency with the goals of AB32, the GHG emissions from the Chevron El Segundo Refinery have also been evaluated for the 1990 operating conditions using historical operating data. GHG emissions are primarily associated with fuel combustion so the 1990 operating data were used to calculate the combustion emissions from heaters, boilers, cogeneration facilities, and flares based on the specific fuel type (propane, butane, natural gas, and refinery fuel gas). In addition, hydrogen plants are also sources of GHG emissions, so GHG emissions from hydrogen plants were calculated based on the amount of hydrogen produced. Based on all these factors, 1990 GHG emissions for the Refinery are estimated to be about 3.9 million metric tons of GHGs per year.

TABLE 5-9

Comparison of GHGs from Cogen Train D to Emissions Performance Standard [1]

	Fuel Input (mmBtu/hr)	Emission Factor	CO_2e Emissions (lbs/hr)	Energy Output (MW-hr)	Efficiency (lbs CO_2e/ MW-hr)
CO_2					
Gas Turbine	524.7	110[2]	57,717	--	--
Duct Burners	128.5	120,000[3]	14,686	--	--
Subtotal, CO_2	--	--	72,403	--	--
Methane	653.2	[1]	110[5]	--	--
N_2O	653.2	[1]	489[5]	--	--
Total CO_2 Equivalence[4]	--	--	73,002	--	--
Electrical Output (MW-hr)	--	--	--	49.90[6]	--
Thermal Output (MW-hr)	--	--	--	73.53[7	--
Efficiency	--	--	--	--	591[8]

(1) See Appendix B for detailed emission calculations and all emission factors. The emission factors vary for the gas turbine and duct burners.
(2) CO_2 emission factor is in lbs/mmBtu.
(3) CO_2 emissions factor is in lbs/mmscf.
(4) The emissions performance standard does not distinguish between CO_2 and CO_2e emissions. For a conservative comparison, the proposed project includes methane and N_2O.
(5) In CO_2 equivalent emissions.
(6) Electricity output is MW-hr.
(7) Thermal Output converted from 250,869,000 Btu to MW-hr.
(8) Energy Efficiency = CO_2e Emissions / (Electrical Output + Thermal Output).

TABLE 5-10

Chevron El Segundo Refinery
Comparison of 1990 versus 2010 Greenhouse Gas Emissions

CO_2 Emissions	GHG (million metric tons/year)
Annual Average Emissions[1]	3.588
Heavy Crude Project (4th quarter 2007 Completion)	0.025
PRO Project Emissions	0.192
Subtotal Refinery Emissions 2010 (following PRO Project)	3.805
Estimated Emissions in 1990	3.941
Reduction from 1990	0.136

(1) See Table 5-6.

In the years since 1990, the Refinery has implemented a number of projects to improve energy efficiency (thereby reducing GHG emissions) and, in one case, to directly reduce CO_2 emissions from the Steam Naphtha Reformer (SNR). These projects include:

- Reducing the Scope of Operations - The Acid Plant and Propylene Polymer Plants Nos. 1 and 2 were shut down.

- Recovering SNR By-Product CO_2 - About one-half of the CO_2 vented to the atmosphere is now piped to an on-site purification/liquefication facility operated by BOC Gases for recovery and sale.

- Consolidating Reforming Operations - The Aromatics Rheniformer/Aromatics Recovery Plant and the second stage of No. 1 Catalytic Reformer were shut down and the No. 2 Catalytic Reformer was converted to a CCR Unit.

- Replacing Process Heaters with More Efficient Units - Heaters at the SNR, ISOMAX, No. 2 RSU, and No. 1 Naphtha Hydrotreater were replaced.

- Installing Cogen Train C - Electrical demand on the Edison grid was reduced by 45 to 50 MW and the demand for steam produced in Refinery fired boilers was reduced by up to 270,000 lb/hr.

- Shutting Down Fired Boilers - Installation of Cogen Train C plus motorization of an FCCU compressor (formerly driven by a condensing steam turbine) and reduction of steam consumption, such as shutdown of the two oxygenate plants, made it possible to shut down one boiler at the FCCU and two boilers at the SNR.

- Replacing Potable Water with Reclaimed Wastewater – Since the 1990's the facility has transitioned potable water use to reclaimed wastewater. Based on water supply energy requirement comparison data from WBMWD, reclaimed water requires less energy than water supplied from the State Water Project and the Colorado River. The reduction in energy to supply approximately seven million gpd of reclaimed water to the Refinery instead of potable water reduces GHG emissions by approximately 7,200 metric tpy. (Note: Recycled water projects are also on the CAPCOA Green List.)

In more general terms, carbon intensity is the relative amount of carbon emitted per unit of energy or fuels consumed. By increasing energy efficiency, a project can show an increase in net benefits per unit of energy. The new Cogen Train D is, in itself, one of the preeminent technologies for minimizing GHG emissions. Cogeneration is far more efficient (in both producing energy and reducing GHG emissions), than separate generation of electricity and steam. As such and as demonstrated above, net GHG emissions from the proposed project are expected to be less than the proposed project with the use of purchased power. Moreover, GHG emissions will be less than the 1990 Refinery baseline - outpacing AB32's goal of reducing to 1990 emission levels by 2020.

Through the use of a highly energy efficient cogeneration system, the PRO Project exhibits a highly favorable level of carbon intensity compared to traditional technologies.

The rules, requirements, and regulations that will be placed on individual industries and facilities under AB32 are currently unknown because the regulations are currently being developed. It is possible that certain sectors of industry, including refineries, will be required to implement additional GHG emission reductions once the regulations required under AB32 are developed; however, such reduction requirements are currently unknown.

Based on the above analysis, the proposed project is consistent with the goals of AB32 for the following reasons:

- The proposed project is expected to result in an increase in GHG emissions; but eliminate the need for purchased power from less energy efficient power production facilities;

- The efficiency of the new Cogen Train D is estimated to be 591 pounds of CO_2e per MW-hr, which is well below the CPUC and CEC EPS of 1,100 pounds of CO_2 per MW-hr;

- Refinery-wide GHG emissions have declined since 1990, which is consistent with the goals of AB32 since the GHG emissions following project completion in 2010 are expected to be less than the 1990 emission levels for the Chevron El Segundo Refinery, ten years in advance of AB32 goals;

- The major contributor of GHG in the PRO Project, the demand for additional power, has been mitigated by installing a cogeneration unit, which is, in itself, one of the preeminent technologies for minimizing GHG emissions. Cogeneration is far more efficient (in both energy and GHG emissions), than separate generation of electricity and steam and will eliminate the need for additional steam generation and SCE supplied power.

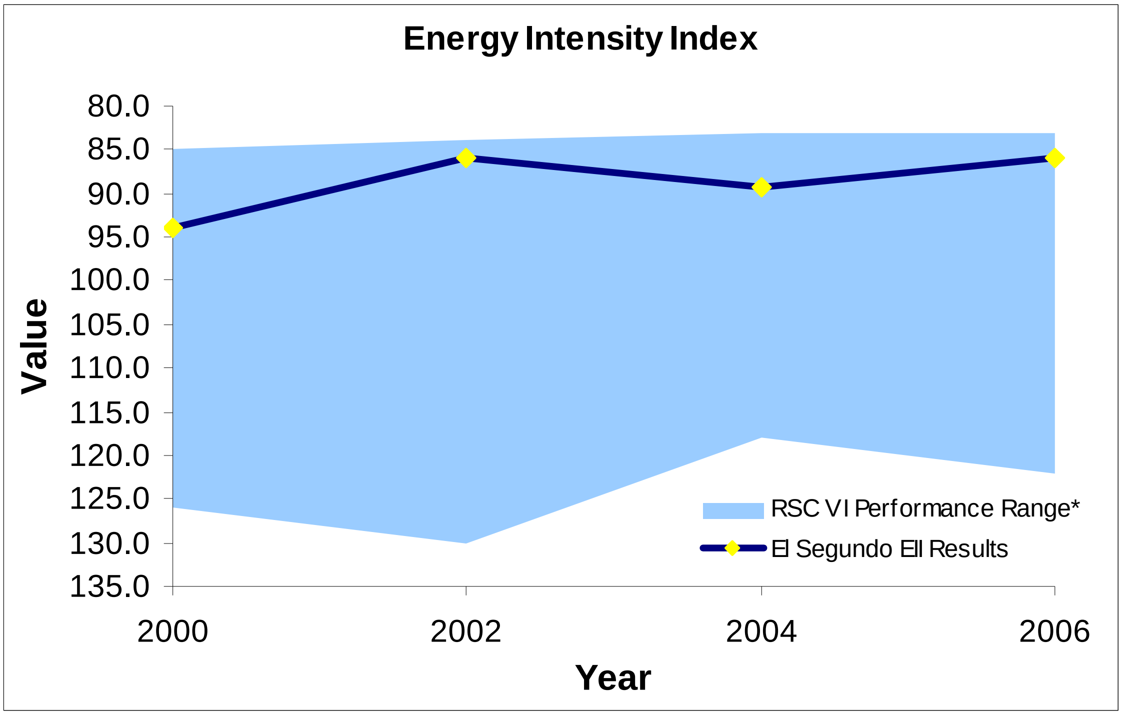
Energy Efficiency Study: In addition, the Chevron El Segundo Refinery has been recognized as being an energy efficient Refinery. Solomon Associates provides benchmarking[5] and consulting services to the petroleum, energy, and petrochemical industrial sectors. One of the ways to evaluate a specific refinery's energy efficiency is to look at their performance using the Solomon Associates reports which provide data on 20 refineries located in Refinery Supply Corridor VI (RSC VI) which includes California, Arizona, Nevada, Oregon, Washington, Alaska, and Hawaii.

[5] Benchmarking is a practice or process in which organizations evaluation various aspects of their process in relation to best practices, usually within their own sector. This evaluation then allows for organizations to develop plans to adopt such best practice, usually with the aim of increasing some aspect of performance.

The Solomon reports evaluate energy efficiency data from each refinery in a given region and calculate their performance using what is called an Energy Intensity Index (EII). As calculated by Solomon, a lower EII means that the facility is more energy efficient. As shown in Figure 5-2, the Refinery has consistently ranked in the first quartile of energy efficient facilities in the Western United States.

FIGURE 5-2

ENERGY INTENSITY INDEX RESULTS



Note : Solomon report data prior to 2000 had a different index basis and therefore, is not comparable to the current methodology.

As an example, over the past six years the Chevron El Segundo Refinery has invested in projects or made operational improvements that have reduced the Refinery EII by 8.4 percent, which translates into less energy consumed in producing a barrel of finished products. This improvement was substantially better on a percentage basis during the same period than the other top performers in RSC VI and is consistent with other investments that Chevron has made since the 1990's to improve the Refinery's overall energy efficiency and reduce GHG emissions from the Refinery.

Conclusion: In spite of all the past projects undertaken by Chevron and a proactive approach to reducing GHG emissions from the proposed project through the installation of a cogeneration unit, rather than taking a business-as-usual approach (i.e., installing a new boiler and increasing demand for electricity from SCE), the cumulative increase in

GHG emissions from the proposed project of 0.194 million metric tons per year is concluded to be significant. Given the position of the legislature on AB32, which states that global warming poses serious threats to the environment, and the requirements of CEQA for the lead agency to determine whether a project will have a significant impact, the overall effect of 0.194 million metric tons per year of GHG emissions is considered cumulatively considerable. Thus, the cumulative greenhouse gas impacts from the proposed project are considered significant. This determination is based on the lack of clear scientific or other criteria for determining the level of significance of the project's contribution to global warming and adverse changes in climate conditions.

5.2.4.4 GHG Mitigation Measures

Pursuant to CEQA Guidelines §15126.4(a)(1) if significant adverse environmental impacts are identified for a project, "An EIR shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy." Potential mitigation measures for the PRO Project are discussed in the following paragraphs.

As part of the PRO Project, Chevron is proposing to install a new 49.9 MW cogeneration unit rather than take the business-as-usual approach of increasing demand for electricity from SCE and installing a new boiler. The new Cogen Train D will supply the electricity and steam required for the PRO Project, and will reduce the amount of electricity purchased from the local provider. As stated in Section 5.3.4.3, the Cogen Train D is one of the preeminent technologies for minimizing GHG emissions and is far more efficient in both energy production and reducing GHG emissions than separate generation of both electricity and steam. Following project completion, Chevron will reduce the amount of electricity currently purchased from SCE by about 20 MW and expects to supply most of the electricity used at the Refinery under normal operating conditions including the PRO Project. Although the operation of the new Cogen Train D will result in an increase in GHG emissions at the Refinery, the new Cogen Train D will eliminate the purchase of electricity from less energy efficient sources. It is estimated that the PRO Project with the Cogen Train D would generate about 0.089 million metric tons/yr less GHG emissions than without cogeneration, i.e., business-as-usual. As such, the Cogen Train D serves to mitigate excess CO_2 emissions from a business-as-usual approach which would involve the installation of a new boiler to provide steam and an increase in purchased power from SCE for the PRO Project.

In 2005, an Energy Efficiency Study of the Refinery was conducted by an independent third party to identify potential energy inefficient processes within the Refinery. The combustion of fuels and the generation of electricity is a major contributor to the generation of GHGs; thus, increasing energy efficiency of a facility would result in a decrease in GHGs. Therefore, the Energy Efficiency Study has served as a GHG audit, since energy efficiency improvements are associated with GHG emission reductions. As a result of the Study, 30 separate energy projects were identified that could potentially improve energy efficiency at the Refinery. Chevron has evaluated these potential projects to determine the feasibility of implementing them. Based on this review, to date, Chevron has completed three of the projects that could be expedited, for a reduction of about 4,067 metric tons per year, with two more projects in progress for an additional reduction of 17,215 metric tons per year. There are an additional 12 projects which are undergoing further feasibility studies. Depending on the final outcome of the evaluation, four of the twelve projects could result in additional reductions of 31,045 metric tons per year of GHG emissions. Ten of the 30 the identified projects were eliminated from further consideration due to operational reliability concerns.

The three remaining energy projects are considered major capital projects due to the capital expense and long-term engineering requirements. The most important energy efficiency project of the three is the construction of an additional cogeneration plant at the Refinery, which has been incorporated into the PRO Project (Cogen Train D) along with a portion of a second project for modification of the FCCU gas recovery section. The remaining major capital project is still under evaluation. In addition to the benefits of the additional cogeneration plant, the two remaining major capital projects could potentially result in a reduction of about 34,000 tons per year of GHG, depending on the outcome of the engineering evaluation.

Specific mitigation measures for the proposed project are outlined below.

GHG 1 To further offset GHG emissions from the PRO Project with the new Cogen Train D at the Refinery, Chevron shall offset the GHG emissions resulting from the proposed PRO Project, as shown in Table 5-7, through the purchase of CO_2 emission reduction credits. Chevron will make a contribution to the SCAQMD of $1,500,000 to produce verifiable and quantifiable permanent GHG emission reductions, for example, which could include energy efficiency projects such as cogeneration facilities, solar collectors, wind turbines, biogas generators, geothermal energy generation, hydroelectric energy generation, biosolids energy production, transportation efficiency or other GHG emission reduction projects and, thus, offset the net increase in the PRO Project GHG emissions (see Table 5-7). Considering that the current market value for GHG emission credits is about $5.00 per metric ton of GHG emissions, this amount is expected to more than cover the funding necessary to reduce Chevron's GHG emissions from the proposed PRO Project to zero.

The SCAQMD shall evaluate the GHG emission reduction projects and the credit market and, by June 30, 2010 (i.e., when the PRO Project is anticipated to become fully operational), will make a determination as to whether sufficient funds have been paid by Chevron to fully offset the GHG emissions for the PRO Project (see Table 5-7). Chevron may be required to fund any shortfall in the cost for emission credits to fully offset the GHG emissions generated by the proposed project over the $1,500,000 initial payment, up to a maximum of 20 percent over the original payment or $1.8 million, which represents approximately a 100 percent premium over current market value. In addition, GHG mitigation projects completed by Chevron by December 31, 2010, not otherwise required by local, state, or federal regulations, can be used to offset GHG emission reduction shortfalls, if necessary, and the financial contribution to fund such offsets would be adjusted accordingly.

These mitigation fees, which are enforced as a mitigation measure in the air quality permit conditions, shall be paid to the SCAQMD no later than December 31, 2008. These fees shall be used to fund projects preferentially in the district, as certified by the SCAQMD, to produce verifiable and quantifiable GHG reductions.

Through implementation of these mitigation measures, the cumulative impacts of GHG emissions associated with the proposed PRO Project would be less than significant.

5.2.5 MITIGATION MEASURES

For the construction period, the mitigation measures developed as part of the proposed Chevron project (see Section 4.2.3) will be imposed on other related projects, if the SCAQMD is the lead agency and project-specific impacts are concluded to be significant. The mitigation measures to minimize emissions associated with operation of stationary sources of the related projects include the use of BACT for all new emission sources and modifications to existing sources. BACT would be required for stationary sources regardless of whether the SCAQMD is the lead agency or is a responsible agency. The use of BACT would control localized emissions. A BACT review will be completed during the SCAQMD permit approval process for all new/modified sources.

5.2.6 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The cumulative adverse air quality impacts due to construction activities are expected to exceed the SCAQMD significance thresholds for all criteria pollutants except SOx and are considered to be cumulatively considerable, even after mitigation. The cumulative air quality impacts due to operational activities are expected to exceed the SCAQMD significance thresholds for all pollutants and are considered to be cumulatively considerable. The project-specific TAC health impacts would not be significant, and are not considered to be cumulatively considerable. GHG emission impacts are expected to be less than significant after mitigation, through the use of GHG emission offsets.

5.3 ENERGY

CEQA Guideline §15130(a) indicates that an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. Where a lead agency is examining a project with an incremental effect that is not cumulatively considerable, a lead agency need not consider the effect significant, but must briefly describe the basis for concluding that the incremental effect is not cumulatively considerable. Therefore the project's contribution to energy impacts is not cumulatively considerable and thus not significant because the proposed project will have beneficial energy impacts (CEQA Guidelines §15130). This conclusion is consistent with CEQA Guidelines §15064 (h)(4), which states, "The mere existence of cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable". Nonetheless, information is provided regarding cumulative projects in the interest of the fullest disclosure.

5.3.1 CONSTRUCTION/OPERATIONAL IMPACTS

The Chevron PRO Project and other projects will consume additional electricity. The new office and commercial buildings are expected to consume additional electricity. A portion of the LAAFB Project and the new Chevron office buildings will consolidate, upgrade, and replace existing office buildings so that the increase in electricity would be minimal. In addition, other projects at the Chevron Refinery are expected to require additional electricity. The PRO Project and the El Segundo Power Plant project will produce additional electricity, 49.9 MW and 280 MW, respectively. Following project completion, Chevron will generate sufficient electricity to operate most of the Refinery under normal operating conditions. Typically, power plants work to meet the demand. Therefore, the cumulative projects are not expected to result in significant increases in electrical demand and, in the case of Chevron, will create a new source of electrical power that will make the Refinery largely self sufficient under normal operations. No significant cumulative energy impacts are expected.

5.3.2 MITIGATION MEASURES

New development will be required to comply with California Uniform Building Code requirements which establish energy conservation standards for new construction. These standards related to insulation requirements, glazing lighting, shading, window requirements, and water and space heating systems. Implementation of the energy conservation requirements is expected to minimize cumulative energy impacts.

5.3.3 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The impacts of the various projects on energy are not expected to be cumulatively considerable as some of the projects will generate additional electricity.

5.4 HAZARDS/HAZARDOUS MATERIALS

CEQA Guideline §15130(a) indicates that an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. Where a lead agency is examining a project with an incremental effect that is not cumulatively considerable, a lead agency need not consider the effect significant, but must briefly describe the basis for concluding that the incremental effect is not cumulatively considerable. Therefore the project's contribution to hazards and hazardous materials impacts is not cumulatively considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130). This conclusion is consistent with CEQA Guidelines §15064(h)(4), which states, "The mere existence of cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable". Nonetheless, information is provided regarding cumulative projects in the interest of the fullest disclosure.

5.4.1 CONSTRUCTION/OPERATIONAL IMPACTS

Although other industrial facilities exist in the general vicinity of the Refinery, the cumulative impacts from the onsite operation of the other industrial projects are not expected to be significant because it is extremely unlikely that upset conditions would occur at more than one facility at the same time. Further, hazard impacts at industrial facilities are not expected to overlap because of the distance between facilities. It also is extremely unlikely that an upset condition at one facility would create an upset at another nearby industrial facility because of the distance between facilities. The El Segundo Power Plant is located west of the Refinery. Most of the other related projects are associated with office buildings or other commercial uses, which generally do not handle or store large quantities of hazardous materials that could create hazardous situations.

The El Segundo Power Plant project included the use of additional aqueous ammonia and the construction of a pipeline from the Chevron Refinery to the plant. Activities related to hazardous materials associated with the El Segundo Power Plant are considered to be less than significant because the project was regulated by existing laws to prevent unacceptable off-site risks to the public. The Chevron PRO Project or other projects at the Refinery are not expected to result in cumulative impacts because the projects are expected to result in a decrease in the amount of ammonia produced and distributed from the Refinery. The FCCU SCR project will result in an increase in the use of aqueous ammonia associated with the installation of a new SCR unit at the Refinery. However, ammonia is produced at the existing ammonia plant at the Chevron Refinery so no increase in the amount of ammonia produced, stored on-site, or distributed is expected. Instead, there would be a reduction in the amount of ammonia sold to other end users. The new project-related explosion or fire hazard impacts associated with the proposed PRO Project are expected to stay within the confines of the existing Refinery or travel no further than existing hazards. Therefore, explosion or fire hazards are not expected to reach or overlap with hazard impacts from other industrial projects, so hazard impacts are not expected to be cumulatively considerable.

5.4.2 MITIGATION MEASURES

The proposed project impacts on hazards are considered to be less than significant. A number of existing rules and regulations apply to the Refinery and other industrial facilities that handle, transport or store hazardous materials. Compliance with these rules and regulations is expected to minimize industry-related hazards at the Refinery and other industrial facilities. Site-specific mitigation measures for hazards may be required for other projects.

5.4.3 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The impacts of the various projects on hazards are not expected to be cumulatively considerable as hazards at or within one project area are not expected to impact or create hazards at other facilities.

5.5 HYDROLOGY/WATER QUALITY

CEQA Guideline §15130(a) indicates that an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. Where a lead agency is examining a project with an incremental effect that is not cumulatively considerable, a lead agency need not consider the effect significant, but must briefly describe the basis for concluding that the incremental effect is not cumulatively considerable. Therefore the project's contribution to hydrology/water quality impacts is not cumulatively considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130). This conclusion is consistent with CEQA Guidelines §15064(h)(4), which states, "The mere existence of cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable". Nonetheless, information is provided regarding cumulative projects in the interest of the fullest disclosure.

5.5.1 CONSTRUCTION/OPERATIONAL IMPACTS

5.5.1.1 Water Supply

The Chevron PRO Project includes modifications to allow the increase in production and use of reclaimed water that will be used for cooling tower purposes and boiler feed water. All of the increased water use associated with the proposed project (about 748,800 gpd) will be reclaimed water and can be provided by the local supplier. Therefore, the proposed project will not result in an increase in the use of potable water or an increase in water demand that exceeds the SCAQMD's project-specific water demand significance threshold, so no significant adverse impacts on water demand or supply are expected. In addition, the proposed project is not expected to result in water demand impacts that are cumulatively considerable.

The El Segundo Power Plant is expected to require about 207,000 gpd of additional water. Water demand impacts from the power plant are expected to be mitigated by the use of reclaimed water for some purposes (CEC, 2002). The other related projects are limited to office buildings, commercial buildings, and some residential buildings, which are not expected to be major users of water. The cumulative increase in water use of about 955,800 million gpd from all cumulative projects is expected to be less than the

SCAQMD's significance threshold of five million gpd. Therefore, the proposed project and the cumulative projects are not expected to produce significant adverse cumulative impacts to water demand.

5.5.1.2 Wastewater

The proposed project is anticipated to increase wastewater discharge from the Chevron Refinery by about 223,200 gpd (about 155 gpm) associated with the PRO Project. This represents about a three percent increase in wastewater discharge during maximum operating conditions. Wastewater generated by Chevron is treated on-site prior to discharge. No wastewater is sent off-site for treatment so no impacts to a publicly owned wastewater treatment plant will occur. No significant impacts associated with wastewater discharge are expected from the Chevron PRO Project.

Table 5-11 provides estimates of the wastewater generated by the cumulative projects in the area. Wastewater generated at the El Segundo Power Plant is also treated in on-site treatment facilities prior to discharge, so no impacts to public owned wastewater treatment facilities are expected. The other related projects are limited to office buildings, commercial buildings, and some residential buildings, which are not expected to be major generators of wastewater.

The total sewage generated by the related projects is shown in Table 5-11 and most of these facilities are expected to discharge to the LACSD sewage system which is treated by the Joint Water Pollution Control Plant (JWPCP). The JWPCP has a design capacity of abut 385 million gpd and currently processes an average flow of 323 million gpd. Therefore, JWPCP has sufficient sewage treatment capacity to accommodate the sewage from the cumulative projects. Therefore, impacts to sewage service would not be cumulatively considerable.

5.5.2 MITIGATION MEASURES

The proposed project impacts on hydrology/water quality were less than significant. Since no cumulative impacts were identified, no mitigation measures are required.

5.5.3 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The cumulative impacts on hydrology/water quality are considered to be less than significant without mitigation.

TABLE 5-11

Estimated Wastewater Generated by Cumulative Projects

No.	Address/Location	Size (Square Feet)	Project Description	Sewage Generation Factors (gals/1000 ft^2)[(1)]	Estimated Wastewater Generation (gals/day)
	Proposed Chevron Process Reliability & Optimization Project	--	Refinery	--	223,200[(2)]
1	Sepulveda/Rosecrans Site Rezoning & Plaza El Segundo Development[(3)]	--	Commercial/Mixed Use	--	277,375
2	El Segundo Power Plant[(4)]	--	Industrial	--	150,000
3	LA Air Force Base Areas A	525[(5)]	Condominium	160	148,079
4	LA Air Force Base Areas B	800,000 ft^2	Mixed Use	80	64,000
5	1950 Grand Ave., El Segundo	93,569 ft^2	Office Building	150	14,035
6	Electronics Superstore, Aviation Blvd./Utah Ave., El Segundo	152,504 ft^2	Commercial	80	12,200
7	2151 E. Grand Ave., El Segundo	125,000 ft^2	Office Building	150	18,750
8	455/475 Continental Blvd., El Segundo	530,000 ft^2	Three Office Buildings and One R&D Center	150	79,500
9	2201 Highland Ave., Manhattan Beach	1,600 ft^2	Retail/Restaurant	80	128
		1,600 ft^2	2 DU Condominium	160	320
10	1300 Highland Ave., Manhattan Beach	15,000 ft^2	Commercial/Office	150	2,250
11	NE corner of Sepulveda Blvd. & Marine Ave., Manhattan Beach	52,174 ft^2	Commercial	80	4,174
12	2200 Sepulveda Ave., Manhattan Beach	29,000 ft^2	Medical Offices	150	4,350
14	1100 Manhattan Beach Blvd., Manhattan Beach	13,396	Retail	80	1,072
				Cumulative Wastewater Increase:	**999,433**

(1) Source: City of Los Angeles, 1998 unless otherwise noted.
(2) See Chapter 4, Subchapter 4.5.
(3) Source: Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development, Draft EIR, October, 2004.
(4) Source: CEC, 2002.
(5) 525 individual condominiums.

5.6 NOISE

CEQA Guideline §15130(a) indicates that an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. Where a lead agency is examining a project with an incremental effect that is not cumulatively considerable, a lead agency need not consider the effect significant, but must briefly describe the basis for concluding that the incremental effect is not cumulatively considerable. Therefore the project's contribution to noise impacts is not cumulatively considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130). This conclusion is consistent with CEQA Guidelines §15064(h)(4), which states, "The mere existence of cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable". Nonetheless, information is provided regarding cumulative projects in the interest of the fullest disclosure.

5.6.1 CONSTRUCTION IMPACTS

Construction phases of each of the related projects are expected to generate localized, short-term noise impacts, some of which may be significant during construction. Construction activities associated with the industrial projects are located in industrial areas where limited sensitive receptors are located. The use of muffling devices, restriction of most construction work hours to daytime hours, compliance with local noise ordinances, etc., are expected to mitigate the increase in noise at most of the construction sites.

The cumulative construction impacts associated with the related industrial projects are not expected to be significant or exceed noise ordinances. The Refinery and other industrial projects are generally a sufficient distance (about 0.5 mile) apart that the noise levels are not expected to overlap. Some of the commercial/office buildings are located close to residential and other sensitive receptors and may create noise impacts in residential areas, but because of the distances from the Chevron project to the commercial/office projects, and to the residential areas, construction noise from Chevron's PRO project is not expected to contribute to the noise impacts at the residential or sensitive receptors. Construction activities are expected to be limited to daytime hours, which reduces the potential for impacts on sensitive receptors.

5.6.2 OPERATIONAL IMPACTS

The operational noise impacts of the industrial projects are not expected to be significant. The noise impacts at the Chevron Refinery are not expected to result in a noticeable change to the surrounding community (see Subsection 4.6.2.2). The El Segundo Power Plant project is the only other industrial project in the general area of the Chevron Refinery. The mitigated operational noise at the southern boundary of the El Segundo Power Plant project was estimated to be no greater than 52 dBA (CEC, 2002). Therefore the noise due to the new generators is not expected to have a significant noise effect and the noise would not overlap with noise sources at the Chevron Refinery. In addition, existing traffic noise levels are significant in the Vista Del Mar Boulevard corridor which runs between the power plant and the Refinery, generating a large portion of the community noise levels.

Most of the noise associated with other cumulative projects (e.g., commercial and office buildings) is expected to be primarily associated with traffic. Sufficient distance separates the Refinery from most of the other project, thus, it is unlikely that noise impacts will overlap. The proposed administration buildings are not expected to be a noise source, once construction is complete, because the buildings are expected to house about the same number of personnel. Existing noise levels from traffic in the vicinity are already considered unacceptable for certain residential areas because of high traffic volumes (e.g., traffic along the I-105 and I-405).

The noise impacts from the proposed project are not expected to be cumulatively considerable because other projects are located sufficient distance (about 0.5 mile) or more from the Chevron Refinery project areas so that noise impacts do not overlap with other related projects.

5.6.3 MITIGATION MEASURES

Since noise impacts from the Refinery proposed project are not considered to be cumulatively considerable, they do not contribute to significant adverse cumulative worse impacts. As a result, no mitigation measures are required.

5.6.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The noise impacts associated with the cumulative projects are not expected to be significant or contribute to significant adverse cumulative noise impacts during construction or operation.

5.7 SOLID/HAZARDOUS WASTE

CEQA Guideline §15130(a) indicates that an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. Where a lead agency is examining a project with an incremental effect that is not cumulatively considerable, a lead agency need not consider the effect significant, but must briefly describe the basis for concluding that the incremental effect is not cumulatively considerable. Therefore the project's contribution to solid and hazardous waste impacts is not cumulatively considerable and thus not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130). This conclusion is consistent with CEQA Guidelines §15064(h)(4), which states, "The mere existence of cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable". Nonetheless, information is provided regarding cumulative projects in the interest of the fullest disclosure.

5.7.1 CONSTRUCTION/OPERATIONAL IMPACTS

5.7.1.1 Hazardous Waste

The Chevron Refinery and El Segundo Power Plant projects are the main industrial developments in the area that have the potential to generate hazardous waste either through remediation activities or through the discovery of contaminated soils. The total amount of hazardous waste generated as contaminated soil is uncertain but maximum estimates are about 6,975 tons for Chevron and 4,000 cubic feet (about 4,000 tons) (assuming that 10 percent of the excavated soil is hazardous). Additional hazardous waste could include asbestos containing material, lead paint, and contaminated ground water (CEC, 2002). The impacts would be considered adverse, but not significant since the existing hazardous waste facilities have sufficient capacity to handle the one-time deposition of hazardous wastes that could be generated, e.g., contaminated soils. However, the additional waste streams may impact the dwindling capacity of certain landfills. An additional 200,000 gallons of waste oil and grease, paint, spent solvent, welding materials and cleaning solvents could be generated during the construction phase of the El Segundo Power Plant project, but most of these materials are expected to be recycled, e.g., waste oil and spent solvents are expected to be recycled (CEC, 2002). In addition to potentially contaminated soil, construction of the proposed Chevron PRO Project is anticipated to generate approximately 1,200 tons of hazardous waste (approximately 1,200 cubic yards) most of which is expected to be recycled. Together, the hazardous materials landfills in California have 10.8 million cubic yards permitted capacity, which will accommodate the waste generated by the proposed project during the construction phase. In addition, other hazardous waste facilities are located out-of-state that could potentially receive hazardous wastes from the projects. Therefore, the cumulative impact from the generation hazardous waste is not considered significant.

Most of the hazardous waste generated during the operational phase of the industrial projects includes used oil and spent catalysts, which are normally recycled to recover materials that have economic value. The office, commercial, and residential projects are not expected to generate substantial quantities of hazardous waste because they do not process hazardous materials as part of their operations. Therefore, no significant cumulative impacts on hazardous waste facilities are expected due to operation of the cumulative projects.

5.7.1.2 Solid Waste

Non-hazardous solid wastes are usually generated in offices, commercial buildings, and residential units. The estimates of solid waste generated by cumulative projects are shown in Table 5-12, where sufficient data are available. Implementation of the related projects as well as cumulative growth in the County of Los Angeles would further increase demand on landfill capacity. Additional capacity to accommodate the

TABLE 5-12

Estimated Solid Waste Generated by Cumulative Projects

No.	Address/Location	Size (Square Feet)	Project Description	Solid Waste Generation Factors (tons/ ft^2)(1)	Estimated Solid Waste Generation (tons/year)
1	Sepulveda/Rosecrans Site Rezoning & Plaza El Segundo Development	850,000	Commercial/Mixed Use	N/A	6,375
3	LA Air Force Base Areas A	525(2)	Condominium	0.918(3)	482
4	LA Air Force Base Areas B	800,000 ft^2	Mixed Use	0.0029	2,341
5	1950 Grand Ave., El Segundo	93,569 ft^2	Office Building	0.0001	9.4
6	Electronics Superstore, Aviation Blvd./Utah Ave., El Segundo	152,504 ft^2	Commercial(4)	0.0029	446
7	2151 E. Grand Ave., El Segundo	125,000 ft^2	Office Building	0.0001	12.5
8	455/475 Continental Blvd., El Segundo	530,000 ft^2	Three Office Buildings and One R&D Center	0.0001	53.0
9	2201 Highland Ave., Manhattan Beach	1,600 ft^2	Retail/Restaurant(4)	0.0029	4.68
		1,600 ft^2	2 DU Condominium	N/A	1.84
10	1300 Highland Ave., Manhattan Beach	15,000 ft^2	Commercial/Office	0.0001	1.5
11	NE corner of Sepulveda Blvd. & Marine Ave., Manhattan Beach	52,174 ft^2	Commercial(4)	0.0029	152.68
12	2200 Sepulveda Ave., Manhattan Beach	29,000 ft^2	Medical Offices	0.0001	2.9
14	1100 Manhattan Beach Blvd., Manhattan Beach	13,396	Retail(4)	0.0029	39.2
				Cumulative Solid Waste Increase:	**9,921.70**

(1) Source: Los Angeles World Airports, 2001
(2) Single condominium units
(3) Tons per day per dwelling unit (du)
(4) Assumes 530 ft^2 per employee

cumulative disposal needs is the responsibility of local, county, and state solid waste management agencies and may become available as these agencies develop solutions to meet the future disposal needs at a regional level (e.g., expanding existing landfills, transporting waste to other landfills, converting waste to energy, recycling and waste reduction.) The related projects would be subject to the source reduction and recycling requirements established by the local jurisdiction in accordance with AB939 (e.g., divert 50 percent of the solid waste generated from landfills through waste reduction, recycling, and composting). The cumulative projects would be required to participate in recycling programs, reducing the amount of solid waste send to landfills for disposal. The Chevron Refinery implements a source reduction and recycling program to minimize solid wastes generated at the Refinery. Because the proposed project's contribution to solid and hazardous waste impacts is not cumulatively considerable, the cumulative impacts on solid/hazardous waste are not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

5.7.2 MITIGATION MEASURES

No mitigation measures are required for the Chevron PRO Project because the impacts are less than significant. Chevron will continue to implement a source reduction and recycling program to minimize solid wastes generated at the Refinery. New development must comply with all applicable city, county, state, and federal requirements regulating solid waste disposal. Cumulative impact mitigation is the responsibility of local regional and state agencies and mitigation measures are limited to source reduction measures.

5.7.3 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Individual project impacts on hazardous and solid waste impacts from the Chevron PRO Project are less than significant and, therefore, not cumulatively considerable for the reason that all cumulative impacts are within existing capacity of landfills.

5.8 TRANSPORTATION/TRAFFIC

5.8.1 CONSTRUCTION IMPACTS

Traffic impacts associated with the construction of the Chevron proposed project are expected to be potentially significant during the evening peak hour at one intersection, Aviation Boulevard/El Segundo Boulevard and on portions of the I-105 and I-405 freeways. Therefore, the proposed project may have cumulative traffic impacts with other projects in the area. The proposed project's contribution to cumulative impacts on traffic during the construction phase would be considered cumulatively considerable.

There could be cumulative construction traffic impacts associated with other industrial construction projects in the area that do not avoid peak traffic hours. However, the Chevron PRO Project is expected to provide the major portion of the traffic related to construction activities, so cumulative construction impacts on traffic from these projects are considered significant.

5.8.2 OPERATIONAL IMPACTS

Table 5-13 shows the projected LOS analysis and volume to capacity ratios due to general growth in the area (see Appendix F for details). The cumulative traffic analysis

TABLE 5-13

Chevron El Segundo Refinery Cumulative Traffic Impacts
Level of Services Analysis and Volume-to-Capacity Ratios

INTERSECTION	BASELINE[1]		IMPACTS		
	PM LOS	Peak Hour V/C	PM LOS	Peak Hour V/C	Change in V/C
Sepulveda (SR1) and El Segundo Blvd.	F	1.104	F	1.167	+0.063*
Sepulveda (SR1) and Rosecrans Ave.	F	1.070	F	1.131	+0.061*
Sepulveda (SR1) and Imperial Hwy.	C	0.718	C	0.758	+0.040
Aviation Blvd. and El Segundo Blvd.	E	0.968	F	1.023	+0.055*
Aviation Blvd. and Rosecrans Ave.	D	0.804	D	0.853	+0.049*
La Cienega Blvd. and I-405 SB on/off	B	0.609	B	0.642	+0.033
La Cienega Blvd. and El Segundo Blvd.	B	0.677	C	0.715	+0.038
I-405 SB on and El Segundo Blvd.	B	0.634	B	0.669	+0.035
I-405 NB on/off and El Segundo Blvd.	A	0.535	A	0.564	+0.029
I-405 SB off and Rosecrans Ave.	B	0.628	B	0.663	+0.035
I-405 NB on/off and Rosecrans Ave.	B	0.618	B	0.652	+0.034
I-405 SB on/off and Hindry Ave.	A	0.541	A	0.570	+0.029
California St. and Imperial Hwy.	A	0.486	A	0.512	+0.026
Main St. and Imperial Hwy.	B	0.639	B	0.674	+0.035
Continental and Grand Ave.	A	0.277	A	0.291	+0.014
Continental and Mariposa Ave.	A	0.415	A	0.437	+0.022
Nash St. and Mariposa Ave.	A	0.344	A	0.361	+0.017
Douglas St. and Mariposa Ave.	A	0.482	A	0.508	+0.026
Douglas St. and Atwood Way	A	0.301	A	0.316	+0.015

* Potentially significant cumulative impact from other projects.
(1) Year 2008, see Table 3-12.

assumed that the ambient traffic growth rate in the city is 0.50 percent per year from year 2008 to year 2020 and no changes in existing intersection geometrics.

Cumulative impacts are not expected to result in a significant impact at the following intersections:

- Sepulveda Boulevard (SR1) and Imperial Highway;
- La Cienega Boulevard and I-405 SB on/off ramps;
- La Cienega Boulevard and El Segundo Boulevard;
- I-405 SB on-ramp and El Segundo Boulevard;
- I-405 NB on/off ramp and El Segundo Boulevard;

- I-405 SB off-ramp and Rosecrans Avenue;
- I-405 NB on/off and Rosecrans Avenue;
- I-405 SB on/off and Hindry Avenue;
- California Street and Imperial Highway;
- Main Street and Imperial Highway;
- Continental Boulevard and Grand Avenue;
- Continental Boulevard and Mariposa Avenue;
- Nash Street and Mariposa Avenue;
- Douglas Street and Mariposa Avenue; and,
- Douglas Street and Atwood Way.

On a cumulative basis, general growth in the area unrelated to Chevron's proposed PRO project may result in significant traffic impacts at the intersections of:

- Sepulveda Boulevard (SR1) and El Segundo Boulevard;
- Sepulveda Boulevard (SR1) and Rosecrans Avenue;
- Aviation Boulevard and El Segundo Boulevard; and,
- Aviation Boulevard and Rosecrans Avenue.

The increase in traffic is unrelated to the proposed project but is related to general population growth in the area so mitigation measures will need to be developed as new projects that generate traffic are proposed and as part of the City of El Segundo's and Manhattan Beach's General Plan process.

5.8.3 MITIGATION MEASURES

The Chevron project construction traffic is expected to be mitigated by avoiding starting the work shifts during the morning peak traffic hours, but the evening peak hours cannot be avoided. Chevron will encourage ride-sharing by construction workers to minimize construction traffic impacts. In addition, different parking areas will be used with construction workers being bussed into the Refinery so that traffic impacts will be dispersed throughout the area.

No mitigation measures are required for the operational phase of the Chevron PRO Project as no significant project-specific impacts are expected. Cumulative operational impacts, however, are significant (Table 5-13). Mitigating the cumulative traffic impacts are typically implemented through local jurisdictions by payment of fair share traffic fees that are used to upgrade/reconfigure intersections to improve traffic flow. Improved timing of signals and widening intersections can also reduce traffic impacts and improve traffic flow.

5.8.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project is expected to result in significant traffic impacts during the construction phase, even after mitigation. The Chevron PRO Project construction traffic impacts are cumulatively considerable, even after mitigation. However, the construction activities are expected to cease following completion of the proposed project so no long term significant traffic impacts are expected.

Individual project impacts on transportation and traffic from the operation of the Chevron PRO Project are less than significant. Because the proposed project's contribution to traffic impacts during project operations is not cumulatively considerable, the cumulative impacts on traffic are not significant because the environmental conditions would essentially be the same whether or not the proposed project is implemented (CEQA Guidelines §15130).

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CHAPTER 6

ALTERNATIVES

6.0 PROJECT ALTERNATIVES

6.1 INTRODUCTION

Chapter 6 provides a discussion of alternatives to the proposed project as required by CEQA. According to the CEQA guidelines, alternatives should include realistic measures to attain the basic objectives of the proposed project and provide means for evaluating the comparative merits of each alternative. In addition, though the range of alternatives must be sufficient to permit a reasoned choice, they need not include every conceivable project alternative (CEQA Guidelines, §15126.6(a)). The key issue is whether the selection and discussion of alternatives fosters informed decision making and public participation.

Alternatives presented in this chapter were developed by identifying alternatives achieving most or some of the objectives of the proposed project. Consequently, each project alternative described below is similar to the proposed project in most respects. The rationale for selecting specific components of the proposed project on which to focus the alternatives analysis rests on CEQA's requirements to present a range of reasonable project alternatives that could feasibly attain the basic objectives of the project, while generating fewer or less severe adverse environmental impacts. The objectives of the proposed project are as follows:

- Improve the energy efficiency, performance, and reliability of process units;
- Allow the Refinery to efficiently and reliably process a wider range of crude oils, including higher sulfur-containing crude oils;
- Produce low-sulfur fuel products and increase production of commercial grade elemental sulfur;
- Improve the management of blending components of CARB fuels; and,
- Reduce the potential for atmospheric releases and related emissions from PRDs in the No. 2 Crude Unit, No. 2 RSU, and the Minalk/Merox Unit.

The proposed project involves modifications to a number of different units. The alternatives presented in this chapter include modifications to aspects of the specific equipment or operations of the proposed project that would still allow the Refinery to meet some or most of the project objectives.

Section 15126.6(f) of the CEQA Guidelines stipulates that the range of alternatives required in an EIR is governed by a rule of reason in that the EIR must discuss only those alternatives "necessary to permit a reasoned choice" and those that could feasibly attain most of the basic objectives of the proposed project.

The project alternatives were developed by modifying one or more components of the proposed project taking into consideration the project's limitations as to space, permitting requirements, and compliance agreement stipulations. Unless otherwise stated, all other components of each project alternative are identical to the proposed project. The identified feasible project alternatives as well as the alternatives rejected as infeasible are discussed further below.

Aside from the alternatives described below, no other project alternatives were identified that met most of the objectives of the proposed project, while substantially reducing significant adverse environmental impacts.

6.2 ALTERNATIVES REJECTED AS INFEASIBLE

In accordance with CEQA Guidelines §15126.6(c), a CEQA document should identify any alternatives that were considered by the lead agency, but were rejected as infeasible during the scoping process and briefly explain the reason underlying the lead agency's determination.

Section 15126.6(c) also states that among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are: (1) failure to meet most of the basic project objectives; (2) infeasibility; or (3) inability to avoid significant environmental impacts. Furthermore, CEQA Guidelines §15126.6(f)(2)(B) indicates that if the lead agency concludes that no feasible alternative locations for the project exist, it must disclose the reasons for this conclusion, and should include the reasons in the EIR.

EMx Technology Instead of SCR: The proposed project includes the installation of an SCR unit to control NOx emissions from the new Cogeneration Unit. The use of SCR is considered BACT for the control of NOx emissions from electrical generating equipment. A new air pollution control technology, the EMx Catalytic Absorption System, is being used in one cogeneration facility located in Redding, California for the control of NOx, CO, VOC, and PM10 emissions and is considered a potential alternative to the use of SCR.

The EMx control system is a post-combustion multi-pollutant control technology developed by EmeraChem LLC. EMx uses a single catalyst to remove NOx, CO, and VOC emissions in turbine exhaust gas by oxidizing nitrogen oxide (NO) to NO_2, CO to carbon dioxide, and hydrocarbons to carbon dioxide and water, and then adsorbing NO_2 onto the catalytic surface using a postassium carbonate absorber coating. The potassium carbonate coating reacts with NO_2 to form potassium nitrites and nitrates, which are deposited onto the catalyst surface.

When all of the potassium carbonate absorber coating has been converted to nitrogen compounds, NOx can no longer be absorbed and the catalyst must be regenerated. Regeneration is accomplished by passing a dilute hydrogen gas across the surface of the catalyst in the absence of oxygen. Hydrogen in the gas reacts with the nitrites and nitrates to form water and molecular nitrogen. Carbon dioxide in the gas reacts with the potassium nitrite and nitrates to form potassium carbonate, which is the absorbing surface coating on the catalyst. The EMx catalyst is sensitive to contamination of sulfur in combustion fuel. Therefore, an ESx catalyst is provided in conjunction with the EMx system to remove sulfur compounds from the gas turbine exhaust stream. The SCAQMD considers the EMx catalyst BACT. Therefore, Chevron has the option of choosing either the EMx or SCR systems.

The Cogeneration Unit at the Chevron Refinery will run on refinery fuel gas and/or natural gas, so Chevron operators are concerned that the sulfur content of the fuel may not be compatible with the EMx catalyst which may interfere with it's ability to consistently comply with BACT NOx requirements. In addition, although the EMx Technology does not use ammonia, it results in an increase in water use and wastewater discharge, and requires a hydrogen supply, which may generate other environmental impacts, including increased GHG emissions. Therefore, the use of the SCR is considered to be preferable over the EMx technology for the specific application at the Chevron Refinery.

Alternative Sites: The Refinery has limited space for new units. The new Cogeneration Unit, new SRU and TGU, new PSA Unit, new SWS, new cooling tower, and new tanks and their supporting infrastructure require significant plot space. Alternate sites within the Refinery are not feasible because:

- There is not enough plot space elsewhere in the Refinery where the equipment and supporting infrastructure can be located.
- If the SRU, TGU, and SWS were sited in different locations in the Refinery, either there is not sufficient space within the Refinery or extensive modifications would be required to the surrounding facilities to meet current code and safety requirements.
- Separate sites would require more equipment to connect processes, and consequently, would result in additional construction and fugitive emissions.

An alternative location to the Chevron Refinery site is also not feasible as the proposed project consists of modifications to an existing Refinery that contains necessary processing units; natural gas, water, and electric transmission infrastructures; crude oil and petroleum product transportation infrastructure; and the appropriate land use designation necessary to support the project. Advantages of the existing Refinery site would be lost if another location were proposed. The development of a new refinery in an alternative location would require substantially more equipment, construction, and potentially generate substantially greater impacts in many environmental categories (e.g., air quality, energy, noise, traffic, and hazards) than the proposed project. Therefore, an alternative refinery site for the proposed project is not feasible.

6.3 DESCRIPTION OF THE PROJECT ALTERNATIVES

6.3.1 ALTERNATIVE 1 – NO PROJECT ALTERNATIVE

CEQA Guidelines §15126.6 (e) require evaluation of a "No Project Alternative". Under the "No Project Alternative," no Refinery modifications would occur. The proposed modifications to the FCCU, Alkylation Unit, VRDS, ISOMAX Unit, Cogen Unit, Railcar Loading/Unloading Rack, connection of atmospheric PRDs in the No. 2 Crude Unit, No. 2 RSU, Minalk/Merox Unit to a closed vent system, and utility improvements would not occur. In addition, the proposed new SRU, SWS, TGU, vapor recovery and safety flare system, storage tanks, cooling tower, PSA Unit, and hydrogen compression and transfer facilities would not be built and the Refinery would continue to operate under its current configuration.

The "No Project Alternative" would not meet the objectives of the proposed project which include: (1) processing of higher sulfur crude oils; (2) producing additional lower sulfur fuel and other sulfur products; (3) improving efficiency, performance and reliability of process units; and (4) reducing emissions from PRDs in specified units.

6.3.2 ALTERNATIVE 2 – NO ADDITIONAL SULFUR RECOVERY FACILITIES

Under Alternative 2, the project as described in Chapter 2 would be constructed with the exception of the Sulfur Recovery facilities, including the SWS, SRU and TGU. All other portions of the proposed project would still be included. This would preclude achieving several major objectives of the PRO Project, namely:

1) The Refinery's ability to process higher sulfur crude oils and recover incremental sulfur for commercial sale would not be augmented.

2) The Refinery's ability to produce additional low sulfur fuel products would be compromised.

3) The reliability of Refinery sulfur processing would not be improved because there would be no increase in the number of parallel sulfur processing units.

6.3.3 ALTERNATIVE 3 – ELIMINATE VAPOR RECOVERY AND SAFETY FLARE SYSTEM

Under Alternative 3, the project as described in Chapter 2 would be constructed with the exception of the Vapor Recovery and Safety Flare System. This is a voluntary Refinery modification that is being proposed to eliminate the potential for venting of PRDs to the atmosphere, thus, minimizing Refinery VOC emissions. Alternative 3 would allow the Refinery to achieve the project objectives of: (1) processing of higher sulfur crude oils; (2) producing lower sulfur fuel and other sulfur products; and (3) improving efficiency, performance and reliability of process units. However, Alternative 3 would not allow the Refinery to further control the potential atmospheric releases and related emissions from PRDs in specified units, potentially in violation of SCAQMD Rule 1173.

6.3.4 ALTERNATIVE 4 – ELIMINATE FCCU AND ALKYLATION UNIT MODIFICATIONS

Under the proposed project, modifications to the Refinery are proposed that would increase the recovery of additional LPG and other intermediate streams from existing Refinery operations that would allow the production of additional CARB gasoline. Specifically, the proposed project includes modifications to the FCCU, including the installation of a new main air blower, a new depropanizer column (replacing three smaller distillation columns), a new deethanizer column, new pumps, and new heat exchangers. The modifications to the Alkylation Unit includes supplemental cooling, additional heat exchangers, and the removal of a depropanizer, which is one of the three depropanizers being removed and replaced by one new depropanizer in the FCCU. Under Alternative 4, the modifications to the FCCU and Alkylation Unit would not occur and the objective related to increasing the recovery of additional LPG and other intermediate streams, which have economic value and contribute to producing CARB fuels, from the fuel gas system would also not occur.

6.3.5 ALTERNATIVE 5 – ELIMINATE THE NEW 49.9 MW COGENERATION UNIT

The proposed project includes the construction of a new 49.9 MW Cogeneration unit to decrease the Refinery's need to purchase electricity from off-site sources. Alternative 5 would eliminate the new Cogeneration Unit and the required additional electricity demand would be supplied by the local utility company. Under Alternative 5, a new auxiliary boiler would be required to supply the necessary amount of steam demand of the proposed new and modified units. Like the cogeneration unit, the new boiler would likely require installation of SCR as BACT for the boiler's combustion source.

6.4 ENVIRONMENTAL IMPACTS FROM THE PROJECT ALTERNATIVES

6.4.1 ALTERNATIVE 1 – NO PROJECT ALTERNATIVE

Air Quality: Air quality impacts associated with construction of the proposed project would be eliminated (see Table 4-3) under Alternative 1 because no construction activities would be required. Construction emissions associated with the proposed project were considered significant for CO, VOC, NOx, PM10, and PM2.5. Under Alternative 1, air quality impacts from construction would be less than significant for all pollutants.

The emissions associated with the operational phase of Alternative 1 would be less than the proposed project since no new or modified units are required under Alternative 1. Therefore, the operational emissions impact of the proposed project would be eliminated. While the No Project Alternative would eliminate all emission increases it would also eliminate all emission benefits (e.g., reduced emissions due reduced venting of PRDs to the atmosphere and installation of low NOx burners on the ISOMAX heaters) associated with the proposed project during the operational phase. The operational emissions from the proposed project were considered to be less than significant after mitigation. Consequently, Alternative 1 would also result in no significant operational air quality impacts.

Alternative 1 would eliminate the increased TAC emissions and the associated health risks. The health risks from the proposed project (both carcinogenic and non-carcinogenic) were considered to be less than significant.

Energy: The No Project Alternative would not change the amount of electricity currently required by the Refinery. The proposed project is estimated to require about 29.9 MW of additional electricity, which would not be necessary under Alternative 1. The proposed project includes the construction of a cogeneration plant that would generate about 49.9 MW of electricity. Therefore, Alternative 1 would result in less electrical demand, but would not allow the Refinery to produce most of its own electricity requiring the continued purchase of electricity from off-site providers.

Alternative 1 would not allow Chevron to increase the production of clean fuels and ULSD, eliminating the beneficial energy impacts provided by the proposed project of producing additional quantities of low emission commercial fuels.

Hazards: The No Project Alternative would eliminate the hazards associated with the proposed project. However, the hazard impacts associated with the proposed project are considered to be less than significant. The potential hazards are confined to the Refinery, or would not create new hazards that would extend off-site. Therefore, the hazard impacts from Alternative 1 would not be significant.

The No Project Alternative is not expected to change the amount of hazardous materials transported to or from the Refinery. Therefore, no increase in transportation hazards is expected from the No Project Alternative. The proposed project is expected to eliminate five ammonia truck trips that transport ammonia to customers. Under the No Project Alternative, these five ammonia truck trips would continue to occur.

Hydrology/Water Quality: The No Project Alternative would eliminate the increase in water use and wastewater discharge associated with the proposed project. The proposed project is expected to result in an increase in water demand of about 520 gpm or about 748,800 gpd. The proposed project would include modifications at the Hyperion Wastewater Treatment Plant to allow the increased production of reclaimed water for cooling tower purposes and boiler feed water so no significant increase in water demand impacts are expected from the proposed project.

The No Project Alternative would eliminate the potential increase in wastewater generated from the proposed project of about 223,200 gpd. The wastewater treatment systems at the Refinery have adequate capacity to handle the increase in wastewater so that wastewater impacts from the proposed project are expected to be less than significant. Nonetheless, Alternative 1 would eliminate any increase in wastewater associated with the proposed project.

Noise: The No Project Alternative would eliminate the increase in noise during both the construction and operational phases. The proposed project is expected to increase the noise levels at the Refinery due to operation of construction equipment and new Refinery equipment. The increased noise levels associated with the proposed project were considered less than significant during both the construction and operational phase of the proposed project as no noticeable noise increase is expected. Implementation of the No Project Alternative would eliminate the potential noise impacts and the impacts would remain at current levels.

Solid/Hazardous Waste: The proposed project impacts on the generation of both non-hazardous and hazardous wastes were considered to be less than significant. The No Project Alternative would eliminate the generation of non-hazardous and hazardous wastes during both construction and operation since the proposed project would not be built.

Traffic/Transportation: The No Project Alternative would eliminate traffic associated with construction activities since no portion of the proposed project would be constructed. The construction traffic impacts associated with the proposed project are considered to be significant, and mitigation measures are not expected to reduce the traffic impacts to less than significant. The No Project Alternative would eliminate traffic impacts as no construction activities would be required. The proposed project impacts on traffic during the operational phase were considered to be less than significant and they would remain at current levels under Alternative 1. The No Project Alternative would eliminate construction traffic impacts associated with the proposed project.

6.4.2 ALTERNATIVE 2 – NO ADDITIONAL SULFUR RECOVERY FACILITIES

Air Quality: Alternative 2 would eliminate the construction of the Sulfur Recovery facilities including the SWS, SRU, and TGU. Alternative 2 would result in a decrease in construction emissions from less workers and less equipment installation since sulfur recovery facilities would not be built; however, the major portions of the proposed project would still be built. The construction emissions under Alternative 2 are expected to remain significant.

Under Alternative 2, the operational emissions are expected to be less than the proposed project since the SWS, SRU, and TGU would not be built. However, Alternative 2 would prevent the Refinery from converting ammonia into atmospheric nitrogen and water and require the ammonia to be recovered in the ammonia plant, therefore, the refinery would maintain their existing level of ammonia for sale. Thus, Alternative 2 would result in an increase in truck emissions to transport aqueous ammonia from the Refinery, as compared to the proposed project. Overall, Alternative 2 is not expected to significantly alter the operational emissions associated with the Refinery operations and operational emissions are expected to remain less than significant.

Alternative 2 would eliminate the increased TAC emissions associated with the Sulfur Recovery facilities (mainly H_2S and carbonyl sulfide) and the associated health risks. The health risks associated with the proposed project (both carcinogenic and non-carcinogenic) were considered to be less than significant and the health risks would remain less than significant under Alternative 2.

Energy: Under Alternative 2, the Cogen Train D and related facilities would still be installed and the sulfur recovery facilities do not require any substantial use of electricity. Therefore, the impacts of Alternative 2 on energy resources are expected to be essentially the same as the proposed project and less than significant.

Hazards: The proposed project impacts on hazards are expected to be less than significant. Under Alternative 2, the Sulfur Recovery facilities, that would allow Chevron to use ammonia as a fuel source, would not be built so that Chevron would maintain their current level of ammonia production and transport. Therefore, the hazard impacts under Alternative 2 are expected to be greater than the proposed project because more ammonia will be handled, stored and transported from the Refinery's aqueous ammonia production equipment, resulting in potentially higher transportation risks associated with ammonia than the proposed project. In comparison, the proposed project would reduce the handling, storage and subsequent transport of ammonia because ammonia would be used as a fuel source in the Sulfur Recovery facilities.

Hydrology/Water Quality: The proposed project impacts on hydrology and water quality are expected to be less than significant. Alternative 2 would not change the amount of wastewater generated by the Refinery. Sour water production from the CKN reactors at the ISOMAX would still increase by about 15 gpm and this water would be processed in the existing SWSs (which produce stripped sour water to the segregated drainage system) rather than in the proposed stripper. The hydrology and water quality impacts associated with Alternative 2 are considered to be less than significant and equivalent to the proposed project.

Noise: The proposed project is expected to increase the noise levels at the Refinery due to operation of construction equipment and new Refinery equipment. The increased noise levels associated with the proposed project were considered less than significant during both the construction and operational phases of the proposed project as no noticeable noise increase offsite is expected. Implementation of Alternative 2 is expected to require less construction activities than the proposed project because fewer Refinery units would be constructed, so noise impacts are expected to be less than the proposed project and, therefore, less than significant.

Operational noise impacts associated with Alternative 2 are expected to be less than the proposed project as the pumps and compressors associated with the Sulfur Recovery facilities, including the SWS, SRU, and TGU would not be installed at the Refinery. However, other major noise generating sources included as part of the project are:

- The new equipment associated with the Cogen Train D;
- New pumps and compressors associated with the ISOMAX Unit; and
- New pumps compressors associated with the vapor recovery system.

Alternative 2 would eliminate the new pumps and motors associated with the Sulfur Recovery facilities. The noise-generating equipment associated with other equipment would still be installed. The location of the new equipment is a sufficient distance from offsite sensitive receptors so that noise impacts under Alternative 2 are expected to remain less than significant and slightly less than the proposed project.

Solid/Hazardous Waste: The proposed project impacts on solid/hazardous waste are expected to be less than significant during both the construction and operational phases. Alternative 2 would eliminate the construction of the Sulfur Recovery facilities so the construction of the foundations and the related grading would not be required. Therefore, there could be a decrease in the amount of contaminated soil that would require removal. Alternative 2 is not expected to significantly alter the estimated generation of hazardous waste generated by the proposed project during the operational phases. Alternative 2 would eliminate the SRU/TGU catalyst use and decrease the potential volume of catalyst that would require recycling. The amount of catalyst that may be used in the SRU/TGU is currently unknown. Under Alternative 2, modifications to the ISOMAX Unit would still occur and Cogen Train D would still be installed; therefore, the catalyst use and related waste would still be generated. Used catalyst is expected to be sent to recycling facilities for recovery of heavy metals, so no increase in waste disposal of catalyst is expected. Therefore, the solid/hazardous waste impacts associated with Alternative 2 are similar to the proposed project and are expected to be less than significant.

Traffic/Transportation: The construction traffic impacts associated with the proposed project are considered to be significant. Alternative 2 would result in less construction activities so that fewer workers and less traffic impacts would be expected. However, peak construction activities are associated with turnaround activities so that the elimination of the construction of the Sulfur Recovery facilities is not expected to reduce traffic/transportation impacts during construction to less than significant.

The proposed project impacts on traffic during the operational phase were considered to be less than significant and they would remain less than significant under this alternative. However, Alternative 2 would be expected to increase the truck traffic associated with the transport of additional aqueous ammonia generated by the Refinery by two trucks. This would, in effect, maintain current ammonia truck transport trips from the Refinery. Truck traffic is generally distributed throughout the work day and does not tend to impact peak hour traffic as much as worker traffic.

6.4.3 ALTERNATIVE 3 – ELIMINATE VAPOR RECOVERY AND SAFETY FLARE SYSTEM

Air Quality: Alternative 3 would eliminate the construction of the Vapor Recovery and Safety Flare System. Alternative 3 would result in a decrease in construction emissions from less workers and less equipment installation since the vapor recovery system would not be built; however, the major portions of the proposed project would still be built. The construction emissions under Alternative 3 are expected to remain significant.

Under Alternative 3, the operational emissions are potentially higher than the proposed project because PRDs on the No. 2 Crude Unit, the No. 2 RSU, and the Minalk/Merox Unit will continue to vent to the atmosphere under upset conditions if sufficient pressure is generated. Thus, Alternative 3 would not provide the potential VOC emission reductions associated with the proposed project. Nonetheless, operational emissions under Alternative 3 are expected to remain less than significant after mitigation, but slightly higher than the proposed project. In effect, PRD emissions would remain equivalent to the baseline conditions and the No Project Alternative. (Note: that the potential emission reductions were not included as part of the proposed PRO Project because those reductions are unknown).

Alternative 3 could result in higher emissions of TACs than the proposed project because PRDs from existing units would continue to vent to the atmosphere instead of to control equipment. The health risks associated with the proposed project (both carcinogenic and non-carcinogenic) were considered to be less than significant (see Chapter 4, subsection 4.2.2.5 Toxic Air Contaminants). The health risks under Alternative 3 are expected to remain the same, therefore, less than significant, as the proposed project because no emission reductions associated with connecting the PRDs to vapor control were included as part of the proposed project since the actual emission reductions are unknown.

Energy: Under Alternative 3, the Cogen Train D and related facilities would still be installed. Therefore, the impacts of Alternative 3 on energy resources are expected to be essentially the same as the proposed project because the vapor recovery system and flare do not use electricity and, therefore, are considered to be less than significant.

Hazards: The proposed project impacts on hazards are expected to be less than significant. Under Alternative 3, PRDs would continue to vent to the atmosphere instead of vapor control. Venting to the atmosphere relieves pressure and avoids overpressure conditions that could lead to explosions. The hazard impacts under Alternative 3 are expected to remain the same as the existing Refinery; however existing hazards would be greater than the proposed project due to the potential for continued uncontrolled VOC emission releases. The hazard impacts associated with Alternative 3 are expected to remain less than significant.

Hydrology/Water Quality: The proposed project impacts on hydrology and water quality are expected to be less than significant. Alternative 3 is expected to require the same water demand and generate about the same amount of wastewater because the vapor recovery system and flare do not use water or generate wastewater. Therefore, the hydrology and water quality impacts of Alternative 3 are expected to be the same as the proposed project and remain less than significant.

Noise: The proposed project is expected to increase the noise levels at the Refinery due to operation of construction equipment and new Refinery equipment. The increased noise levels associated with the proposed project were considered less than significant during both the construction and operational phases of the proposed project as no noticeable noise increase offsite is expected. Implementation of Alternative 3 is expected to require fewer construction activities than the proposed project because fewer Refinery units would be constructed, so noise impacts are expected to be less than the proposed project, and less than significant.

Operational noise impacts associated with Alternative 3 are expected to be less than the proposed project as the compressors associated with the Vapor Recovery facilities would not be installed at the Refinery. However, other major noise generating sources included as part of the project are:

- The new equipment associated with the Cogen Train D;
- New pumps and compressors associated with the ISOMAX Unit; and
- New pumps, compressors, and blowers associated with the Sulfur Recovery facilities.

The noise-generating equipment associated with other equipment would still be installed. The location of the new equipment is a sufficient distance from sensitive receptors so that noise impacts under Alternative 3 are expected to remain less than significant.

Solid/Hazardous Waste: The proposed project solid/hazardous waste impacts are expected to be less than significant during both the construction and operational phases. Alternative 3 is not expected to alter the estimated generation of solid or hazardous wastes generated by the proposed project during the construction phase or operational phases. The vapor recovery facilities do not typically generate solid/hazardous wastes. Therefore, the solid/hazardous waste impacts associated with Alternative 3 are the same as for the proposed project and less than significant.

Traffic/Transportation: The construction traffic impacts associated with the proposed project are considered to be significant. Alternative 3 would result in less construction activities so that fewer workers and less traffic impacts would be expected. However, peak construction activities are associated with turnaround activities so that the elimination of the construction of the Vapor Recovery facilities is not expected to reduce traffic/transportation impacts during construction to less than significant.

The proposed project impacts on traffic during the operational phase were considered to be less than significant and they would remain less than significant under this alternative. Alternative 3 is not expected to result in an increase in traffic during operation and, as a result, traffic impacts during operation are equivalent to the proposed project.

6.4.4 ALTERNATIVE 4 – ELIMINATE FCCU AND ALKYLATION UNIT MODIFICATIONS

Air Quality: Alternative 4 would eliminate the construction activities associated with the modifications to the FCCU and Alkylation Unit. Alternative 4 would result in a decrease in construction emissions since the FCCU and Alkylation Unit would not be modified and, thus, less workers are needed and less equipment is installed. However, the major portions of the proposed project would still be built. The construction emissions under Alternative 4 are expected to remain significant.

Under Alternative 4, the operational emissions are expected to be less than the proposed project since the modifications to the FCCU and Alkylation Unit would not occur, eliminating fugitive VOC emissions from pumps, valves, flanges, etc. Thus, Alternative 4 would result in a decrease in VOC emissions from the proposed project. Overall, Alternative 4 is not expected to substantially alter the operational emissions associated with Refinery operations because the major project components would still be built; therefore, operational emissions are expected to remain less than significant.

Alternative 4 would eliminate the increased TAC emissions associated with the FCCU and Alkylation Unit modifications and the associated health risks. The health risks associated with the proposed project (both carcinogenic and non-carcinogenic) were considered to be less than significant and the health risks would remain less than significant under Alternative 4.

Energy: Under Alternative 4, the Cogen Train D and related facilities would still be installed. Therefore, the impacts of Alternative 4 on electricity are expected to be essentially the same as the proposed project and less than significant. Alternative 4 would result in the recovery of less LPG and other intermediate products than the proposed project, resulting in reduced energy efficiency in the Refinery operations, production of less CARB fuels, and potentially more flaring.

Hazards: The proposed project's hazards impacts are expected to be less than significant. Under Alternative 4, the hazard impacts associated with the modifications to the FCCU and Alkylation Unit would be eliminated. Therefore, the hazard impacts under Alternative 4 are expected to be less than for the proposed project and, therefore, less than significant.

Hydrology/Water Quality: The proposed project impacts on hydrology and water quality are expected to be less than significant. Alternative 4 is expected to require the same water demand and generate about the same amount of wastewater. Therefore, the hydrology and water quality impacts of Alternative 4 are expected to be the same as the proposed project and remain less than significant.

Noise: The proposed project is expected to increase the noise levels at the Refinery due to operation of construction equipment and new Refinery equipment. The increased noise levels associated with the proposed project were considered less than significant during both the construction and operational phase of the proposed project as no noticeable noise increase is expected offsite. Implementation of Alternative 4 is expected to require less construction activities than the proposed project because fewer Refinery units would be constructed, so noise impacts are expected to be less than the proposed project, and less than significant.

Operational noise impacts associated with Alternative 4 are expected to be less than the proposed project as the cooling tower and new pumps associated with the modifications to the FCCU would not be installed at the Refinery. However, other major noise generating sources included as part of the project are:

- The new equipment associated with the Cogen Train D;
- New pumps and compressors associated with the ISOMAX Unit;
- New pumps, compressors and blowers associated with the Sulfur Recovery facilities; and
- New pumps and compressors associated with the vapor recovery system.

The noise-generating equipment associated with other equipment would still be installed. The location of the new equipment is a sufficient distance from sensitive receptors so that noise impacts under Alternative 4 are expected to remain less than significant.

Solid/Hazardous Waste: The proposed project impacts on solid/hazardous waste are expected to be less than significant during both the construction and operational phases. Alternative 4 is not expected to alter the estimated generation of solid or hazardous waste generated by the proposed project during the construction phase or operational phases. The modifications associated with the FCCU and Alkylation Unit will not require the construction of new foundations so contaminated soil requiring disposal is not expected to be uncovered during construction activities. Further, the modifications to the FCCU and Alkylation Unit are not expected to generate additional quantities of solid/hazardous wastes, e.g., no increase in the use of catalyst is expected. Therefore, the solid/hazardous waste impacts associated with Alternative 4 are the same as for the proposed project and less than significant.

Traffic/Transportation: The construction traffic impacts associated with the proposed project are considered to be significant. Alternative 4 would result in less construction activities so that fewer workers and less traffic impacts would be expected. However, peak construction activities are associated with turnaround activities so that the elimination of the construction of the modifications to the FCCU and Alkylation Unit are not expected to reduce traffic/transportation impacts during construction to less than significant.

The proposed project impacts on traffic during the operational phase were considered to be less than significant and they would remain less than significant under this alternative. Alternative 4 is not expected to result in an increase in traffic during operation compared to the proposed project and, therefore, is not significant.

6.4.5 ALTERNATIVE 5 – ELIMINATE THE NEW 49.9 MW COGENERATION UNIT

Air Quality: Alternative 5 would eliminate the construction activities associated with the new Cogen Train D. Alternative 5 would result in a decrease in construction emissions since the Cogen Train D would not be built and, thus, less workers are needed and less equipment would be installed. However, the major portions of the proposed project would still be built. The construction emissions under Alternative 5 are expected to be less than for the proposed project, but would remain significant.

Under Alternative 5, the operational emissions from the Refinery are expected to be less than the proposed project since the Cogen Train D would not be constructed. However, the Refinery would be required to install an auxiliary boiler to generate steam to support Refinery operations and would also need to purchase an additional 29.9 MW of electricity, which would be produced at an off-site electrical generating facility and transmitted to Chevron for use. The emission increases associated with an auxiliary boiler are expected to be offset and, thus, air quality impacts would be less than significant. Even without the new Cogen Train D, Alternative 5 is expected to result in an overall increase in emissions in the South Coast Air Basin.

Alternative 5 would eliminate the increased TAC emissions associated with the Cogen Train D, but TAC emissions would increase from the new auxiliary boiler and an off-site electrical generating facility if it is located outside the SCAQMD's jurisdiction. The health risks associated with the proposed project (both carcinogenic and non-carcinogenic) were considered to be less than significant and the health risks are expected to remain less than significant under Alternative 5.

Energy: Alternative 5 will eliminate new electricity generated by the Refinery. The proposed project is estimated to require about 29.9 MW of additional electricity, which would be purchased from off-site electricity providers under Alternative 5. Therefore, Alternative 5 would result in the same electrical demand, but would not allow the Refinery to produce its own electricity requiring the purchase of additional electricity from off-site providers and generating potentially significant energy impacts.

Hazards: The proposed project impacts on hazards are expected to be less than significant. The hazard impacts associated solely with the new Cogen Train D are also considered to be less than significant. Alternative 5 would also require the installation of a new auxiliary boiler. A new boiler would be expected to operate on natural gas and/or refinery fuel gas and have similar hazards as the Cogen Train D (e.g., torch fire related to natural or refinery fuel gas). No increase in transport of hazardous materials compared to the proposed project is expected under Alternative 5. The hazard impacts under Alternative 5 are expected to be equivalent to the proposed project and less than significant.

Hydrology/Water Quality: The proposed project impacts on hydrology and water quality are expected to be less than significant. Alternative 5 is expected to require about the same water demand and generate about the same amount of wastewater as the proposed project. An auxiliary boiler to replace the steam produced by the Cogen Train D will be required under Alternative 5. Therefore, the hydrology and water quality impacts of Alternative 5 are expected to be similar to the proposed project and remain less than significant.

Noise: The proposed project is expected to increase the noise levels at the Refinery due to operation of construction equipment and new Refinery equipment. The increased noise levels associated with the proposed project were considered less than significant during both the construction and operational phases of the proposed project as no noticeable noise increase is expected offsite. Implementation of Alternative 5 is expected to require fewer construction activities than the proposed project because fewer Refinery units would be constructed, so noise impacts are expected to be less than the proposed project, and less than significant.

Operational noise impacts associated with Alternative 5 are expected to be less than the proposed project as the Cogen Train D would not be installed at the Refinery. However, other major noise generating sources included as part of the project are:

- New pumps and compressors associated with the ISOMAX Unit;
- New pumps, compressors and blowers associated with the Sulfur Recovery facilities; and
- New pumps and compressors associated with the vapor recovery system.

In addition to the above, a new auxiliary boiler would be installed under Alternative 4 to provide additional steam. The noise-generating equipment associated the boiler and with other equipment would be installed. The location of the new equipment is a sufficient distance from sensitive receptors so that noise impacts under Alternative 5 are expected to remain less than significant.

Solid/Hazardous Waste: The proposed project solid/hazardous waste impacts are expected to be less than significant during both the construction and operational phases. Alternative 5 is not expected to alter the estimated generation of solid or hazardous waste from the proposed project during the construction phase or operational phases. Cogeneration units do not typically generate solid/hazardous wastes. Under Alternative 5, the catalyst associated with the Cogen Train D SCR unit would be eliminated. However, an auxiliary boiler to generate additional steam would be required and BACT for the auxiliary boiler would also be an SCR unit. Therefore, the solid/hazardous waste impacts associated with Alternative 5 are approximately the same as for the proposed project and less than significant.

Traffic/Transportation: The construction traffic impacts associated with the proposed project are considered to be significant. Alternative 5 would result in less construction activities because Cogen Train D would not be constructed; however, the construction of an auxiliary boiler would be required. Alternative 5 would be expected to require fewer workers and less traffic impacts would be expected. However, peak construction activities are associated with turnaround activities so that the elimination of the Cogen Train D is not expected to reduce traffic/transportation impacts during construction to less than significant.

The proposed project impacts on traffic during the operational phase were considered to be less than significant and they would remain less than significant under this alternative. Haul trucks associated with transport of SCR catalysts to the Refinery and spent catalysts for recycling or disposal would be about the same as for the cogeneration unit. Alternative 5 is not expected to result in an increase in traffic during operation.

6.5 CONCLUSION

Table 6-1 compares the potential environmental impacts of the various alternatives relative to the proposed project. Based on the analyses herein, no feasible alternatives were identified that would reduce or eliminate the potentially significant air quality or traffic impacts during construction activities related to the proposed project and achieve the objectives of the proposed project. Only the No Project Alternative would eliminate these impacts, but would not achieve the goals of the proposed project.

TABLE 6-1

Environmental Impacts of Alternatives
As Compared to Proposed Project

ENVIRONMENTAL TOPIC	Proposed Project	Alt. 1	Alt. 2	Alt. 3	Alt.4	Alt. 5
Air Quality						
Construction	S	NS(-)	S(-)	S(-)	S(-)	S(-)
Operation	MNS	NS(-)	MNS(=)	MNS(+)	MNS(-)	MNS(+)
Toxic Air Contaminants	NS	NS(-)	NS(-)	NS(+)	NS(-)	NS(+)
Energy	NS	NS(+)	NS(=)	NS(=)	NS(+)	S(+)
Hazards						
Operational Hazards	NS	NS(-)	NS(-)	NS(+)	NS(-)	NS(=)
Transportation Hazards	NS	NS(-)	NS(+)	NS(=)	NS(-)	NS(-)
Hydrology/Water Quality	NS	NS(-)	NS(=)	NS(=)	NS(=)	NS(=)
Noise						
Construction Noise	NS	NS(-)	NS(-)	NS(-)	NS(-)	NS(-)
Operational Noise	NS	NS(-)	NS(-)	NS(-)	NS(-)	NS(-)
Solid/Hazardous Waste	NS	NS(-)	NS(=)	NS(=)	NS(=)	NS(=)
Transportation/Traffic						
Construction	S	NS(-)	S(-)	S(-)	S(-)	S(-)
Operation	NS	NS (=)	NS(+)	NS(=)	NS(=)	NS(=)

Notes:
S = Significant
NS = Not Significant
MNS = Mitigated, Not Significant
(-) = Potential impacts are less than the proposed project.
(+) = Potential impacts are greater than the proposed project.
(=) = Potential impacts are approximately the same as the proposed project.

The No Project Alternative (Alternative 1) would prevent Chevron from: (1) Improving the energy efficiency, performance, and reliability of certain process units; (2) processing a wider range of crude oils, including higher sulfur-containing crude oils; (3) producing more low-sulfur fuel and other sulfur products; (4) improving the management of blending components of CARB fuels; and (5) reducing the potential for atmospheric releases and related emissions from PRDs in the No. 2 Crude Unit, No. 2 Residuum Unit, and the Minalk/Merox Unit. However, the No Project Alternative would eliminate the potentially significant impacts related to air quality and traffic during construction, making it an environmentally superior alternative.

Alternative 2 would result in significant impacts to air quality and traffic during construction, but would reduce the emissions and related traffic since the Sulfur Recovery facilities would not be built. Therefore, in addition to the No Project Alternative, Alternative 2 would be considered the environmentally superior alternative as it would reduce project impacts, but would not reduce potentially significant impacts to less than significant. However, Alternative 2 would not allow the Refinery to meet the project objectives of: (1) producing low-sulfur fuel products and increase production of commercial grade elemental sulfur; and (2) allowing the Refinery to efficiently and reliably process a wider range of crude oils, including higher sulfur-containing crude oils.

Alternatives 3 and 4 would have similar impacts to the proposed project on air quality, energy, hazards/hazardous materials, noise and traffic. Alternatives 3 and 4 would result in significant impacts to air quality and traffic during construction, but would reduce the emissions and related traffic since fewer units would be built. Alternative 3 would not allow the Refinery to control the potential atmospheric releases and related emissions from PRDs in specified units. Alternative 4 would not include the energy efficiency modifications proposed for the FCCU and Alkylation Unit. Alternatives 3 and 4 would reduce project construction-related air quality and traffic impacts, but would not reduce potentially significant impacts to less than significant.

Alternative 5 would reduce project construction-related air quality and traffic impacts, but would not reduce potentially significant impacts to less than significant. Alternative 5 could result in significant energy impacts because the Cogen Train D, which would supply additional electricity to the Refinery, would not be constructed. The GHG emissions would be greater under Alternative 5 (see Chapter 5, subsection 52.4 – Greenhouse Gases for a detailed discussion). Therefore, the proposed project is preferred because it would most effectively attain all project objectives, whereas, all alternatives except the No Project Alternative do not eliminate significant adverse construction and traffic air quality impacts.

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CHAPTER 7

REFERENCES

7.0 REFERENCES

7.1 REFERENCES

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7.2 ORGANIZATIONS AND PERSONS CONSULTED

The CEQA statues and Guidelines require that organizations and persons consulted be provided in the EIR. A number of organizations, state and local agencies, and private industry have been consulted. The following organizations and persons have provided input into this document.

7.2.1 ORGANIZATIONS

Chemical Waste Management, Inc.
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Southern California Edison
South Coast Air Quality Management District

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CHAPTER 8

ACRONYMS AND GLOSSARY

ACRONYMS

ABBREVIATION	DESCRIPTION
AB2588	Air Toxic "Hot Spots" Information and Assessment Act
AB2595	California Clean Air Act
AB2728	Tanner Bill
AB32	California Global Warming Solutions Act of 2006
AB939	California Integrated Waste Management Act of 1989
AFV	alternative fuel vehicle
AHM	Acutely Hazardous Material
ANSI	American National Standards Institute
API	American Petroleum Institute
AQMP	Air Quality Management Plan
AVR	average vehicle ridership
BACT	Best Available Control Technology
Basin	South Coast Air Basin
BLEVE	boiling liquid expanding vapor explosion
BOD	biochemical oxygen demand
BPD	barrels per day
Btu	British Thermal Unit
CAFE	Corporate Average Fuel Economy
CalARP	California Accidental Release Prevention Program
CalOSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officer's Association
CARB	California Air Resources Board
CAT	Climate Action Team
CCR	California Code of Regulations
CCR Unit	Continuous Catalytic Reformer Unit
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIWMB	California Integrated Waste Management Board
CKN	Century Type ISOMAX Catalyst for deNitrification
CMP	Congestion Management Program for Los Angeles County
CNEL	Community Noise Equivalent Level
CO	Carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent emissions
Cogen	Cogeneration
CPUC	California Public Utilities Commission
CWA	Clean Water Act
CWMI	Chemical Waste Management Inc.
DAF	Dissolved Air Flotation

dBA	A-weighted noise level measurement in decibels
D/C	demand-to-capacity
DTSC	Department of Toxic Substances Control
EIR	Environmental Impact Report
EPA	California State Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPS	emissions performance standard
ERPG	Emergency Response Planning Guideline
FAA	Federal Aviation Administration
FCCU	Fluid Catalytic Cracking Unit
GHGs	greenhouse gases
gpd	gallons per day
gpm	gallons per minute
gWh	gigawatt hours
HARP	Hotspots Analysis Reporting Program
HMT	Hazardous Materials Transportation
HOV	High-Occupancy Vehicle
HRA	Health Risk Assessment
H_2	hydrogen
H_2S	Hydrogen Sulfide
IAF	Induced Air Flotation
I-110	Harbor Freeway
I-405	San Diego Freeway
I-605	San Gabriel River Freeway
I-710	Harbor Freeway
ISCST3	Industrial Source Complex – Short Term
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
I-105	Glenn M. Anderson Freeway
kV	kilovolt
kWh	kilowatt-hour
LAAFB	Los Angles Air Force Base
LA Basin Plan	Water Quality Control Plan for the Los Angeles Region
LACDPW	Los Angeles County Department of Public Works
LACSD	Los Angeles County Sanitation Districts
LADOT	Los Angeles Department of Transportation
LAER	Lowest Achievable Emission Reductions
LAIWMB	Los Angeles Integrated Waste Management Board
LAX	Los Angeles International Airport
Leq	equivalent sound level
LFL	lower flammable limit
LOS	Level of Service
LPG	Liquefied Petroleum Gas
LSFO	Low Sulfur Fuel Oil
LST	Localized Significance Threshold
MACT	Maximum Achievable Control Technology

MAX	Municipal Area Express
MEIR	Maximum Exposed Individual Resident
MEIW	Maximum Exposed Individual Worker
mmBtu/hr	Million British Thermal Units per hour
MPOs	Metropolitan Planning Organizations
MTA	Metropolitan Transportation Authority
MW	megawatts
MW - hr	megawatt - hour
NAAQS	National Ambient Air Quality Standards
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NO	nitrogen oxide
NOP/IS	Notice of Preparation and Initial Study
NO_2	nitrogen dioxide
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NSR	New Source Review
OES	Office of Emergency Services
OEHHA	Office of Environmental Health Hazard Assessment
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
PAHs	polycyclic aromatic hydrocarbons
PM	particulate matter
PM10	particulate matter less than 10 microns in diameter
PM2.5	particulate matter less than 2.5 microns in diameter
ppm	parts per million
PRDs	Pressure Relief Devices
PRO	Product Reliability and Optimization
PSA	Pressure Swing Absorption
PSD	Prevention of Significant Deterioration
psig	pound per square inch, guage
PSM	Process Safety Management Program
RCRA	Resource Conservation and Recovery Act
RECLAIM	Regional Clean Air Incentives Market
Refinery	Chevron Products Company El Segundo Refinery
REL	reference exposure levels
RMP	Risk Management Program
RPS	renewables portfolio standard
RSU	Residuum Stripper Unit
RTCs	RECLAIM Trading Credits
RWQCB	Los Angeles County Regional Water Quality Control Board
SAMS	Systems Acquisition Management Support
SARA	Superfund Amendments and Reauthorization Act
SB14	Senate Bill 14, Hazardous Waste Source Reduction and Management Review Act of 1989

SB97	Senate Bill 97, CEQA: Greenhouse Gas Emissions
SB1368	Senate Bill 1368, Greenhouse Gas Emissions Performance Act
SB1731	Senate Bill 1731, Toxic Air Contaminants
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCR	Selective Catalytic Reduction
SO_2	sulfur dioxide
SOx	sulfur oxide
SMC	Space and Missile Systems Center
SNR	Steam Naphtha Reformer
SPCC	Spill Prevention Control and Countermeasure
SRU	Sulfur Recovery Unit
SR1	Sepulveda Boulevard, State Route 1
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWS	Sour Water Stripper
TACs	Toxic Air Contaminants
TBACT	Best Available Control Technology for Toxics
TEA-21	Transportation Equity Act for the 21st Century
TGU	Tail Gas Unit
TPD	tons per day
TSS	total suspended solids
ULSD	Ultra Low Sulfur Diesel
U.S. DOE	United States Department of Energy
U.S. DOT	United States Department of Transportation
U.S. EPA	United States Environmental Protection Agency
UVCE	unconfined vapor cloud explosion
V/C	Volume to Capacity ratio
VOC	Volatile Organic Compounds
VPD	vehicles per day
VRDS	Vacuum Residuum Desulfurization
WBMWD	West Basin Municipal Water District
WGCs	Waste Gas Compressors
$\mu g/m^3$	micrograms per cubic meter

GLOSSARY

TERM	DEFINITION
Ambient Noise	The background sound of an environment in relation to which all additional sounds are heard
Anhydrous	Free from water.
Aqueous	Formed from water, having a water base.
Aromatics	Hydrocarbons which contain one or more benzene rings.
Barrel	42 gallons.
Blending	One of the final operations in refining, in which two or more different components are mixed together to obtain the desired range of properties in the finished product.
Catalyst	A substance that promotes a chemical reaction to take place but which is not itself chemically changed.
CO_2 equivalent (CO_2e)	A measure for comparing CO2 with other GHGs, based on the amount of the other GHGs multiplies by the appropriate global warming potential factor.
Condensate	Steam that has been condensed back into water by either raising its pressure or lowering its temperature
Cogeneration	A cogeneration unit is a unit that produces electricity.
Cracking	The process of breaking down higher molecular weight hydrocarbons to components with smaller molecular weights by the application of heat; cracking in the presence of a suitable catalyst produces an improvement in product yield and quality over simple thermal cracking.
Crude Oil	Crude oil is "unprocessed" oil, which has been extracted from the subsurface. It is also known as petroleum and varies in color, from clear to tar-black, and in viscosity, from water to almost solid.
dBA	The decibel (dDB) is one tenth of a *bel* where one bel represents a difference in noise level between two

	intensities I_1, I_0 where one is ten times greater than the other. (A) indicates the measurement is weighted to the human ear.
Distillation	The process of heating a liquid to its boiling point and condensing and collecting the vapor.
Feedstock	Material used as a stream in the refining process.
Flares	Emergency equipment used to incinerate refinery gases during upset, startup, or shutdown conditions
Flue Gas	Gases produced by burning fuels in a furnace, heater or boiler.
Heat exchanger	Process equipment used to transfer heat from one medium to another.
Heater	Process equipment used to raise the temperature of refinery streams processing.
Hydrocarbon	Organic compound containing hydrogen and carbon, commonly occurring in petroleum, natural gas, and coal.
L_{50}	Sound level exceeded 50 percent of the time (average or mean level)
Liquefied Petroleum Gas (LPG)	Liquefied light end gases often used for home heating and cooking; this gas is usually 95 percent propane, the remainder being split between ethane and butane.
Naphtha naphthas	A crude distillation unit cut in the range of C_7-420^o; are subdivided – according to the actual crude distillation cuts - into light, intermediate, heavy, and very heavy virgin naphthas; a typical crude distillation operation would be: C_7-160^o - light naphtha 160-280^o - intermediate naphtha 280-330^o - heavy naphtha 330-420^o - very heavy naphtha
Natural Gas	A mixture of hydrocarbon gases that occurs with petroleum deposits, principally methane together with varying quantities of ethane, propane, butane, and other gases.

Octane	Measurement of the burning quality of the gasoline; reflects the suitability of gasoline to perform in internal combustion engines smoothly without letting the engine knock or ping.
Olefins	Hydrocarbons that contain at least two carbons joined by double bonds; olefins do not naturally occur in crude oils but are formed during the processing.
Peak Hour	This typically refers to the hour during the morning (typically 7 AM to 9 AM) or the evening (typically 4 PM to 6 PM) in which the greatest number of vehicles trips are generated by a given land use or are traveling on a given roadway.
Pentane	Colorless, flammable isomeric hydrocarbon, derived from petroleum and used as a solvent.
Reactor	Vessels in which desired reactions take place.
Refinery gas for fuel	Gas produced from refinery operations used primarily gas combustion in refinery heaters and boilers.
Reformate	One of the products from a reformer; a reformed naptha; the naptha is then upgraded in octane by means of catalytic or thermal reforming process.
Reformulated Gasoline	New gasoline required under the federal Clean Air Act and California Air Resources Board to reduce emissions.
Reid Vapor Pressure	The vapor pressure of a product determined in a volume of air four times greater than the liquid volume at 100^{o}F; Reid vapor pressure (RVP) is an indication of the vapor-lock tendency of a motor gasoline, as well as explosion and evaporation hazards.
Selective Catalyst Reduction	An air pollution control technology that uses a catalyst to remove nitrogen oxides from the flue gas.
Stripper or Splitter	Refinery equipment used to separate two components in a feed stream; examples include sour water strippers and naphtha splitters.

Sulfiding	Conversion of metal oxides on the surface of the regenerated or fresh catalyst to metal sulfides to activate the catalyst before starting oil feed to the unit.

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APPENDIX A

NOTICE OF PREPARATION AND INITIAL STUDY

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 • www.aqmd.gov

SUBJECT: **NOTICE OF PREPARATION OF DRAFT ENVIRONMENTAL IMPACT REPORT**

PROJECT TITLE: **CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
PRODUCT RELIABILITY AND OPTIMIZATION PROJECT**

In accordance with the California Environmental Quality Act (CEQA), the South Coast Air Quality Management District (SCAQMD) is the Lead Agency and will prepare a Draft Environmental Impact Report (EIR) for the project identified above. The purpose of this Notice of Preparation (NOP) is to solicit comments on the environmental analysis to be contained in the EIR.

In conjunction with the development of the proposed project, it is necessary to address the potential adverse effects of the proposed project on the environment. The SCAQMD is preparing the appropriate environmental analysis consistent with CEQA. The Notice of Preparation (NOP) serves two purposes: to solicit information on the scope of the environmental analysis for the proposed project and notify the public that the SCAQMD will prepare a Draft EIR to further assess potential adverse environmental impacts that may result from implementing the proposed project.

This NOP, and the attached Initial Study, are not SCAQMD applications or forms requiring a response from you. Their purpose is simply to provide information to you on the above project. If the proposed project has no bearing on you or your organization, no action on your part is necessary. The project's description, location, and potential environmental impacts are described in the NOP and the attached Initial Study.

Comments focusing on your area of expertise, your agency's area of jurisdiction, or issues relative to the environmental analysis should be addressed to Mr. Mike Krause at the address shown above, sent by FAX to (909) 396-3324, or e-mailed to mkrause@aqmd.gov. Comments must be received no later than 5:00 p.m. on September 11, 2007. Please include the name and phone number of the contact person for your organization.

Project Applicant: Chevron Products Company

Date: August 10, 2007 **Signature:** Steve Smith

Steve Smith, Ph.D.
Program Supervisor
Planning, Rules, and Area Sources

Reference: California Code of Regulations, Title 14, Sections 15082, 15103, and 15375

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 Copley Drive, Diamond Bar, California 91765-4182

NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT

Project Title:
Chevron Products Company El Segundo Refinery – Proposed Product Reliability and Optimization Project

Project Location:
The Chevron Products Company El Segundo Refinery is located at 324 West El Segundo Boulevard, El Segundo, CA 90245

Description of Nature, Purpose, and Beneficiaries of Project:
Chevron is proposing modifications to and installation of new equipment at the El Segundo Refinery. Proposed modifications will occur in the No. 2 Crude Unit, No. 2 Residuum Stripper Unit, Minalk/Merox Unit, Fluidized Catalytic Cracking Unit, Alkylation Unit, Vacuum Residuum Desulfurization Unit, Isomax Unit, Cogeneration Facilities, and the Railcar Loading/Unloading Rack. New process units include sulfur processing facilities (i.e., Sour Water Stripper, Sulfur Recovery Unit, and Tail Gas Unit), Vapor Recovery and Flare System, Water Treatment Facilities (i.e., reverse osmosis units and oxygen removal units), and additional storage capacity. The purpose of these modifications and additions is to increase the reliability and capacity of specific existing Refinery processing equipment.

Lead Agency:	**Division:**
South Coast Air Quality Management District	Planning, Rule Development and Area Sources

Initial Study and all Supporting Documentation are Available at:

SCAQMD Headquarters 21865 Copley Drive Diamond Bar, CA 91765	Or by Calling: (909) 396-2039

Or by accessing:
http://aqmd.gov/ceqa/nonaqmd.html

Scheduled Scoping Meeting Date:
A CEQA scoping meeting will be held on August 21, 2007, in the Friends of the Library Room at the El Segundo Public Library, 111 West Mariposa Avenue, El Segundo, CA 90245 at 6:00 p.m., for the proposed project.

The Notice of Preparation is provided through the following:

☑ Los Angeles Times and Daily Breeze (August 10, 2007)		☑ SCAQMD Website
☑ El Segundo Herald		
☑ SCAQMD Public Information Center	☑ Interested Parties	☑ SCAQMD Mailing List

Review Period:
August 10, 2007 through September 11, 2007

CEQA Contact Person:	**Phone Number:**	**E-Mail Address**
Mike Krause	(909) 396-2706	mkrause@aqmd.gov

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Initial Study for:
Chevron Products Company El Segundo Refinery
Product Reliability and Optimization Project

August 2007

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Jeff Cox – Air Quality Engineer I

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT GOVERNING BOARD

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CHAPTER 1

PROJECT DESCRIPTION

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

Chevron Products Company is proposing a project at its El Segundo Refinery (Refinery) to increase the reliability, flexibility and capacity of specific Refinery equipment. The overall focus of this project is to increase the reliability of the Refinery's existing equipment, increase the capacity of certain existing equipment, and optimize the ability of specific processes to increase production of transportation fuels and other chemical products derived from the refining process. With respect to the transportation fuel products, the California Energy Commission's report entitled *Transportation Fuels, Technologies, and Infrastructure Assessment* states: "... as California's population and economic output grow, demand for transportation services and fuel will grow. Petroleum will continue to be the energy resource of choice ... total demand for gasoline and diesel fuels will increase by almost 35 percent over the next 20 years." (CEC, 2003)

The Product Reliability and Optimization (PRO) project includes modifications to existing specific process units, and also new infrastructure that supports and links these units to other processes, units or facilities throughout the Refinery. The proposed project will involve physical changes and additions to multiple process units and operations as well as operational and functional improvements within the confines of the Refinery with no increase in crude throughput.

1.2 AGENCY AUTHORITY

The California Environmental Quality Act (CEQA), Public Resources Code § 21000 et seq., requires the evaluation of environmental impacts for proposed projects and requires the identification and implementation of feasible methods to reduce, avoid or eliminate significant adverse impacts from these projects. To fulfill the purpose and intent of CEQA, the SCAQMD is the lead agency for this project and has prepared a Notice of Preparation and Initial Study (NOP/IS) to solicit information on the scope of the environmental analysis, provide a preliminary analysis of environmental impacts, and notify the public that a Draft Environmental Impact Report (DEIR) will be prepared that will evaluate the potential environmental impacts associated with implementing the Refinery PRO Project.

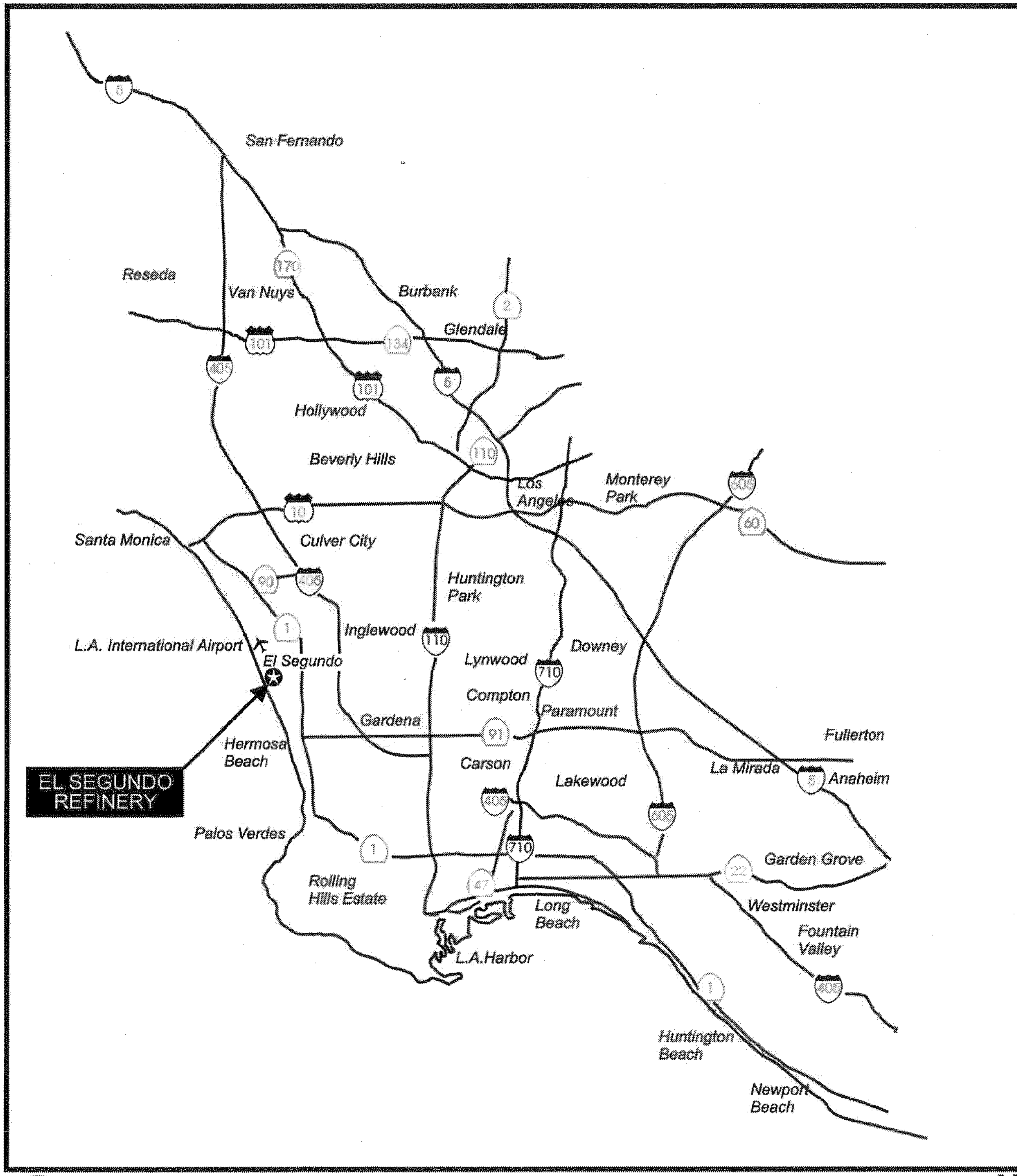
The lead agency is the public agency that has the principal responsibility for carrying out or approving a project that may have a significant effect upon the environment (Public Resources Code §21067). It was determined that the SCAQMD has the primary responsibility for supervising or approving the entire project as a whole and is the most appropriate public agency to act as lead agency (CEQA Guidelines §15051(b)). The proposed project requires discretionary approval from the SCAQMD for modifications to existing stationary source equipment and installation of new stationary source equipment.

1.3 PROJECT LOCATION

The proposed project will occur within the confines of the Chevron Products Company El Segundo Refinery, except for the improvements at the West Basin Municipal Water District that is located just east and also just north of the Refinery. The Refinery, which was constructed over 90 years ago, is located within the overall southern California region, as shown in Figure 1-1. The Refinery is located at 324 West El Segundo Boulevard in the City of El Segundo, California, as shown in Figure 1-2. The El Segundo Refinery occupies an irregularly shaped parcel of land, between Vista Del Mar on the west, El Segundo Boulevard on the north, Sepulveda Boulevard on the east, and Rosecrans Avenue on the south. The proposed location within the Refinery for the process unit modifications and additions are shown in Figure 1-3.

Land use at the Refinery and in the surrounding vicinity is consistent with the City of El Segundo General Plan land use designations for the area. The Land Use element of the General Plan currently in force was adopted in December 1992, and no revisions have occurred since that time (City of El Segundo Planning Department, 2005). The strip of development on the north side of El Segundo Boulevard between Main Street and Richmond Boulevard, northeast of the Refinery's main office visitor parking lot and approximately one-half mile west of the No. 4 Crude Unit, is part of the Downtown Specific Plan, adopted in August 2000. The Refinery site is zoned by the City of El Segundo as Heavy Industrial (M-2) (City of El Segundo Planning Department, 2005).

The Chevron Refinery is located in an area of mixed land uses, with industrial, recreation, residential, and commercially zoned areas nearby. Land use to the north of the Chevron Refinery is primarily residential, with a mix of commercial and light industrial zoning mixed in. The predominant adjacent land uses west of the Refinery are nearly all heavy industrial or open space, which includes Dockweiler State Beach, Manhattan Beach, and the El Segundo Generating Station, although a small parcel of land at the southwest corner of the Chevron property is made up of commercial and multiple-family residential. Directly south of the Refinery, there is a single-family residential use bordering the entire length of the Refinery separated by Rosecrans Avenue. The corridor immediately east of the proposed site is comprised of a golf course at the corner of Sepulveda Boulevard and El Segundo Boulevard, with light commercial and heavy industrial zoning for the rest of the tract.



Environmental Audit, Inc.

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REGIONAL MAP
Chevron Products Company
El Segundo Refinery

Project No. 2505 | Figure 1-1

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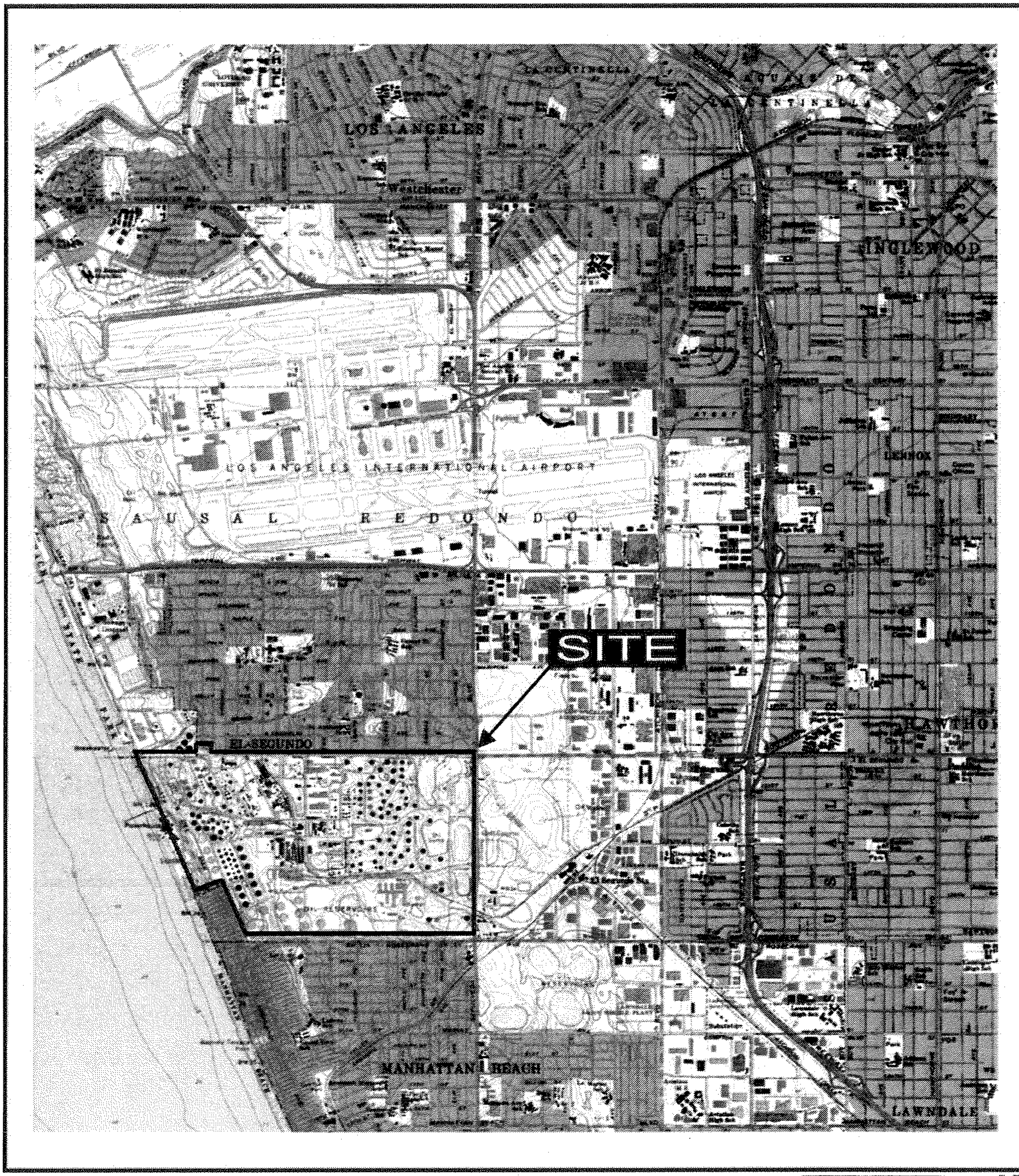

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SITE LOCATION MAP
Chevron Products Company
El Segundo Refinery

Project No. 2505

Figure 1-2

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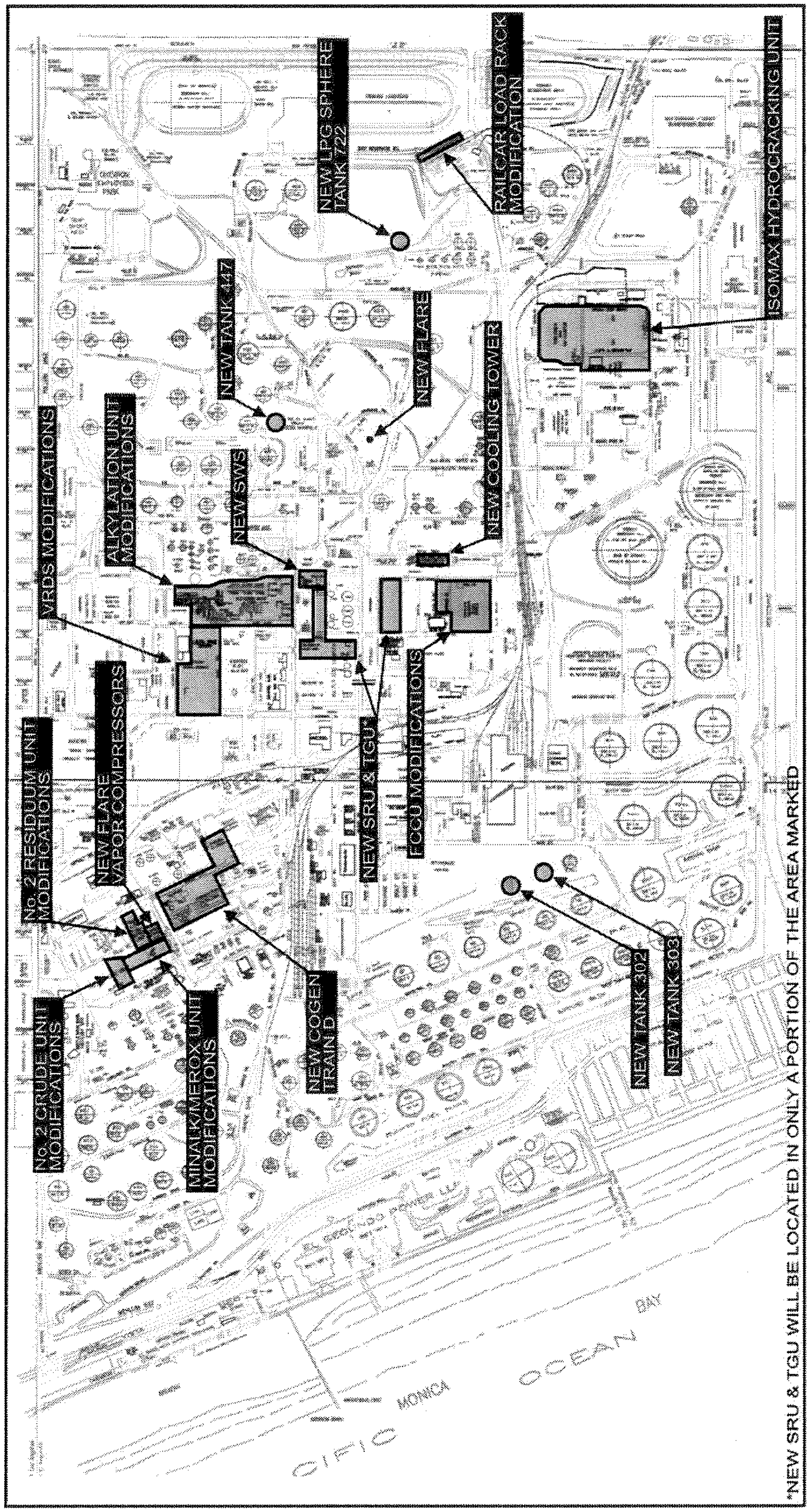


CHEVRON PRODUCTS COMPANY
PROJECT COMPONENT LOCATIONS

Figure 1-3

Project No. 2505
N:\2505\SourceLocationsMap (rev.5) CDR

1.4 PROPOSED PROJECT MODIFICATIONS TO THE REFINERY

The following discussions describe each of the proposed Refinery modifications. The locations of both the proposed new and modified components are shown in Figure 1-3.

1.4.1 PROPOSED PROCESS UNIT MODIFICATIONS

The following units will be modified as part of the PRO project.

1.4.1.1 No. 2 Crude Unit

The No. 2 Crude Unit provides the initial separation of crude oil by distillation. The various distillates are then further refined in other processing units in the Refinery. The proposed modifications to the No. 2 Crude Unit include rerouting pressure relief devices (PRDs) to the proposed new Vapor Recovery and Flare System. In addition, two knock-out drums will be added to the unit to collect any liquids released from the PRDs in the No. 2 Crude Unit, the No. 2 Residuum Stripper Unit, and the Minalk/Merox Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere.

1.4.1.2 No. 2 Residuum Stripper Unit

The No. 2 Residuum Stripper Unit (RSU) processes the heavy hydrocarbons from the bottom of the No. 2 Crude Unit using vacuum distillation to produce various weight gas oils. The proposed modifications to the No. 2 RSU are limited to rerouting PRDs to the proposed new Vapor Recovery and Flare System via the two new knock-out drums in the No. 2 Crude Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere.

1.4.1.3 Minalk/Merox Unit

The Minalk/Merox Unit converts sulfur compounds (mercaptans) to disulfides using a catalyst. The proposed modifications to the Minalk/Merox Unit are limited to rerouting PRDs to the proposed new Vapor Recovery and Flare System via a new knock-out drum in the No. 2 Crude Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent.

1.4.1.4 Fluidized Catalytic Cracking Unit

The Fluidized Catalytic Cracking Unit (FCCU) converts heavy petroleum gas oils into lighter, more valuable products such as gasoline, liquefied petroleum gas (LPG), and refinery intermediates. The unit consists of a number of major sections, including the Reactor Section, the Regenerator Section, the Main Fractionator Section and the Gasoline Recovery Unit. The reactor is the vessel where preheated feed is vaporized, contacted by regenerated catalyst, and cracked into lighter components. In the Regenerator Section, spent catalyst from the reactor is regenerated with oxygen to remove carbon. The reaction mix from the reactor enters the Main Fractionator where the separation of cracked gas oils and lighter products takes place. The Gasoline Recovery Unit receives gases and liquids from the Main Fractionator overhead. The uncondensed gases in this overhead steam are compressed by the wet gas compressor before being routed to the deethanizer where most of the hydrogen, methane and ethane are separated from the stream and sent to further processing to capture sulfur compounds for commercial sale. The remaining overhead stream is then routed to the Refinery's fuel gas system. Fuel gas is burned to provide heat to operate the Refinery.

The proposed FCCU modifications do not functionally change the process flow and control of the FCCU. The purpose of the modifications is to more efficiently separate intermediate streams and to improve energy efficiency. The modifications and equipment additions are as follows:

- Install a new motorized main air blower replacing the existing steam turbine driven main air blower (the existing equipment will be idled);
- Install a new depropanizer column replacing three smaller existing distillation columns;
- Install a new gas recovery stripping column;
- Install a new gas recovery absorber column;
- Install new pumps; and,
- Install new heat exchangers.

1.4.1.5 Alkylation Unit

The Alkylation Unit combines light olefins (propylene, butylene and pentenes) with isobutane to produce an alkylate product for use as a gasoline blending component. The unit provides the controlled conditions for the alkylation reaction, which occurs in the presence of sulfuric acid catalyst. The Alkylation Unit also produces propane and normal butane as secondary commercial product streams. The proposed modifications to the Alkylation Unit include supplemental cooling that will be supplied by a new cooling tower (see Section 1.4.2.4) and additional heat exchangers. The depropanizer Column C-12, located in the older section of the Alkylation area, will be removed. This column is one of the three depropanizers being removed as part of FCCU upgrades. The purpose of the modifications is to improve reliability through more efficient cooling (i.e., heat removal) and improve product separation in the Unit.

1.4.1.6 Vacuum Residuum Desulfurization Unit

The Vacuum Residuum Desulfurization (VRDS) Unit desulfurizes and denitrifies gas oil feedstock for the FCCU. There are two parallel reactor trains, each consisting of two reactors in series. Feed to the reactors is mixed with hydrogen and then preheated in reactor feed/effluent heat exchangers and a feed heater. Treated gas oil from the reactors passes through the hot high pressure separator to remove hydrogen and then to the hot low pressure separator to remove remaining gases and then fed to the Hydrogen Sulfide (H_2S) Stripper Column. VRDS product from the bottom of the stripper is cooled and pumped to the FCCU or to intermediate tankage. Hydrogen from the hot high pressure separator is cooled and sent through two liquid separators to the Diethanolamine (DEA) Scrubber to capture hydrogen sulfide prior to being directed to the reactors. The hydrogen sulfide is converted to commercial grade sulfur in the Sulfur Recovery Units.

The purposed of this modification is to allow taking one of the parallel reactor trains out of service to replace the catalyst while the other train remains in service. The unit modifications and additions are as follows:

- Installing valve manifolds to separate the reactor trains;
- Installing a new, parallel hot high pressure separator;
- Repiping of the existing Recycle Hydrogen Heat Exchangers and Recycle Hydrogen Air Coolers to split them between the two trains; and,
- Installing new facilities to allow sulfiding of fresh catalyst in one reactor train with the other train in operation. This includes installation of two new separator vessels, a new sulfiding recycle hydrogen compressor, and a new recycle hydrogen air cooler. In addition, the existing VRDS Product Coolers will be repiped so they can be used in the catalyst sulfiding loop.

1.4.1.7 ISOMAX Unit

The ISOMAX Unit converts light and intermediate gas oils into jet fuel, motor gasoline, and LPG. The feed and makeup hydrogen are passed through four parallel CKN (a Century Type Isomax Catalyst for deNitrification) reactor modules to convert sulfur and nitrogen to hydrogen sulfide and ammonia. The hydrogen sulfide and ammonia are absorbed in water that is injected into the reaction stream, removed from the unit, and processed in other units in the Refinery. Then unconverted CKN product and additional hydrogen are passed through two parallel Isoreactor modules, where the bulk of the conversion takes place. Products are separated from the reaction mix in the distillation section.

The unit will be modified to increase the feed capacity by approximately 7,000 - 10,000 barrels per day (BPD) and to produce two additional products, diesel fuel and FCCU feed. The purpose of the modifications is to accommodate the improved gas oil production from previous projects and optimize output from the Unit.

In the CKN section, a new feed surge drum will be added; the two existing feed booster pumps and one of the main feed pumps will be replaced. The existing power recovery turbine will be coupled to the new motor-driven main feed pump to reduce electrical power requirements in normal operation. Feed/effluent heat exchangers in each module will be replaced with larger units to preclude the need for fired heater modifications. A new hydrogen booster compressor will be installed.

The Distillation Section modifications include:

- Installing a new vacuum distillation column, and appurtenances;
- Augmenting the existing air-cooled overhead condensers for the Topping Column and Isosplitter Column with new modules;
- Replacing the existing feed/effluent heat exchanger with a larger unit; and,
- Replacing three Isosplitter Column bottoms pumps with larger pumps.

1.4.1.8 Cogeneration Facilities

The Refinery currently operates a cogeneration plant to supply most of the electricity and steam used by processing equipment. To supplement electrical needs, electricity is purchased from offsite sources (e.g., Southern California Edison (SCE)). The existing cogeneration plant will be expanded by an additional 49 megawatts (MW). The new 49 MW Cogeneration Train D (Cogen Train D) will consist a natural gas and refinery gas-fired turbine, a new steam-driven turbine, electrical generators, feed gas compressors, knockout and surge pots, waste heat boilers to generate steam, a carbon monoxide oxidation catalyst unit, and a selective catalytic reduction (SCR) unit or other control technology to control emissions. Expansion of this facility will decrease the Refinery's need for offsite sources of electricity.

1.4.1.9 Railcar Loading/Unloading Rack

The Refinery currently ships and receives LPG by trucks and rail cars. As part of the PRO Project, the LPG Loading/Unloading Rack will be expanded by the addition of two new loading/unloading positions for added flexibility that will increase the ability to optimize gasoline blending.

1.4.1.10 Utility Improvements

SCE and the West Basin Municipal Water District (WBMWD) may improve systems to service the proposed project. SCE improvements expected to be made include new and upgraded power substations on site. WBMWD currently provides boiler feed water from secondary-treated effluent from the Hyperion Wastewater Treatment Plant that has been further processed by filtration, chlorination, and demineralization by reverse osmosis. WBMWD also currently provides cooling tower water from secondary-treated effluent from the Hyperion Wastewater Treatment Plant that has been further processed by filtration, chlorination, and denitrification. Improvements as part of the PRO project at WBMWD, located nearby, include increasing reverse osmosis and denitrification water production facilities.

1.4.2 PROPOSED NEW PROCESS UNITS

The following discussions describe each of the proposed new units at the Refinery. The locations of both the proposed new and modified components are shown in Figure 1-3.

1.4.2.1 Sulfur Recovery Facilities

Sour Water Stripper

A new Sour Water Stripper (SWS) with a capacity of 300 gallons per minute (gpm) will be constructed to supplement the existing plants. Sour water is a process water stream that contains sulfur compounds, primarily hydrogen sulfide, and nitrogen compounds, primarily ammonia. The sulfur and nitrogen are contained in crude oil and are recovered from the crude for use when it is processed. This stripper will allow for increased processing of sour water and production of commercial grade sulfur. The overhead stream from the stripper, containing hydrogen sulfide, ammonia and water vapor, will be fed to a new Sulfur Recovery Unit (SRU).

Sulfur Recovery Unit

A new sulfur recovery unit (SRU) with a capacity of 175 long tons per day will be installed to process increased amounts of hydrogen sulfide to commercial grade, molten sulfur for sale. Ammonia in the feed stream to the SRU will be converted to atmospheric nitrogen and water and exhausted through the Tail Gas Unit (TGU) to the atmosphere.

Tail Gas Unit

The exhaust from the SRU will be vented to a new TGU for further processing before dischargining to the atmosphere. The TGU will include a new incinerator.

1.4.2.2 Vapor Recovery and Flare System

A new closed relief system, including vapor recovery compressors and an elevated flare will be installed. The flare will not exceed 200 feet in height. The PRDs on the No. 2 Crude Unit, the No. 2 Residuum Stripper Unit, and the Minalk/Merox Unit that currently vent to atmosphere will be routed to this new Vapor Recovery and Flare System. In addition, PRDs from the new Sulfur Recovery Unit and Tail Gas Unit will be routed to this new Vapor Recovery and Flare System. The recovered gases will be treated prior to being added to the existing Refinery fuel gas system.

1.4.2.3 Additional Storage Capacity

The proposed project will require additional storage of intermediate hydrocarbon streams and products. A new LPG sphere (Tank 722), two new FCCU light gasoline tanks (Tanks 302 and 303), and a new Isomax diesel tank (Tank 447) with the flexibility to store other products will be added. In addition, new pumps will be added to transfer materials to and from the new tanks.

1.4.2.4 Cooling Tower

A new cooling tower with a water circulation rate of approximately 30,000 gpm will be constructed to support cooling needs at the existing Alkylation Unit, new SRU, new SWS, and new TGU.

1.4.2.5 Hydrogen Compression and Transfer Facilities

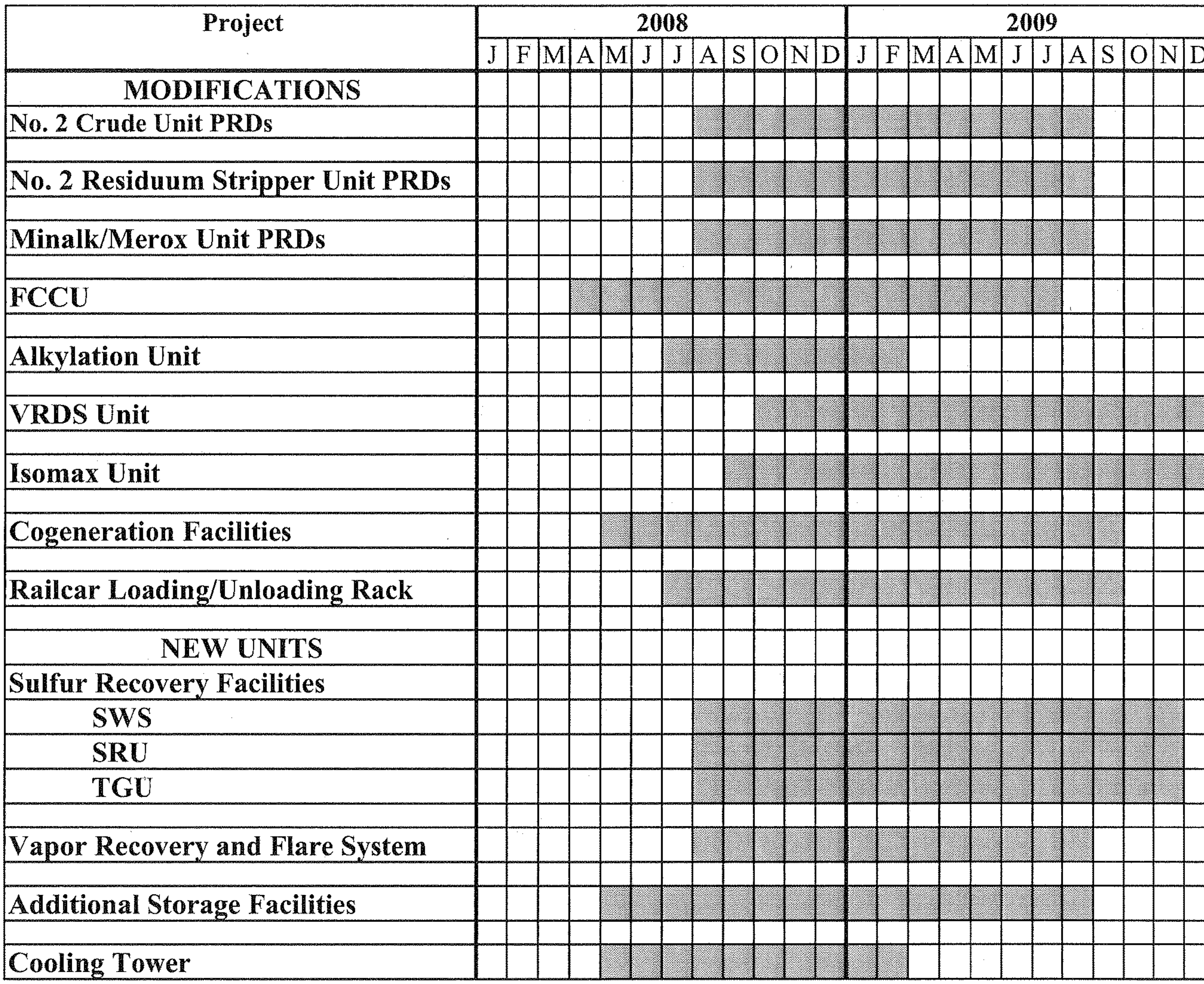
Additional hydrogen compression and transfer facilities will be installed to supply Refinery units with hydrogen at the required pressures.

1.5 CONSTRUCTION SCHEDULE

As shown in Figure 1-4, the construction schedule for individual components of Chevron Products Company's PRO Project are expected to overlap to a certain extent. Construction activities for most aspects of the proposed project are expected to begin in the first quarter of 2008 and be completed by the fourth quarter of 2009.

Figure 1-4

Chevron Products Company El Segundo Refinery
Product Reliability and Optimization Project
Construction Schedule



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CHAPTER 2

ENVIRONMENTAL CHECKLIST

INTRODUCTION

The environmental checklist provides a standard evaluation tool to identify a project's adverse environmental impacts. This checklist identifies and evaluates potential adverse environmental impacts that may be created by the proposed project.

GENERAL INFORMATION

Project Title:	Chevron Products Company El Segundo Refinery Product Reliability and Optimization Project
Lead Agency Name:	South Coast Air Quality Management District
Lead Agency Address:	21865 Copley Drive Diamond Bar, CA 91765
Contact Person:	Mike Krause
Contact Phone Number:	(909) 396-2706
Project Sponsor's Name:	Chevron Products Company
Project Sponsor's Address:	324 West El Segundo Boulevard, El Segundo, CA 90245
General Plan Designation:	Heavy Industrial
Zoning:	M-2 Heavy Industrial
Description of Project:	Chevron proposes modifications to multiple Refinery process units at the El Segundo Refinery to increase the reliability, flexibility and capacity of specific refinery equipment. Refer to Section 1.4 for a more complete description.
Surrounding Land Uses and Setting:	The Chevron Refinery is located in an area of mixed uses, with industrial, recreation, residential, and commercial uses nearby. The predominant adjacent land uses include: Dockweiler State Beach, Manhattan Beach and the El Segundo Generating Station to the west; a residential area of Manhattan Beach to the south; a golf course, a commercial and light industrial corridor to the east; and commercial/light industrial and residential areas of El Segundo to the north.
Other Public Agencies Whose Approval may be Required:	City of El Segundo

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental checklist provides a standard evaluation tool to identify a proposed project's potential adverse environmental impacts. The following environmental impact areas have been assessed to determine their potential to be affected by the proposed project. As indicated by the checklist on the following pages, environmental topics marked with a "√" may be adversely affected by the proposed project. An explanation relative to the determination of impacts can be found following the checklist for each area.

☐	Aesthetics	☐	Agriculture Resources	☑	Air Quality
☐	Biological Resources	☐	Cultural Resources	☑	Energy
☐	Geology/Soils	☑	Hazards & Hazardous Materials	☑	Hydrology/ Water Quality
☐	Land Use/Planning	☐	Mineral Resources	☑	Noise
☐	Population/Housing	☐	Public Services	☐	Recreation
☑	Solid/Hazardous Waste	☑	Transportation/ Traffic	☑	Mandatory Findings of Significance

DETERMINATION

On the basis of this initial evaluation:

☐ I find the proposed project COULD NOT have a significant effect on the environment, and that a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be significant effects in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☑ I find that the proposed project MAY have a significant effect(s) on the environment, and an ENVIRONMENTAL IMPACT REPORT (EIR) is required.

☐ I find that the proposed project MAY have a "potentially significant impact" on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Date: August 10, 2007 Signature: Steve Smith

Steve Smith, Ph.D.
Program Supervisor

ENVIRONMENTAL CHECKLIST AND DISCUSSION

	Potentially Significant Impact	Less Than Significant Impact	No Impact
1.0 AESTHETICS. Would the project:			
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☑
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☑
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☑	☐
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	☐	☐	☑

Checklist Response Explanation

1. a), b), and c) The Chevron Refinery is located in an area of mixed uses, with industrial, recreation, residential, and commercial uses nearby. The predominant adjacent land uses include: Dockweiler State Beach, Manhattan Beach and the El Segundo Generating Station to the west; a residential area of Manhattan Beach to the south; a golf course, a commercial and light industrial corridor to the east; and commercial and residential areas of El Segundo to the north. Some of these areas, particularly those associated with the beaches and Santa Monica Bay, are of scenic value.

Most project activities will take place within the boundaries of the existing Refinery (see Figure 1-3), except for the improvements at the WBMWD that is located just east and also just north of the Refinery. The new Refinery and WBMWD equipment to be installed as part of the proposed project will be similar in size, appearance, and profile to the existing facilities and equipment at the El Segundo Refinery and WBMWD. There are a number of existing tall structures in the Refinery. These include the Atmospheric Distillation Column, Furnace Stacks at the No. 4 Crude Unit, and Furnace Stacks at the No. 2 Crude Unit, which are 215, 155, and 171 feet tall, respectively. The Continuous Catalytic Reformer process plant is about 172 feet tall. The top of the Main Fractionator at the Coker is approximately 122 feet above grade. Drilling structures on top of the coke drums are 240 feet high. Also, the top of the FCCU Reactor is about 230 feet above grade.

The primary changes with potential for visual resources impacts will be associated with the proposed installation of the Cogen Train D, the New Flare, and other new structures, which include the SWS, SRU, TGU, and tanks. The Cogen Train D will be of similar design and adjacent to the existing Cogen Trains A, B, and C and is not expected to be visually discernable from the existing Trains. The New Flare will be located in the central portion of the Refinery in an area adjacent to other flares and will be of similar height. The other new structures will be located in the central areas of the Refinery adjacent to similar structures and are not expected to be visually discernable from the existing facility. While the new structures have the potential to add to the existing visual character, the quality of the site will not be substantially or significantly degraded because the locations and designs of the new structures are similar to the existing equipment.

The Refinery site is zoned by the City of El Segundo as M-2 (Heavy Manufacturing), with a variety of zoning (commercial to industrial) surrounding the Refinery, reflecting the diverse land uses. Section 15-6B-7 of the City of El Segundo Municipal Code provides Site Development Standards with which all uses within the M-2 zone must comply. Section 15-6B-7B states that buildings and structures in the M-2 zone shall not exceed a height of 200 feet. Thus, the proposed project structures would be consistent and in compliance with the height requirements of the City of El Segundo.

The proposed project is located in an existing industrial facility and will be industrial in nature. The proposed project, once complete, will not be discernable from the existing Refinery and will not change any scenic vistas. No scenic resources are present within the Refinery. Therefore, the proposed project will not have substantial adverse effects on scenic vistas or scenic resources.

1. d) Construction activities associated with the proposed project are planned to occur over two shifts during the peak construction period; therefore, construction activities will occur during the nighttime as well as the daytime. Construction activities are proposed adjacent to the existing Refinery units, which are already lighted for safety purposes during nighttime operations. Additional lighting may be required to provide adequate lighting during nighttime construction activities, but these light sources will be directed towards the Refinery and the locations of construction activities (i.e., away from residential areas), are temporary, and are not expected to be noticeable to the surrounding community because of their central location in the Refinery (see Figure 1-3).

There will be minimal additional permanent light sources required as part of the proposed project. New lighting that will be installed on the proposed equipment (i.e., SRU, TGU, and Cogen Train D) will be consistent in intensity and type with the existing lighting on equipment and other nearby Refinery structures. Because of the central location of the proposed new sources, the light sources are expected to blend in with existing light sources and not be noticeable to the surrounding community. The new Refinery equipment will be illuminated at night for safety and security purposes.

Based on these considerations, the proposed project is not expected to create substantial new sources of light or glare which would adversely affect day or nighttime views in the area.

Conclusion

Based upon these considerations, no significant impacts on aesthetics (i.e., impacts to the visual character to the site and surrounding areas) are expected from the proposed project. Therefore, aesthetic impacts will not be analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
2.0 AGRICULTURE RESOURCES. Would the project:			
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☑
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☑
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	☐	☐	☑

Checklist Response Explanation

2. a) All proposed modifications would occur within the confines of the existing Refinery. The proposed project would be consistent with the heavy industrial zoning for the Refinery (M2). No agricultural resources are present at or in the vicinity of the Refinery and no new land will be acquired as part of the proposed project. Further, the proposed project would not convert farmland (as defined in Question 2.a) to non-agricultural use or involve other changes in the existing environment that could convert farmland to non-agricultural use or conflict with agricultural land uses, or Williamson Act contracts.

2. b) and c) Land in the vicinity of the Refinery is not currently zoned for agricultural use. The proposed project does not conflict with an existing agricultural zone or Williamson Act contract and does not include converting agricultural land for non-agricultural uses.

Conclusion

Based upon these considerations, no significant impacts on agricultural resources are expected from the proposed project. Therefore, agricultural resources impacts will not be further analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
3.0 AIR QUALITY. Would the project:			
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☑
b) Violate any air quality standard or contribute to an existing or projected air quality violation?	☑	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☑	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☑	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☑	☐
f) Diminish an existing air quality rule or future compliance requirement resulting in a significant increase in air pollutant(s)?	☐	☐	☑

Checklist Response Explanation

3. a) The Final 2007 Air Quality Management Plan (AQMP) demonstrates that the applicable ambient air quality standards can be achieved within the timeframes required under federal law. Growth projections from local general plans adopted by cities in the district are some of the inputs used to develop the AQMP. As indicated in the Population and Housing and Transportation/Traffic sections, the proposed project will only require approximately 12 additional Refinery employees and will not generate significant worker-related traffic during operation. Therefore, the proposed project will not cause increases in the growth projections in the City of El Segundo General Plan. Additionally, this project must comply with applicable SCAQMD requirements and control measures for new or modified sources. For example, new emission sources associated with the proposed project are required to comply with the SCAQMD's Regulation XIII - New Source Review requirements that include the use of Best Available Control Technology (BACT) and emission reduction credit offsets for any emission increases greater than one pound per day. It must also comply with prohibitory rules, such as SCAQMD Rule 403 – Fugitive Dust. By meeting these requirements, the project will be consistent with the goals and objectives of the AQMP.

3. b) Most of the proposed project components will generate emissions including the modifications to the No. 2 Crude Unit, the No. 2 Residuum Stripper Unit, the Isomax Unit, the FCC Unit, the Alkylation Unit, and others. The proposed project must comply with SCAQMD rules and regulations. Some portions of the proposed project such as Vapor Recovery and Flare System are being completed to reduce potential Refinery emissions and improve safety.

Construction activities associated with the proposed project would result in emissions of carbon monoxide (CO), particulate matter less than ten microns in diameter (PM10), volatile organic compounds (VOCs), nitrogen oxides (NOx) and sulfur oxides (SOx). Construction activities include standard land preparation activities involving grading, pouring new foundations, and all other activities associated with the installation of the new equipment. Construction-related activities will generate emissions from worker vehicles, trucks, and construction equipment. The air quality impacts associated with the construction phase of the proposed project are potentially significant and will be evaluated in the EIR.

The proposed project would add emission sources to the Refinery including compressors, pumps, valves, and flanges. Some of the proposed project modifications in the Isomax Unit and VRDS Unit will result in an increase in the throughput of the unit, and some new units will be installed that will increase emissions of criteria pollutants and greenhouse gases (i.e., the new Flare, Cogen Train D, SRU, SWS, and TGU). The SCAQMD requires the installation of BACT for new and modified emission sources within the South Coast Air Basin, which should minimize project-related emissions. Nonetheless, the proposed project impacts on air quality during the operational phase are potentially significant and will be evaluated in the EIR.

The proposed project may also alter the transport of raw materials to the Refinery and the transport of products from the Refinery. The emission impacts related to changes in the amount or type of materials transported will be evaluated in the EIR.

3. c) The proposed project may result in an increase in emissions from the operation of the Refinery and has the potential to result in cumulative impacts. Since the project-specific air quality impacts may be significant, they may contribute to impacts that are cumulatively considerable. The cumulative air quality impacts are potentially significant and will be evaluated in the EIR.

3. d) New emission sources associated with the proposed project may emit toxic air contaminants. The impact of the emissions of toxic air contaminants on sensitive populations, including individuals at hospitals, nursing facilities, daycare centers, schools, and elderly intensive care facilities, as well as residential and off-site occupational areas, will be evaluated in the EIR.

3. e) The proposed project is not expected to create significant objectionable odors, either during construction or during operations. Sulfur compounds (e.g., hydrogen sulfide) are the primary sources of odors from existing operations throughout the Refinery. The sulfur-bearing materials are processed in the proposed new SRU and the existing SRUs where they are converted to commercial grade (molten) sulfur, which does not emit an appreciable odor. The Refinery will continue to process sulfur-bearing materials in the existing SRUs and the proposed project would increase the sulfur production capacity of the Refinery. The proposed new TGU will use a mixture of methyl diethanol amine (MDEA) and an alkanolamine mixture, while the existing TGUs use sodium hydroxide and sodium bisulfite solutions. Sodium hydroxide, sodium bisulfite, MDEA, and an alkanolamine mixture do not produce odors. The use of the MDEA and the alkanolamine mixture is expected to be more efficient than the currently used solutions. The proposed project is not expected to increase the potential for odors since the exhaust from the SRU vents to the TGU where it is incinerated prior to discharge to atmosphere and the PRDs associated with natural gas and refinery fuel gas will be routed to the new Vapor Recovery and Flare System.

Ammonia will be used in the SCR to aid in the control of NOx emissions. Ammonia can have a strong odor; however, the proposed project is not expected to generate substantial ammonia emissions, since the project will use aqueous ammonia, and the ammonia will be stored in existing tanks with controls to reduce ammonia emissions and transported in enclosed piping to the SCR unit at the proposed Cogen Train D. Ammonia emissions from the SCR unit stack (also referred to as ammonia slip) will be limited to 5 parts per million (ppm). Since exhaust emissions are buoyant as a result of being heated, ammonia will disperse and ultimate ground level concentrations will be substantially lower than 5 ppm. Five ppm is below the odor threshold for ammonia of 20 ppm (OSHA, 2007).

The Refinery maintains a 24-hour environmental surveillance effort, which helps to minimize the frequency and magnitude of odor events. No odors are expected from the new equipment. In addition, all new and modified components of the proposed project will be required to comply with BACT requirements as well as existing SCAQMD rules and regulations, including Rule 402 - Prohibition of Nuisances. Recovering sulfur from process streams and compliance with BACT and Rule 402 are expected to help minimize the frequency and magnitude of odor events at the Refinery. Therefore, no significant odor impacts are expected from constructing and operating the proposed project.

3. f) The Final 2007 AQMP demonstrates that, with aggressive adoption and implementation of control measures, applicable federal ambient air quality standards can be achieved within the timeframes required under federal law. This proposed project must comply with applicable SCAQMD rules and regulations as well as control measures applicable to new or modified sources. For example, new emission sources associated with the proposed project are required to comply with SCAQMD Regulation XIII – New Source Review requirements that include the use of BACT. The project proponent must also comply with prohibitory rules, such as Rule 403, for the control of fugitive dust. By meeting these requirements, the project will be consistent with the goals and objectives of the AQMP to improve air quality in the Basin. Further, the proposed project is consistent with the Final 2007 AQMP and is not expected to diminish an existing air quality rule or a future compliance requirement.

Conclusion

Project-specific and cumulative adverse air quality impacts associated with increased emissions of air contaminants (both criteria air pollutants and toxic air contaminants) during the construction and operation phases of the proposed project will be evaluated in the EIR. Impacts to sensitive receptors will also be analyzed in the EIR.

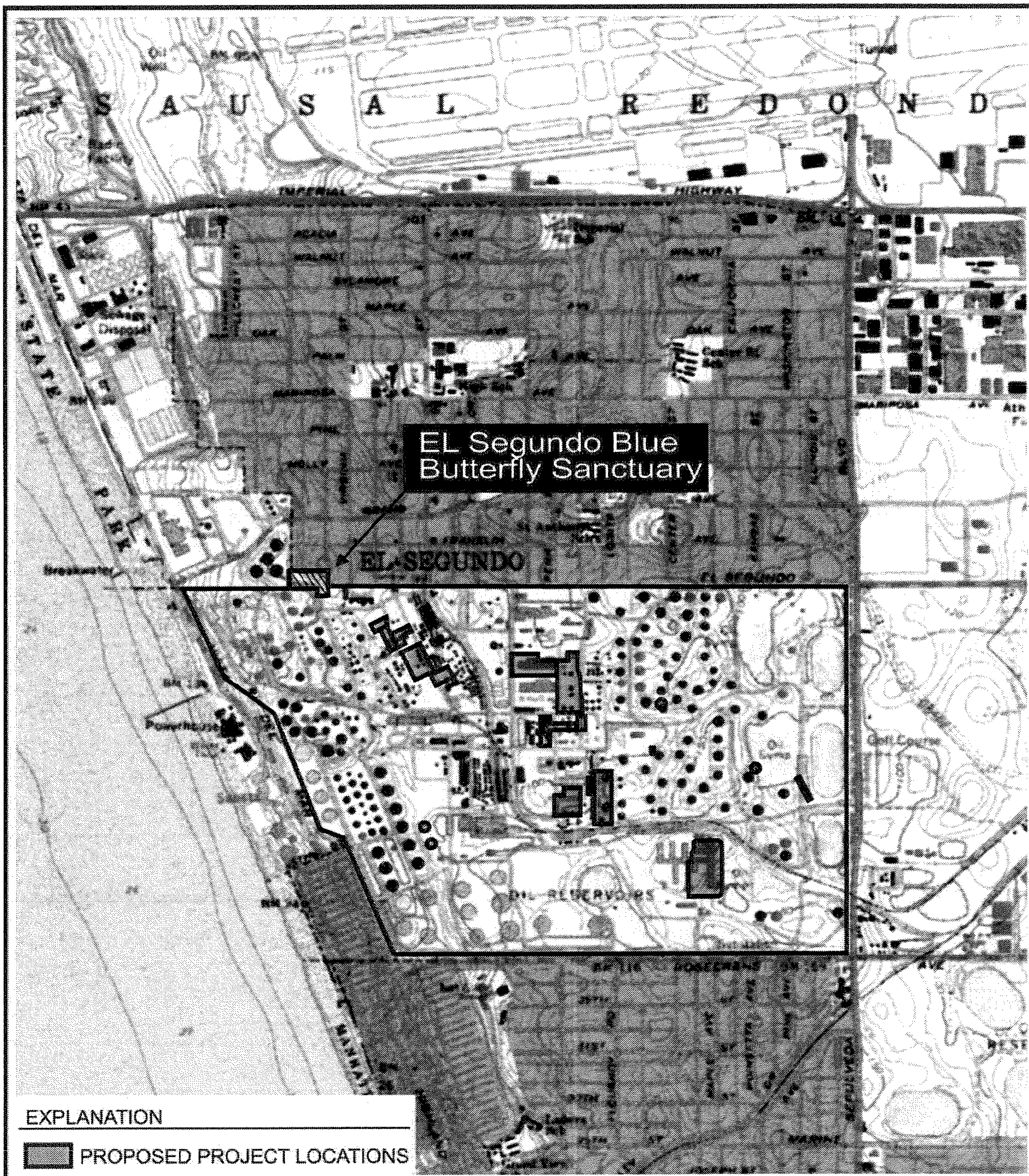
	Potentially Significant Impact	Less Than Significant Impact	No Impact
4.0. BIOLOGICAL RESOURCES. Would the project:			
a) Have substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☑
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☑

		Potentially Significant Impact	Less Than Significant Impact	No Impact
c)	Have a substantial adverse effect on federally protected wetlands as defined by §404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☑
d)	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☑
e)	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☑
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☑

Checklist Response Explanation

4. a), b), c), d), and f) The proposed project would be located within existing boundaries of the Chevron Refinery, which is zoned and has been used for heavy industrial purposes since 1911, and has already been graded and developed. The Refinery site does do not support riparian habitat, federally protected wetlands (as defined by §404 of the Clean Water Act), or migratory corridors. With the exception of some decorative landscaping around the perimeter of the site, plants have previously been removed from operating areas of the Refinery for safety reasons. There are three special-status species that have been reported in the immediate vicinity of the Refinery: two animal species (the El Segundo Blue Butterfly and the Pacific pocket mouse) and one plant species (the beach spectaclepod).

The El Segundo Blue Butterfly (*Euphilotes battoides allyni*) is a small (wing span of less than one inch), brightly colored butterfly that historically has been found in the El Segundo sand dunes of Los Angeles County. Because of extensive habitat loss, degradation, and fragmentation due to urban development, the butterfly's habitat has been reduced to two areas: sand dunes near the Los Angeles International Airport (LAX), which contain the largest population of the butterfly; and two acres at the butterfly sanctuary that was created within the property of the Chevron El Segundo Refinery (see Figure 2-1).



Environmental Audit, Inc.

El Segundo Blue Butterfly Sanctuary
Chevron El Segundo Refinery

Project No. 2505

Figure 2-1

N:\2505\El Segundo Blue Butterfly Sanctuary (rev.1).cdr

Original In Color

The El Segundo Blue Butterfly was listed as an endangered species by the federal government in 1976. The butterfly was discovered on an undeveloped portion of the Refinery property in 1975, and, shortly thereafter, the area where the butterfly was found in the northwest portion of the Refinery property was voluntarily fenced by Chevron to protect the butterfly's habitat and the coastal buckwheat plant (*Eriogonum parvifolium*), upon which the butterfly feeds during all stages of its life cycle.

Because the buckwheat plant at the Refinery's butterfly sanctuary has been threatened by various invasive species and annual grasses (e.g., tumbleweeds, rye grass, and ice plant), efforts have been made on an ongoing basis since the early 1980s to inhibit weed growth and stimulate buckwheat growth. Approximately 5,000 buckwheat plants have been transplanted at the Refinery since 1983 (Chevron 2005). In the mid 1980s, there were only about 400 of these butterflies at the Chevron butterfly sanctuary; at present there are approximately 10,000 (Chevron 2005b). The butterfly population on LAX property also has increased, from a population of approximately 500 in 1985 to between 40,000 and 50,000 in 2001 (City of Los Angeles, 2001).

The Pacific pocket mouse (*Perognathus longimembris pacificus*) is a small brownish rodent that lives in fine-grained sandy areas (coastal strand, coastal dunes, coastal sage scrub, and river alluvium) in the immediate vicinity of the Pacific Ocean in southwestern California (SCAQMD, 2001). Historically, the mouse's range extended from Los Angeles County south to the Mexican border, including portions of the Chevron Refinery property. Only a few known populations remain, and they are in Orange County (Dana Point) and San Diego County (Camp Pendleton). The Pacific pocket mouse was last reported in the area of the Chevron Refinery in 1938, and, thus, is not expected to exist at the Refinery at present because habitat that could be used by the Pacific pocket mouse is no longer present at the Refinery.

The beach spectaclepod (*Dithyrea maritime*) is a small low-growing perennial herb. The species is native to California and occurs in foredunes, active sand, and dune scrub from San Luis Obispo south to Baja California. The beach spectaclepod is considered extremely rare by the California Native Plant Society; it is listed as threatened by the State of California and as a Species of Concern by the federal government. The only reported occurrence for this plant at the Refinery site was in 1884, and the species is not expected to exist at the Refinery at present because the Refinery site has been continuously cleared of all vegetation since 1911 for safety reasons (SCAQMD, 2001).

The proposed project activities will take place at an existing Refinery, whose active areas (including the locations where Refinery equipment will be modified and constructed) have been highly disturbed and contain no significant biological resources. No impacts are expected to special status species. The Pacific pocket mouse and beach spectaclepod have not been sighted at the Refinery in decades (since 1938 for the mouse and since the late 19th century for the spectaclepod).

The Refinery area population of the federally endangered El Segundo Blue Butterfly has increased substantially over the past 20 years, due to the existence of and habitat improvements at the Refinery butterfly sanctuary. These increases in the El Segundo Blue Butterfly population have occurred while Refinery operations have continued nearby. The distance between the project construction site and the Blue Butterfly Sanctuary is approximately 650 feet, with other existing Refinery equipment located in closer proximity. The proposed project would not be expected to have significant adverse impacts on the El Segundo Blue Butterfly.

In summary, the proposed project would have no significant adverse impacts on special-status animal or plant species.

The proposed project does not occur within the confines of the Refinery butterfly sanctuary and, therefore, does not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

4. e) Because modifications to implement the proposed project will occur entirely within the boundaries of the existing Refinery, the project will not conflict with local policies or ordinances protecting biological resources nor local, regional, or state conservation plans of any type.

Conclusion

The proposed project is not expected to adversely affect special-status animal and plant species or other biological resources (riparian habitats, wetlands, or migratory corridors); or conflict with ordinances or conservation plans. Therefore, biological resources will not be evaluated further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
5.0 CULTURAL RESOURCES. Would the project:			
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☑
b) Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?	☐	☐	☑
Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☑

	Potentially Significant Impact	Less Than Significant Impact	No Impact
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☑

Checklist Response Explanation

5. a) CEQA Guidelines §15064.5 states that resources listed in the California Register of Historical Resources or in a local register of historical resources are considered "historical resources." A records search was conducted at the South Central Coastal Information Center (SCCIC) in August 2005 of all recorded archaeological sites and survey reports within a 0.5 mile radius of the El Segundo Refinery (SCAQMD, 2006). Federal, state and local historic listings were reviewed along with historic maps. In addition, this background research was supplemented by an internet search for relevant historical information. The research revealed that the listings of the National Register of Historic Places, California Historical Landmarks, California State Historic Resources Inventory, California Points of Historical Interest, and Los Angeles County Landmarks include no properties within the Refinery. One historic site, P-186856, (that could include buildings, structures, objects, districts, and landscapes, the details of which are kept confidential to protect the resource) is recorded at the outer edge of the 0.5-mile radius and outside of the Refinery boundary (SCAQMD, 2006, Appendix A). Because the proposed project activities will occur entirely within the existing Refinery boundaries, site P-186856 would not be directly or indirectly impacted by the proposed project. Based on the results of these records searches, the proposed project will not cause an adverse change in the significance of a resource listed in the California Register of Historical Resources or in a local register of historical resources.

Additionally, CEQA Guidelines §15064.5(a)(3) states that "generally, a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing in the California Register of Historical Resources including the following:

(A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(B) Is associated with the lives of persons important in our past;

(C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values;

(D) Has yielded or may be likely to yield information important in prehistory or history".

The California Register eligibility criteria are modeled on those of the eligibility criteria of the National Register of Historic Places. Generally, resources (buildings, structures, equipment) that are less than 50 years old are excluded from listing in the National Register of Historic Places unless they can be shown to be exceptionally important (SCVTA/FTA, 2004). The proposed project will not affect any structures that are more than 50 years old and, because of the industrial nature of the structures onsite, are not considered to be exceptionally important. Therefore, the proposed project will not cause an adverse change in the significance of a resource potentially eligible for listing in the California Register of Historical Resources.

5. b), c), and d) The August 2005 records search indicated that 14 archaeological investigations have been performed within a 0.5-mile radius of the Refinery, including three surveys of small linear areas within the Refinery boundaries (SCAQMD, 2006). No prehistoric sites or Native American sacred lands are recorded within the Refinery boundaries or within a 0.5-mile radius of the facility. No paleontological resources or unique geological features are known to exist at the facility.

The 90 plus years of operations at the El Segundo Refinery have included extensive ground disturbance associated with the construction and operation of Refinery facilities and equipment. Proposed project activities will take place in areas where the ground surface has been previously disturbed. The extent of previous earth disturbance has reduced the likelihood that previously unknown archaeological or paleontological resources will be encountered during project construction. However, it is possible that intact prehistoric deposits may occur below the disturbed horizon, although the proposed project will not involve extensive subsurface construction activities.

While the likelihood of encountering cultural resources is low, if such resources were to be encountered unexpectedly during ground disturbance associated with construction of the proposed project, there would be the potential for significant adverse impacts. To minimize the risk of adverse impacts occurring, project construction will incorporate a number of standard protective measures during earth-disturbing activities:

- If cultural resources are exposed, a professional archaeologist and a Gabrielino/Tongva representative will be retained to monitor the subsurface work;
- The archaeological monitor will have the authority to temporarily halt or redirect earth disturbance work in the vicinity of the exposed cultural resources, so the find can be evaluated and mitigated as appropriate; and
- As required by State law, if human remains are unearthed, no further disturbance will occur until the County Coroner has made the necessary findings concerning the origin and disposition of these remains. The Native American Heritage Commission will be notified if the remains are determined to be of Native American descent.

Conclusion

The proposed project is not expected to have significant adverse impacts on historic or prehistoric cultural resources or paleontological resources. Therefore, cultural resources will not be evaluated further in the EIR.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
6.0	**ENERGY.** Would the project:			
a)	Conflict with adopted energy conservation plans?	☐	☐	☑
c)	Result in the need for new or substantially altered power or natural gas utility systems?	☐	☑	☐
d)				
c)	Create any significant effects on local or regional energy supplies and on requirements for additional energy?	☑	☐	☐
d)	Create any significant effects on peak and base period demands for electricity and other forms of energy?	☑	☐	☐
e)	Comply with existing energy standards?	☐	☑	☐

Checklist Response Explanation

6. a) and e) The proposed project is not expected to conflict with energy conservation plans or energy standards. The proposed project will include the installation of additional Cogeneration Facilities. Conserving energy and complying with existing energy standards minimizes operating costs and, therefore, encourages the efficient use of energy. New equipment installed as part of the proposed modifications is expected to be as energy efficient as possible. Further, energy used to operate the new equipment is not considered a wasteful use of energy that will interfere or conflict with existing energy conservation plans. The proposed project is not expected to conflict with an adopted energy conservation plan because there is no known energy conservation plan that would apply to this proposed project. The proposed project is not expected to substantially increase the Refinery's energy demand.

6. b), c), and d) The Chevron Refinery is currently served by three existing Cogeneration Units and supplemented by Southern California Edison (SCE) for electricity supply. Natural gas is supplied by the Southern California Gas Company and used in conjunction with refinery fuel gas.

Construction: Electrically powered welding machines and other construction equipment may be used during construction, but the increase in electrical demand will be within the variation in load already supplied by SCE. Because of the limited availability of natural gas-powered construction equipment, it is expected that construction could include a few, but very limited number of this type of equipment. As a result, limited or no impacts on natural gas utility systems are expected during construction activities. Therefore, no significant adverse impacts on energy are expected during the construction period.

Operation: The proposed project is expected to require additional electricity. The additional Cogen Train D, which is part of the proposed project, is expected to supply all the power for the proposed project. No increase in electricity is expected to be required from a public utility once the project is complete. However, as the project moves towards completion additional electricity may be required prior to Cogen Train D becoming operational. The availability of the interim demand for power is being investigated. Therefore, peak demand on local and regional energy supplies are potentially significant and will be evaluated in the EIR.

The proposed project will use either natural gas, Refinery fuel gas, or a combination and will result in a maximum increase of approximately 14 million standard cubic feet per day in natural gas use at the Cogen Train D, the SRU and TGU, and the new Flare. Sufficient natural gas supplies exist, about 5,700 million cubic feet per day (SCAQMD, 2007), so that the increase in natural gas use is not expected to be significant.

Conclusion

The proposed project-specific energy resources impacts associated with increased demand for natural gas do not have a potential to create significant adverse impacts. Therefore, energy resource impacts with respect to natural gas will not be evaluated further in the EIR. However, the proposed project is expected to increase electricity demand, and, therefore, energy resource impacts with respect to electricity will be evaluated further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
7.0 GEOLOGY AND SOILS. Would the project:			
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☑	☐
• Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	☐	☐	☑

		Potentially Significant Impact	Less Than Significant Impact	No Impact
•	Strong seismic ground shaking?	☐	☑	☐
•	Seismic–related ground failure, including liquefaction?	☐	☑	☐
•	Landslides?	☐	☐	☑
e)	Result in substantial soil erosion or the loss of topsoil?	☐	☑	☐
f)	Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☑	☐
d)	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☑	☐
e)	Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☑

Checklist Response Explanation

7. a), c), and d) Geological Hazards The proposed project will be constructed in an area of known seismic activity. Approximately 35 active faults are known to exist within a 50-mile radius of the Refinery. Of primary concern are two active faults: the Newport-Inglewood Fault, approximately five miles north of the Refinery, and the Palos Verdes Fault, approximately 3.8 miles south of the site.

The Newport-Inglewood Fault Zone represents the most significant source of strong seismic ground shaking at the Refinery. The Newport-Inglewood Fault Zone extends more than 40 miles from Newport Bay to Beverly Hills and trends to the northwest. The greatest concentration of seismic events on the Newport-Inglewood Fault Zone is related to the 1933 Long Beach earthquake and its aftershocks. The fault is considered capable of generating a 6.9 magnitude earthquake.

Another significant fault in the immediate Refinery vicinity is the Palos Verdes Fault Zone. This fault extends approximately 72 miles from Santa Monica Bay south to Lausen Knoll in the southern San Pedro Channel. The Palos Verdes fault is considered capable of a 7.1 magnitude earthquake. As cited in the Final EIR for the Chevron-El Segundo Refinery

CARB Phase 3 Clean Fuels Project, evaluations by the California Division of Mines and Geology (CDMG) indicate that there is a 10 percent probability of earthquake ground motion exceeding 0.45g at the Refinery site over a 50-year period (CDMG, 1998).

Although within a seismically active area, according to the Alquist-Priolo Earthquake Fault Zoning Maps and Fault Activity Map of California (1994), the El Segundo Refinery is not located on a fault trace that would define the site as a special seismic study zone under the Alquist-Priolo Act. Thus, the risk of earthquake-induced ground rupture is considered less than significant.

Based on the historical record, it is highly probable that earthquakes will affect the Los Angeles region in the future. Research shows that damaging earthquakes will occur on or near recognized faults which show evidence of recent geologic activity. The proximity of major faults to the Refinery increases the probability that an earthquake may impact the Refinery. There is the potential for damage in the event of an earthquake. Impacts of an earthquake could include structural failure, spill, etc. The hazards of a hazardous materials release during an earthquake are addressed in the "8. Hazards and Hazardous Materials" section below.

New structures must be designed to comply with the Uniform Building Code Zone 4 requirements since the proposed project is located in a seismically active area. The City of El Segundo is responsible for assuring that the proposed project complies with the Uniform Building Code as part of the issuance of the building permits and can conduct inspections to ensure compliance. The Uniform Building Code is considered to be a standard safeguard against major structural failures and loss of life. The goal of the code is to provide structures that will: (1) resist minor earthquakes without damage; (2) resist moderate earthquakes without structural damage, but with some non-structural damage; and (3) resist major earthquakes without collapse, but with some structural and non-structural damage. The Uniform Building Code bases seismic design on minimum lateral seismic forces ("ground shaking"). The Uniform Building Code requirements operate on the principle that providing appropriate foundations, among other aspects, helps to protect buildings from failure during earthquakes. The basic formulas used for the Uniform Building Code seismic design require determination of the seismic zone and site coefficient, which represent the foundation conditions at the site.

The Chevron Refinery will be required to obtain building permits, as applicable, for all new structures at the site. The Refinery shall submit building plans to the City of El Segundo for review. The Chevron Refinery must receive approval of all building plans and building permits to assure compliance with the latest Building Code adopted by the City prior to commencing construction activities. The issuance of building permits from the local agency will assure compliance with the Uniform Building Code requirements, which include requirements for building within seismic hazard zones. No significant adverse impacts from seismic hazards are expected since the project will be required to comply with the Uniform Building Codes.

The proposed project site is not subject to landslide or mudflow since the site is flat. Therefore, no significant adverse impacts due to landslides or mudflows are expected.

Liquefaction is a mechanism of seismic ground failure in which earthquake-caused ground motion causes loose, water-saturated, cohesionless soils to be transformed to a liquid state. The Refinery site has not been identified as an area where liquefaction is considered a significant potential risk (CDMG, 1998 and SCAQMD, 2001). The site also is not considered to be an area with the potential for permanent ground displacement due to earthquake-induced landslides or due to heavy precipitation events (CDMG, 1998 and SCAQMD, 2001).

7. b) Topography and Soils The proposed project is located within the confines of the existing Chevron Refinery. Concrete foundations presently support Refinery structures and equipment. Most of the Refinery roads, including all high traffic roads have been paved. Some portions of the site have also been landscaped. The operating portions of the Refinery are relatively flat. No unstable earth conditions, loss of top soil, changes in topography or changes in geologic substructures are anticipated to occur with the proposed project because of the limited grading and excavation involved. No significant adverse impacts on topography and soils are expected.

The proposed project involves adding new equipment to existing facilities so construction activities are limited to foundation work and trenching for piping. At most, ground disturbance will be limited to installing foundations for new units and trenching for piping and utilities. Since the proposed project will occur within already developed facilities, no significant adverse impacts related to soil erosion are expected. No significant change in topography is expected because little grading/trenching is required that could substantially increase wind erosion or runoff from affected sites.

The proposed project will be required to comply with SCAQMD Rule 403 – Fugitive Dust, which imposes requirements to minimize dust emissions associated with wind erosion. Relative to operation, no change in surface runoff is expected because surface conditions will remain relatively unchanged. Further, surface runoff is minimized because surface runoff at all facilities is typically captured, treated, and released to the ocean.

7. e) Waste Discharge The proposed project is expected to generate additional wastewater discharged by the Refinery. The Chevron Refinery discharges wastewater to the ocean under a National Pollutant Discharge Elimination System (NPDES) permit. Neither the Refinery nor the proposed project will use septic tanks or alternative wastewater disposal systems, therefore, no significant adverse impacts on soils from alternative wastewater disposal systems are expected.

Conclusion

No significant adverse impacts on geology and soils are expected from the proposed project. Therefore, geology and soils impacts will not be evaluated further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
8.0 HAZARDS AND HAZARDOUS MATERIALS. Would the project:			
a) Create a significant hazard to the public or the environment through the routine transport, use, and disposal of hazardous materials?	☑	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☑	☐	☐
c) Emit hazardous emissions, or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☑	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would create a significant hazard to the public or the environment?	☐	☑	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☑
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☑	☐

		Potentially Significant Impact	Less Than Significant Impact	No Impact
h)	Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☑
i)	Significantly increase fire hazard in areas with flammable materials?	☑	☐	☐

Checklist Response Explanation

8. a) and b) Though hazard analyses have been previously completed for the equipment at the existing Refinery, the proposed project may alter the existing hazards setting. For example, some of the new units that are proposed to be installed, such as the new SWS and SRU, may increase the amount of hydrogen sulfide containing materials handled on-site and increase the potential hazards at the Refinery in the event of a release from the SWS or SRU. The proposed project could also increase the potential for fires and explosions associated with additional storage/use of flammable materials (i.e., LPG, gasoline, diesel, etc.). In addition, the proposed project may increase the quantity of hazardous materials that will need to be transported to or from the Refinery (e.g., LPG, etc.). The proposed project may also alter the transportation modes for feedstock and products delivered to and shipped from the Refinery and related terminals. The potential hazard impacts related to the proposed project are potentially significant and will be addressed in the EIR.

Increases in potential hazards associated with the implementation of the proposed project could potentially alter the probability for upset and accident conditions that could cause a release of hazardous materials into the environment. The potential effects of an accidental release of the additional hazardous materials being stored, used and transported as part of implementing the proposed project will be evaluated in the EIR.

8. c) The proposed project affected units are not located within a one-quarter mile of an existing or proposed school site. Since the proposed project will not create emissions of acutely hazardous materials, or handle hazardous or acutely hazardous materials, substances or waste within one-quarter of a mile of an existing or proposed school, no potential hazards impacts are expected to affect schools.

8. d) The existing Refinery is listed as a hazardous materials site compiled pursuant to Government Code §65962.5; however, the proposed project equipment and activities are similar to the existing equipment and activities related to refining crude oil. The proposed project will be constructed within the confines of the existing Chevron Refinery. In 1985, the Regional Water Quality Control Board (RWQCB) adopted Order 85.17 requiring the Chevron Refinery (and other local refineries and terminals) to conduct subsurface investigations of soil and ground water. CEQA Section 21092.6 requires the lead agency to consult the lists compiled pursuant to Section 65962.5 of the Government Code to determine whether the project and any alternatives are located on a site which is included on such list. The Refinery is included on the list because it is on a list of Cleanup and Abatement Orders prepared by the State Water Resources Control Board (Order No. 85-17). For sites which are listed pursuant to Government Code Section 65962.5, the following information is requested:

Applicant:	Chevron Products El Segundo Refinery
Address:	324 West El Segundo Boulevard, El Segundo, California 90245
Phone:	(310) 615-5267
Address of Site:	324 West El Segundo Boulevard, El Segundo, California 90245
Local Agency:	City of El Segundo
Assessor's Book:	4138-016-005
List:	Cleanup and Abatement Order
Regulatory ID No:	008336901.
Date of List:	February 14, 1985

The proposed project is not expected to adversely affect the Refinery's Cleanup and Abatement Order. The Order will remain in effect and continue to establish requirements for site monitoring and clean up of existing contamination. Currently, there is no evidence that soil contamination is located within the areas proposed for grading, trenching or excavation. Construction activities could uncover contaminated soils, given the heavily industrialized nature of the Refinery and the fact that refining activities, petroleum storage, and distribution have been conducted at the site for a number of years.

Excavated soils that contain concentrations of certain substances, including heavy metals and hydrocarbons, generally are regulated under California hazardous waste regulations. Any required soil remediation will be handled under the approved SCAQMD Rule 1166 plan by using an organic vapor analyzer and visual inspection for detection of VOC and other hydrocarbons. Soil which demonstrates a VOC reading in excess of 50 ppm or greater at a distance of up to three inches from the surface or which otherwise appears contaminated will be segregated and stockpiled for further analysis. Soils, which exceed the standards specified in the plan, will be segregated and managed as contaminated soil with treatment or disposal managed in accordance with state hazardous waste regulations. No significant adverse impacts are expected from the construction-related potential for encountering contaminated soils during excavation since there are numerous local, state (Title 22 of the California Code of Regulations) and federal rules which regulate the handling, transportation, and ultimate disposition of contaminated soils, including SCAQMD Rule 1166. Title 22 of the California Code of Regulations establishes many requirements for hazardous waste handling, transport and disposal, including requirements to use approved disposal/treatment facilities, use certified hazardous waste transporters, and use manifests to track hazardous materials, among many other requirements. Soil sampling will be conducted in the event excavation is necessary and the Refinery will comply with all applicable rules and regulations.

8. e) and f) The Refinery is located within two miles of LAX. However, the modifications to the facilities required for the proposed project are comparable to existing facilities and would not increase safety hazards for people residing or working in the proposed project area. The height of the proposed new process equipment will not exceed the 200-foot height threshold that would require Federal Aviation Administration notification, as specified in 14 CFR §17.13(a) and Federal Aviation Regulation Part 77. Therefore, no safety hazards are expected from the proposed project at any airports in the region.

There are no private airstrips in the vicinity of the Refinery. Therefore, the proposed project would not be exposed to hazards from private airstrip activity.

8. g) The proposed project is not expected to interfere with adopted emergency response plans or emergency evacuation plans. The proposed project will result in modifications to the existing Refinery. All construction activities will occur within the confines of the existing Refinery or nearby, so that no emergency response plans would be effected. Chevron has implemented emergency response plans at its facility, but no modifications to the plans are expected as a result of the proposed project because there will be no change in the materials stored on site or the manner in which those materials are handled. The proposed project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evaluation plan. Procedures for emergency response are provided to employees along with training guidelines and the use of personal protective equipment. All construction and operation personnel will be safety-trained in accordance with Chevron's procedures. The proposed project is not expected to alter the route that employees would take to evacuate the site, as the evacuation routes generally direct employees outside of the main operating portions of the Refinery. The proposed project is not expected to impact any emergency response plans.

8. h) The proposed project will not increase the existing risk of fire hazards in areas with flammable brush, grass, or trees and will not expose people or structures to wildland fires because the Refinery is not located near any forested wildlands. The Refinery will continue to use and produce flammable materials. No substantial wildland or native vegetation exists within the Refinery. Only landscape vegetation is present around the perimeter of the Refinery. Therefore, no significant increase in wildland fire hazards is expected at the Refinery associated with the proposed project.

8. i) New vessels, such as the knock-out drum for the vapor recovery system and the new storage tanks, will be required as part of the proposed project and are expected to contain flammable materials. Due to the proximity of the new vessels and the sources of these flammable materials within the Refinery, should a fire occur, it would likely remain on-site and not be exposed to the public. Nonetheless, because existing components at the Refinery currently store large volumes of flammable materials and the proposed project will also involve flammable materials, the potential fire hazards associated with the proposed project will be evaluated in the EIR.

Conclusion

The effects of an accidental release of hazardous materials being stored, used, and transported are potentially significant and will be evaluated in the EIR. Fire hazards associated with the proposed new vessels will also be analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
9.0 HYDROLOGY AND WATER QUALITY. Would the project:			
a) Violate any water quality standards or waste discharge requirements?	☐	☑	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☑
c) Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?	☐	☐	☑
d) Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	☐	☑	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☑	☐
f) Otherwise substantially degrade water quality?	☐	☑	☐

		Potentially Significant Impact	Less Than Significant Impact	No Impact
g)	Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☑
h)	Place within a 100-year flood hazard area structures, which would impede or redirect flood flows?	☐	☐	☑
i)	Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☑
j)	Inundation by seiche, tsunami, or mudflow?	☐	☑	☐
k)	Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☑	☐
l)	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☑	☐	☐
m)	Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☑	☐
n)	Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☑	☐	☐
o)	Require in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☑	☐

Checklist Response Explanation

9. a), f), k), l), and o) Wastewater Generation Refinery wastewater is currently collected and treated in two separate drain and treatment systems: a segregated system and an unsegregated system. The unsegregated system, which consists of an API separator and induced air flotation (IAF) units, is normally used for non-process wastewater, including cooling tower blowdown, steam condensate, a portion of the water pumped from groundwater recovery wells, and other wastewater streams containing free oil recovered with primary (physical) treatment only. Primary treatment consists of the separation of oil, water, and solids in two stages. During the first stage (API separator), wastewater moves very slowly through the separator allowing free oil to float to the surface and be skimmed off and solids to settle to the bottom. Periodically, the separator is shut down and the sludge is collected for disposal. The second stage utilizes an IAF unit, which bubbles air through the wastewater, and both oil and suspended solids are skimmed off the top. The unsegregated system is also used to collect and treat stormwater. Both structural (impoundments, berms, and curbs) and non-structural (inspections and training) controls are used to keep contaminants from entering the unsegregated system. The unsegregated system can be operated such that flow can be diverted to effluent diversion tankage or to the segregated treatment system, where additional treatment can be performed.

The segregated system is normally used to treat process wastewater containing emulsified oil, organic chemicals, and a portion of the water pumped from groundwater recovery wells. This system consists of gravity separators, a dissolved air flotation (DAF) unit, and activated sludge units for secondary (biological) treatment. In secondary treatment, dissolved oil and other organic pollutants may be consumed biologically by microorganisms. Effluent that does not meet the discharge limits may receive additional solids removal from an auxiliary off-specification DAF unit or be routed to two auxiliary effluent diversion tanks for additional IAF treatment. The biosolids from the biological treatment are disposed to the sanitary sewer for treatment by the Hyperion Treatment Plant under an Industrial Waste Discharge Permit.

The proposed project is expected to generate effluent water composed of cooling tower and boiler blowdown and unrecycled stripped water from the SWS. The existing treatment facilities onsite may have the capability to treat the project wastewater to permit limits. However, further analysis is necessary to determine the extent, if any, of the modifications. Therefore, potentially significant adverse impacts associated with wastewater discharges will be analyzed further in the EIR.

9. b) and n) Water Supply The Refinery currently consumes approximately 10 million gallons of water per day. Approximately 2.6 million gallons per day of fresh/potable water, which is produced by the West Basin Municipal Water District (WBMWD), is used. In addition, approximately 7.5 million gallons per day of reclaimed water, which is also produced by the WBMWD, is consumed. The WBMWD applies tertiary treatment to the secondary-treated effluent from the City of Los Angeles Hyperion Treatment Plant. Approximately 200,000 gallons of reclaimed water per day is used for irrigation of Refinery perimeter landscaping, approximately 3.5 million gallons per day of denitrified reclaimed water is used for the cooling towers, and approximately 3.8 million gallons per day of demineralized reclaimed water is used for boiler feed water.

As part of the proposed project, boiler feed water and cooling tower makeup water will be required. No demand on groundwater or potable water will be made by the project. The WBMWD will supply reclaimed water for the project consistent with reclaimed water currently supplied for similar uses at the Refinery The additional reclaimed water supplied by WBMWD may require expansion of the WBMWD treatment facility. Therefore, potentially significant adverse impacts associated with water demand will be analyzed further in the EIR.

9. c), d), e), and m) Surface Water The proposed project would be constructed at an existing Refinery and involves the construction of new structures and the demolition and replacement of others. The Refinery is mostly paved, and the proposed project primarily consists of modifications to the existing Refinery, so minimal grading will be required. Ground disturbance will be limited to activities required to install foundations and trenching. The proposed project is not expected to increase the stormwater runoff from the Chevron Refinery. No new storm drainage facilities, expansion of existing storm facilities, changes to drainage facilities, or changes in the drainage patterns are expected as part of the proposed project. Since stormwater discharge or runoff is not expected to change in volume or water quality, no significant adverse stormwater quality or stormwater drainage impacts are expected to result from the operation of the proposed project.

9. g), h), and i) Flood Hazards The proposed project would be constructed at an existing Refinery and does not include the construction of any housing, nor would it require placing housing within a 100-year flood hazard area. The Refinery is not located within a 100-year flood hazard area so the proposed project would not impede or redirect 100-year flood flows. The proposed project is not located within a flood zone and would not expose people or property to any known flood-related hazards. Thus, no significant adverse impacts associated with flood hazards are expected.

9. j) Other Hydrology Impacts The Refinery is located approximately 900 feet from the ocean at elevations from 45 feet to 174 feet above sea level. Based on the Refinery's distance and elevation in relation to the ocean, the proposed project is not expected to result in increased risk of seiche or tsunami. The proposed project site is located in a flat area with no hills or mountains nearby so the potential for significant adverse impacts from mudflows is considered less than significant. Thus, no significant adverse impacts associated with seiches, tsunamis, or mud flows are expected.

Conclusion

The potential adverse impacts of the proposed project on hydrology and water quality resources, with the exception of wastewater treatment facilities and water supply facilities, are expected to be less than significant and will not be analyzed further in the EIR. The potential adverse impacts of the proposed project on wastewater treatment facilities and water supply facilities will be evaluated further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
10.0 LAND USE AND PLANNING. Would the project:			
a) Physically divide an established community?	☐	☐	☑
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☑
c) Conflict with any applicable habitat conservation or natural community conservation plan?	☐	☐	☑

Checklist Response Explanation

10. a) The proposed project includes improvements and modifications within an existing industrial facility that is zoned and used for heavy manufacturing. No established communities are located on the Refinery property, and consequently, the proposed project will not physically divide an established community.

10. b) The Refinery is located in the City of El Segundo within Los Angeles County in an urbanized area which includes a substantial amount of industrial development, due to the proximity of LAX. The areas surrounding the Refinery can generally be characterized as a blend of heavy and light industrial, commercial, medium- and high-density residential, and industrial/manufacturing.

Land use at the Refinery and in the surrounding vicinity is consistent with the City of El Segundo General Plan land use designations for the area. The Land Use element of the General Plan currently in force was adopted in December 1992, and no revisions have occurred since that time (City of El Segundo, 2007). The strip of development on the north side of El Segundo Boulevard between Main Street and Richmond Boulevard, northeast of the Refinery's main office visitor parking lot and approximately one-half mile west of the No. 4 Crude Unit is part of the Downtown Specific Plan, adopted in August 2000. The Refinery site is zoned by the City of El Segundo as Heavy Industrial (M-2) (City of El Segundo, 2007a).

The overall activities and products produced at the Refinery will remain the same. The proposed modifications would not conflict with the City of El Segundo General Plan land use designation for the Refinery site nor would they conflict with the Downtown Specific Plan for the area north of the Refinery site. The proposed project would not require zoning or land use changes. The modifications and additions proposed at the Refinery as part of the proposed project would be subject to plan check review by the City of El Segundo during the building permit approval process. Since the proposed project is consistent with all zoning ordinances and General and Specific Plan policies and goals, no significant adverse land use impacts are expected from the proposed project.

10. c) Because the location of the proposed project is in an industrialized area for which no habitat or natural community conservation plans exist, the proposed project will not conflict with local habitat conservation plans or natural community conservation plans. (See also the discussion for item 4.e).)

Conclusion

The proposed project would not physically divide an established community and it would not conflict with the applicable land use plans, policies, and regulations of the City of El Segundo or create any significant adverse land use impacts. Therefore, land use and planning impacts will not be discussed further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
11.0 MINERAL RESOURCES. Would the project:			
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☑
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☑

Checklist Response Explanation

11. a) & b) The proposed project will be constructed on land within an existing industrial site. There are no known mineral resources on the Refinery site. Any potential loss of mineral resources from the extraction of the crude oil processed takes place off-site and will continue regardless of the proposed project. Therefore, the proposed project will not result in the loss of a known mineral resource that would be of value to the region and residents of the state. Similarly, because there are no known mineral resources on the project site, the project will not result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Conclusion

No significant adverse impacts to mineral resources are expected from the construction and operation of the proposed project. Therefore, mineral resources impacts will not be analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
12.0 NOISE. Would the project result in:			
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☑	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☑	☐	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☑	☐	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☑	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☑

Checklist Response Explanation

12. a), b), c), and d) Construction activities associated with the proposed project will generate noise from heavy construction equipment and construction-related traffic. The types of construction equipment that will be used at the Refinery include, but are not limited to, welding machines, trucks, cranes, compressors, loaders, concrete pumps, graders, and pavers. The estimated noise level during installation of various equipment is expected to average about 80 decibels (dBA) at 50 feet from the center of construction activity. Most of the construction noise sources will be located at or near ground level, so the noise levels are expected to attenuate. Nonetheless, the potential generation and exposure to construction noise impacts may be significant.

Once constructed, the proposed project is expected to produce noise in excess of current operations. The proposed project will add new noise sources to the Refinery including compressors, pumps, and fans. These anticipated increases in noise sources are potentially significant and the impacts of noise generation and excessive groundborne vibration will be analyzed further in the EIR.

12. e) and f) The proposed project site is not located within an airport land use plan or within the vicinity of a private airstrip. The proposed project is located within two miles of LAX. The proposed project would not add residential units to the area. The types of noise expected from the proposed project would be unlikely to significantly interact with noise generated from the airport, since the new equipment would be located about two miles south of the airport. Further, the Refinery is not located within the normal flight pattern of the airport. Thus, the proposed project would not increase the noise levels to people residing or working in the area, relative to existing noise levels from LAX.

Conclusion

The noise impacts associated with the proposed project are potentially significant and will be analyzed further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
13.0 POPULATION AND HOUSING. Would the project:			
a) Induce substantial growth in an area either directly (for example, by proposing new homes and businesses) or indirectly (e.g. through extension of roads or other infrastructure)?	☐	☐	☑

	Potentially Significant Impact	Less Than Significant Impact	No Impact
a) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☑
b) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☑

Checklist Response Explanation

13. a), b), and c) Construction of the proposed project will take place over a period of approximately 24 months at an existing Refinery located in a highly urbanized and populous area of southern California. At the peak of construction, approximately 1,000 temporary construction jobs will be created by the proposed project. Because of the large size of the construction work force available in the southern California area, all 1,000 temporary construction jobs are expected to be filled from the existing regional labor pool. Once construction is completed, approximately 12 additional staff is expected to be needed at the Refinery for long-term operation of the proposed project. Thus, the proposed project will not induce substantial growth either directly or indirectly.

Because the proposed project will occur within an existing facility located in a highly urbanized area, no additional housing will be necessary to accommodate the labor force needed during construction and, further, no existing housing or population will be displaced. Substantial housing growth in the area will not occur as a result of the proposed project. Therefore, no significant adverse population or housing impacts are expected to result from the proposed project.

Conclusion

No significant adverse impacts on population size, population distribution, or housing are expected to result from proposed project construction and operation. Therefore, population and housing impacts will not be discussed further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
14.0. PUBLIC SERVICES. Would the proposal result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:			
a) Fire protection?	☐	☑	☐
b) Police protection?	☐	☑	☐
c) Schools?	☐	☐	☑
d) Parks?	☐	☐	☑
e) Other public facilities?	☐	☐	☑

Checklist Response Explanation

14. a) To respond to emergency situations, the Chevron El Segundo Refinery maintains an on-site fire department. The Refinery fire department adheres to National Fire Protection Association standards and is recognized as a professional functioning fire department by the California State Fire Marshal's office. The department is staffed with trained and certified fire fighters and emergency medical technicians. The Refinery fire department is capable of responding to petroleum and structure fires, hazardous materials releases, and confined-space rescues on average within three minutes. Due to the local proximity of the Refinery fire department, the response in containing and controlling fire situations is much more effective.

The on-site fire department holds regular training sessions and drills in conjunction with local fire departments (e.g., City of El Segundo). Also, the Refinery is active in the Beach Cities Community Awareness and Emergency Response (CAER) organization, where industry and local government agencies coordinate emergency response activities, and is a sponsor of the Community Alert Network (CAN) telephone call-out system.

The Chevron fire department includes a full-time staff of approximately 18, with a three-person crew on duty at the Refinery at all times. In addition, a Fire Prevention Officer, a Training Officer, a Relief Battalion Chief, and the Fire Chief are on duty Monday through Friday during the day shift. To supplement the Fire Department, an Emergency Response Team consisting of personnel from various Operating Divisions of the Refinery is trained and available to assist with any fire emergencies.

The Refinery is also served by the City of El Segundo Fire Department, which maintains two fire stations within the city and, as mentioned above, cooperates in emergency response planning with industrial facilities in the community, such as the Chevron Refinery.

The Refinery notifies the City of El Segundo Fire Department when an incident occurs at the Refinery that might affect the environment or pose a life safety hazard to employees or the public. The Refinery also maintains a mutual aid agreement with other Los Angeles area refineries, under which Chevron can request the assistance of other refineries' resources to assist in managing and controlling a major incident.

The proposed project during both construction and operation will not substantially change the load on the Refinery's fire fighting and emergency response resources and would not be expected to create the need for additional fire protection services or resources by Chevron or the City of El Segundo. The proposed project involves the installation of new vessels and storage facilities at the Refinery and new fire hazards will be added to the Refinery. However, the Refinery will continue to operate the existing on-site fire department with continued close coordination with local fire departments and emergency services. Fire stations in the areas near the Refinery are equipped to handle emergency response incidents at industrial facilities. No significant adverse impacts on fire protection are expected.

14. b) The Refinery is an existing facility with a 24-hour security force for people and property currently in place. The Refinery is fenced and access provided by security-controlled gates. Because the proposed project will not significantly change Refinery staffing or substantially expand the existing facilities within the Refinery, there is expected to be no increased need for new or expanded police protection.

14. c), d), and e) The local workforce is more than adequate to fill the short-term construction positions required for this project. Therefore, there will be no increase in the local population and, thus, no impacts are expected to schools, parks, or other public facilities.

Conclusion

No significant adverse impacts to public services are expected to occur as a result of the proposed project. Therefore, public services impacts will not be discussed further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
15.0 RECREATION			
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☑
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☑

Checklist Response Explanation

15. a) As previously concluded in Section 13, Population and Housing, of this document, implementation of the proposed project is not expected to increase the local population. Therefore, implementation of the proposed project is not expected to increase the demand for neighborhood or regional parks, or other recreational facilities and it will not adversely affect existing recreational facilities.

15. b) Implementation of the proposed project does not include new recreational facilities or require expansion of existing recreational facilities and, thus, will not have an adverse physical effect on the environment.

Conclusion

No significant adverse impacts on recreation are expected from the proposed project. Therefore, recreation impacts will not be analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
16.0. SOLID/HAZARDOUS WASTE. Would the project:			
a) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☑	☐	☐
b) Comply with federal, state, and local statutes and regulations related to solid and hazardous waste?	☐	☑	☐

Checklist Response Explanation

16. a) and b) Solid waste generation and disposal will increase during construction of the proposed project. The wastes are expected to consist of demolition debris including concrete, asphalt, wood, and metal debris, and normal construction debris including cardboard, paper, and plastic. The solid waste generated during construction will be disposed in an appropriately classified disposal facility by a licensed contractor. Potential impacts of solid waste disposal during construction will be evaluated further in the EIR.

If contaminated soils are encountered during the project construction, the soils would be removed for proper disposal in accordance with SCAQMD Rule 1166 and requirements of other agencies such as the RWQCB. The potential occurrence of contaminated soils and the removal procedure will be evaluated further in the EIR.

The proposed project will perform the same functions as the existing equipment with some change to the scale of operations at the Refinery. Solid or hazardous waste generation rates (i.e., volume and/or frequency of disposal) may increase as a result of the proposed project operation. Therefore, potential impacts of project solid and hazardous waste disposal on available waste disposal facilities will be evaluated further in the EIR.

The facility is expected to continue to comply with federal, state, and local statutes and regulations related to solid and hazardous wastes.

Conclusion

Proposed project solid/hazardous waste generation has the potential for significant adverse impacts on disposal facilities. Therefore, impacts of the proposed project on solid/hazardous waste will be analyzed further in the EIR.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
17.0 TRANSPORTATION/TRAFFIC. Would the project:			
a) Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	☑	☐	☐
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	☑	☐	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☑
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☑
e) Result in inadequate emergency access?	☐	☐	☑
f) Result in inadequate parking capacity?	☑	☐	☐
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g. bus turnouts, bicycle racks)?	☐	☐	☑

Checklist Response Explanation

17. a) and b) Construction of the proposed project will increase the traffic in the area associated with 1,000 construction workers, construction equipment, and the delivery of construction materials. The impacts of the traffic during the construction phase will be analyzed in the EIR.

Once construction of the proposed project is completed, the existing work force at the Refinery is expected to increase by approximately 12 staff. The receipt and transport of operational materials are expected to change as a result of this project so that operation-related traffic may increase. Therefore, the impacts of the traffic during the operational phase will be analyzed in the EIR.

17. c) The proposed project includes modifications to existing equipment and installation of new equipment within the existing Refinery. The proposed modifications and new structures will be similar in height and appearance to the existing Refinery structures. Since the proposed modifications and new structures will be less than 200 feet in height and are not expected to result in a change to air traffic patterns, notification to the Federal Aviation Administration pursuant to Advisory Circular AC 70/7460-2K is not required. Further, since the Refinery is located about two miles south of the nearest airport, LAX, the Refinery is located outside of the normal flight pattern of LAX. In addition, the proposed project will not involve the delivery of materials via air cargo so no increase in air traffic is expected.

17. d) and e) The proposed project is not expected to substantially increase traffic hazards or create incompatible uses at or adjacent to the Refinery. The proposed project does not include construction of roadways that could include design hazards. Emergency access at the Refinery will not be impacted by the proposed project and Chevron will continue to maintain the existing emergency access gates to the Refinery.

17. f) Additional parking for the construction workers will be required. Although adequate parking is available on-site, due to the large number of construction workers, traffic patterns will be evaluated in the EIR and the most appropriate parking plan will be developed to minimize traffic impacts. Therefore, parking will be evaluated in the EIR.

17. g) The proposed project will be constructed within the confines of an existing Refinery and is not expected to conflict with adopted policies, plans, or programs supporting alternative transportation modes (e.g., bus turnouts, bicycle racks).

Conclusion

The traffic impacts associated with the construction and operational phases of the proposed project are potentially significant and will be analyzed in the EIR. The impacts of the proposed project on other transportation related areas are expected to be less than significant and will not be considered further in the EIR.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
18.0	**MANDATORY FINDINGS OF SIGNIFICANCE.**			
a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☑
b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)	☑	☐	☐
c)	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☑	☐	☐

Checklist Response Explanation

18. a) The proposed project does not have the potential to adversely affect the quality of the environment, reduce or eliminate any plant or animal species or destroy prehistoric records of the past. The proposed project is located at a site that is part of an existing industrial facility, which has been previously disturbed, graded and developed, and this project, as proposed, will not extend into environmentally sensitive areas, but will remain within the confines of an existing, operating Refinery. For additional information, see Section 4.0 – Biological Resources and Section 5.0 – Cultural Resources.

18. b) and c) The areas where there is the potential for cumulative adverse environmental impacts include air quality, energy, hazards/hazardous materials, hydrology/water quality, noise, solid/hazardous waste, and transportation/traffic, which have the potential to impact humans. The proposed project has the potential to result in an increase in emissions, energy demand, hazard impacts, water treatment facilities, noise sources, waste generation, and traffic from the construction of the proposed project and has the potential to result in cumulative impacts. The potential cumulative impacts will be analyzed, as necessary, in the EIR.

Conclusion

Project-specific impacts to the following environmental areas will be further analyzed in the EIR: air quality, energy, hazard and hazardous materials, hydrology/water quality, noise, solid/hazardous waste, and transportation/traffic. Potential adverse cumulative impacts to these environmental areas will also be evaluated in the EIR.

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ACRONYMS

ABBREVIATION	DESCRIPTION
API	American Petroleum Institute
AHM	Acutely Hazardous Material
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
BACT	Best Available Control Technology
Basin	South Coast Air Basin
BPD	barrels per day
CAER	Community Awareness and Emergency Response
CAN	Community Alert Network
CARB	California Air Resources Board
CDMG	California Division of Mines and Geology
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CPUC	California Public Utilities Commission
CUP	Conditional Use Permit
CWMI	Chemical Waste Management Inc.
C4	butane
DAF	Dissolved Air Floatation
dBA	A-weighted noise level measurement in decibels
DEA	diethanolamine
DOT	Department of Transportation
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
DWR	California Department of Water Resources
EHS	Extremely Hazardous Substance
EIR	Environmental Impact Report
ERPG	Emergency Response Planning Guideline
^oF	Degrees Fahrenheit
FCCU	Fluid Catalytic Cracking Unit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
g	acceleration of gravity
gpm	gallons per minute
GWh	Gigawatts per hour
H_2	Hydrogen
H_2S	hydrogen sulfide
HAZOP	Hazardous operation process analysis
HDS	Hydrodesulfurization

HI	Hazard Index
HMBP	Hazardous Materials Business Plan
HRA	Health Risk Assessment
IAF	Induced Air Floatation
ID #	Identification number
ISCST3	Industrial Source Complex Model Short Term Version 3
^{o}K	degrees Kelvin
LACFD	Los Angeles County Fire Department
LACSD	Los Angeles County Sanitation Districts
LADPW	Los Angeles Department of Public Works
LADWP	Los Angeles Department of Water and Power
LAER	lowest achievable emission reduction
LARWQCB	Los Angeles Regional Water Quality Control Board
LAX	Los Angeles International Airport
LEL	Lower Explosive Limit
lbs	pounds
lbs/hr	pounds per hour
LFL	Lower Flammable Limit
Lmax	Maximum sound level
Lmin	Minimum sound level
LOS	Level of Service
LPG	liquefied petroleum gas
m/s	meters per second
MATES	Multiple Air Toxic Exposure Study
MDEA	methyl diethanol amine
MEIR	maximum exposed individual resident
MEIW	maximum exposed individual worker
MW	megawatts
mmscf	million standard cubic feet
mmscf/day	million standard cubic feet per day
MICR	Maximum Individual Cancer Risk
MWD	Metropolitan Water District of Southern California
N_2	nitrogen
NH_3	ammonia
NAAQS	National Ambient Air Quality Standards
nanograms/m^3	nanograms per cubic meter
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Agency
NOP	Notice of Preparation
NOP/IS	Notice of Preparation/Initial Study
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NSR	New Source Review
OSHA	Occupational Safety and Health Administration
pH	potential hydrogen ion concentration

PM10	particulate matter less than 10 microns in diameter
ppbv	parts per billion by volume
ppm	parts per million
ppmv	parts per million by volume
ppmw	parts per million by weight
PRD	pressure relief device
PRC	Public Resources Code
PRO	Product Reliability and Optimization
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch (gauge)
PSM	Process Safety Management Program
RCRA	Resource Conservation and Recovery Act
RECLAIM	Regional Clean Air Incentives Market
Refinery	Chevron El Segundo Refinery
REL	Reference exposure level
RFG	reformulated fuels gasoline
RMP	Risk Management Plan
RMPP	Risk Management and Prevention Program
RVP	Reid Vapor Pressure
RWQCB	Regional Water Quality Control Board, Los Angeles Region
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCCIC	South Central Coastal Information Center
SCE	Southern California Edison Company
SCFH	standard cubic feet per hour
SCH	State Clearinghouse
SCR	Selective Catalytic Reduction
SEP	Supplemental Environmental Project
SO_2	sulfur dioxide
SOx	sulfur oxide
SPCC	Spill Prevention, Control and Countermeasure
SRU	Sulfur Recovery Unit
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWS	Sour Water Stripper
T-BACT	Toxics Best Available Control Technology
TACs	toxic air contaminants
TGU	Tail Gas Unit
TPH	total petroleum hydrocarbons
ULSD	Ultra low sulfur diesel
USDOT	United States Department of Transportation
U.S. EPA	United States Environmental Protection Agency
USC	United States Code

USDA	United States Department of Agriculture
USGS	United States Geological Society
ug/l	micrograms per liter
ug/m^3	micrograms per cubic meter
UVCE	Unconfined Vapor Cloud Explosion
V/C	volume to capacity ratio
VOCs	volatile organic compounds
VRDS	Vacuum Residuum Desulfurization
WGS	Wet Gas Scrubber
WBMWD	West Basin Municipal Water District

GLOSSARY

TERM	DEFINITION
Ambient Noise	The background sound of an environment in relation to which all additional sounds are heard
Aromatics	Hydrocarbons which contain one or more benzene rings.
Barrel	42 gallons.
Blending	One of the final operations in refining, in which two or more different components are mixed together to obtain the desired range of properties in the finished product.
Catalyst	A substance that promotes a chemical reaction to take place but which is not itself chemically changed.
Cooling Tower	A cooling tower is a heat rejection device, which extracts waste heat to the atmosphere through the cooling of a water stream to a lower temperature. Common applications for cooling towers are providing cooled water for manufacturing and electric power generation.
Condensate	Steam that has been condensed back into water by either raising its pressure or lowering its temperature
Cogeneration	A cogeneration unit is a unit that produces electricity and thermal energy.
Cracking	The process of breaking down higher molecular weight hydrocarbons to components with smaller molecular weights by the application of heat; cracking in the presence of a suitable catalyst produces an improvement in product yield and quality over simple thermal cracking.
Crude Oil	Crude oil is "unprocessed" oil, which has been extracted from the subsurface. It is also known as petroleum and varies in color, from clear to tar-black, and in viscosity, from water to almost solid.
dBA	The decibel (dB) is one tenth of a *bel* where one bel represents a difference in noise level between two intensities I_1, I_0 where one is ten times greater than the other. (A) indicates the measurement is weighted to the human ear.

Distillation	The process of heating a liquid to its boiling point and condensing and collecting the vapor.
Feedstock	Material used as a stream in the refining process.
Flares	Emergency equipment used to incinerate refinery gases during upset, startup, or shutdown conditions
Flue Gas	Gases produced by burning fuels in a furnace, heater or boiler.
Heat exchanger	Process equipment used to transfer heat from one medium to another.
Heater	Process equipment used to raise the temperature of refinery process streams.
Hydrocarbon	Organic compound containing hydrogen and carbon, commonly occurring in petroleum, natural gas, and coal.
Hydrotreater	A machine that treats hydrocarbons.
Hydrotreating	A process to catalytically stabilize petroleum products or feedstocks by reacting them with hydrogen.
Isomerization	The rearrangement of straight-chain hydrocarbon molecules to form branch chain products; normal butane may be isomerized to provide a portion of the isobutane feed needed for the alkylation process.
L_{50}	Sound level exceeded 50 percent of the time (average or mean level).
Liquefied Petroleum Gas (LPG)	Liquefied light end gases often used for home heating and cooking;this gas is usually 95 percent propane, the remainder being split between ethane and butane.
Mercaptans	Sulfur-containing compounds

Naphtha	A crude distillation unit cut in the range of C_7-420°; naphthas are subdivided – according to the actual crude distillation cuts - into light, intermediate, heavy, and very heavy virgin naphthas; a typical crude distillation operation would be: C_7-160° - light naphtha 160-280° - intermediate naphtha 280-330° - heavy naphtha 330-420° - very heavy naphtha
Natural Gas	A mixture of hydrocarbon gases that occurs with petroleum deposits, principally methane together with varying quantities of ethane, propane, butane, and other gases.
Octane	Measurement of the burning quality of the gasoline; reflects the suitability of gasoline to perform in internal combustion engines smoothly without letting the engine knock or ping.
Olefins	Hydrocarbons that contain at least two carbons joined by double bonds; olefins do not naturally occur in crude oils but are formed during the processing.
Paleontological	Prehistoric life.
Peak Hour	This typically refers to the hour during the morning (typically 7 AM to 9 AM) or the evening (typically 4 PM to 6 PM) in which the greatest number of vehicles trips are generated by a given land use or are traveling on a given roadway.
Pentane	Colorless, flammable isomeric hydrocarbon, derived from petroleum and used as a solvent or fuel.
Reactor	Vessels in which desired reactions take place.
Refinery fuel gas	Gas produced from refinery operations used primarily for fuel gas combustion in refinery heaters and boilers.
Reformate	One of the products from a reformer; a reformed naptha; the naptha is then upgraded in octane by means of catalytic or thermal reforming process.
Reformulated Gasoline	New gasoline required under the federal Clean Air Act and California Air Resources Board to reduce emissions.

Reid Vapor Pressure	The vapor pressure of a product determined in a volume of air four times greater than the liquid volume at 100°F; Reid vapor pressure (RVP) is an indication of the vapor-lock tendency of a motor gasoline, as well as explosion and evaporation hazards.
Seiches	A vibration of the surface of a lake or landlocked sea that varies in period from a few minutes to several hours and which may change in intensity.
Selective Catalyst Reduction	An air pollution control technology that uses a catalyst to remove nitrogen oxides from flue gas.
Sour	Refinery streams with more than 2.5 percent sulfur.
Stripper or Splitter	Refinery equipment used to separate two components in a feed stream; examples include sour water strippers and naphtha splitters.
Sweet	Refinery streams with less than 0.5 percent sulfur.

COMMENTS AND RESPONSE TO COMMENTS RECEIVED ON THE NOP/IS

CHEVRON PRODUCTS EL SEGUNDO REFINERY PRODUCT RELIABILITY AND OPTIMIZATION PROJECT

RESPONSE TO COMMENTS RECEIVED ON NOP/IS

INTRODUCTION

The NOP/IS was circulated for a 30-day public review and comment period, which started on August 10, 2007, and ended September 11, 2007.

The NOP/IS included a detailed project description, the environmental setting for each environmental resource, and an analysis of each environmental resource on the California Environmental Quality Act (CEQA) checklist including all potentially significant environmental impacts. The SCAQMD received five comment letters on the NOP/IS during the public comment period. Responses to the comment letters are presented herein. The comments are bracketed and numbered. The related responses are identified with the corresponding number and are included in the following pages.

Comment Letter	Commentator
#1	NAHC
#2	Dept. of Transportation
#3	SCAG
#4	PUC
#5	Michael Pell (citizen)

STATE OF CALIFORNIA Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
www.nahc.ca.gov
ds_nahc@pacbell.net

August 14, 2007

Mr. Michael Krause, Air Quality Specialist
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765

Re: SCH# 2007081057; CEQA Notice of Preparation (NOP); draft Environmental Impact Report (DEIR) for Chevron Products Company El Segundo Refinery Product Reliability & Optimization Project; Los Angeles County, California

Dear Mr. Krause:

Thank you for the opportunity to comment on the above-referenced document. The California Environmental Quality Act (CEQA) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR per CEQA guidelines § 15064.5(b)(c). In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE),' and if so, to mitigate that effect. To adequately assess the project-related impacts on historical resources, the Commission recommends the following action: 1-1

√ Contact the appropriate California Historic Resources Information Center (CHRIS). Contact information for the 'Information Center' nearest you is available from the State Office of Historic Preservation in Sacramento (916/653-7278). The record search will determine: 1-2
- If a part or the entire (APE) has been previously surveyed for cultural resources.
- If any known cultural resources have already been recorded in or adjacent to the APE.
- If the probability is low, moderate, or high that cultural resources are located in the APE.
- If a survey is required to determine whether previously unrecorded cultural resources are present.

√ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
- The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure. 1-3
- The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.

√ Contact the Native American Heritage Commission (NAHC) for:
- A Sacred Lands File (SLF) search of the project area and information on tribal contacts in the project vicinity who may have information on cultural resources in or near the APE. Please provide us site identification as follows: USGS 7.5-minute quadrangle citation with name, township, range and section. This will assist us with the SLF. 1-4
- Also, we recommend that you contact the Native American contacts on the attached list to get their input on the effect of potential project (e.g. APE) impact.

√ Lack of surface evidence of archeological resources does not preclude their subsurface existence.
- Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5 (f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities. 1-5
- Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.

√ Lead agencies should include provisions for discovery of Native American human remains or unmarked cemeteries in their mitigations plans.

- CEQA Guidelines §15064.5(d) requires the lead agency to work with the Native Americans identified by this Commission if the Initial Study identifies the presence or likely presence of Native American human remains within the APE. CEQA Guidelines provide for agreements with Native American groups, identified by the NAHE, to ensure the appropriate and dignified treatmentof Native American human remains and any associated grave goods.
- Health and Safety Code §7050.5, Public Resources Code §5097.98 and CEQA Guidelines §15064.5(d) mandate procedures to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

√ Lead agencies should consider avoidance, as defined in CEQA Guidelines §15370 when significant cultura resources are discovered during the course of project planning or execution.

1-6

Please feel free to contact me at (916) 653-6251 if you have any questions.

Sincerely,

Dave Singleton
Program Analyst

Attachment: Native American Contact List

Native American Contacts
Los Angeles County
August 14, 2007

LA City/County Native American Indian Comm
Ron Andrade, Director
3175 West 6th Street, Rm. 403
Los Angeles , CA 90020
(213) 351-5324
(213) 386-3995 FAX

Gabrielino/Tongva Council / Gabrielino Tongva Nation
Sam Dunlap, Tribal Secretary
761 Terminal Street; Bldg 1, 2nd floor Gabrielino Tongva
Los Angeles , CA 90021
office @tongvatribe.net
(213) 489-5001 - Officer
(909) 262-9351 - cell
(213) 489-5002 Fax

Ti'At Society
Cindi Alvitre
6602 Zelzah Avenue Gabrielino
Reseda , CA 91335
calvitre@yahoo.com
(714) 504-2468 Cell

Gabrielino Band of Mission Indians of CA
Ms. Susan Frank
PO Box 3021 Gabrielino
Beaumont , CA 92223
(951) 897-2536 Phone/Fax

Tongva Ancestral Territorial Tribal Nation
John Tommy Rosas, Tribal Adminstrator
4712 Admiralty Way, Suite 172 Gabrielino Tongva
Marina Del Rey , CA 90292
310-570-6567

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Tribal Chair/Cultural Resources
5450 Slauson, Ave, Suite 151 PMB Gabrielino Tongva
Culver City , CA 90230
gtongva@verizon.net
562-761-6417 - voice
562-920-9449 - fax

Gabrieleno/Tongva Tribal Council
Anthony Morales, Chairperson
PO Box 693 Gabrielino Tongva
San Gabriel , CA 91778
ChiefRBwife@aol.com
(626) 286-1632
(626) 286-1758 - Home
(626) 286-1262 Fax

Gabrielino Tongva Indians of California Tribal Council
Mercedes Dorame, Tribal Administrator
20990 Las Flores Mesa Drive Gabrielino Tongva
Malibu , CA 90265
Pluto05@hotmail.com

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native American with regard to cultural resources for the proposed SCH#2007081057; CEQA Notice of Preparation (NOP) for Chevron Products Company El Segundo Refinery Product Reliability & Optimization Project; Los Angeles county, California (SCAQMD).

COMMENT LETTER NO. 1
NATIVE AMERICAN HERITAGE COMMISSION

Response 1-1

The SCAQMD notes that the Native American Heritage Commission is the state's Trustee Agency for Native American Cultural Resources.

The SCAQMD is aware of the requirements of CEQA Guidelines §15064.5 and has complied with this section as well as all other relevant CEQA requirements. As stated on pages 2-14 through 2-17 of the NOP/IS for the Chevron Products El Segundo Refinery Product Reliability and Optimization Project, potential significant adverse impacts on cultural resources were not anticipated. This conclusion is based on the fact that there are no prehistoric or historic cultural resources or paleontological resources within the boundaries of the Chevron El Segundo Refinery.

The entire Refinery site has been previously graded and developed. The larger Refinery structures and equipment are supported on concrete foundations. The remainder of the site is unpaved. Any archaeological or paleontological resources that may have been present prior to development of the Refinery are not expected to be found at the site due to past disturbance. In addition, an August 2005 records search indicated that 14 archaeological investigations have been performed within a 0.5-mile radius of the Refinery, including three surveys of small linear areas within the Refinery boundaries. No prehistoric sites or Native American sacred lands are recorded within the Refinery boundaries or within 0.5-mile radius of the facility. No paleontological resources are known to exist at the facility.

If cultural resources were to be encountered unexpectedly during ground disturbance associated with construction of the proposed project, proper procedures (i.e., contacting professional archaeologist and a Gabrielino/Tongva representative, temporarily halting or redirecting disturbance work in vicinity, etc.) will be taken. Further, the Refinery's site does not contain known paleontological resources and, thus, the proposed project is not expected to adversely affect any sites of paleontological value.

Response 1-2

The Chevron Products El Segundo Refinery PRO project is proposed to occur within the boundaries of an existing petroleum refinery. The site has been previously disturbed to accommodate refinery projects associated with the placement and relocation of infrastructure (i.e., underground utilities and piping) and no cultural resources or native American remains were found during these subsurface activities in or surrounding the property (i.e., area of potential effect).

Federal state and local historic listings were reviewed along with historic maps. In addition, this background research was supplemented by an internet search for relevant historical information. The research revealed that the listings of the National Register of Historic Places, California Historical Landmarks, California State Historic Resources Inventory, California Points of Historical Interest, and Los Angeles County Landmarks include no properties within the Refinery. One historic site, P-186856, (that could include buildings, structures, objects, districts, and landscapes, the details of which are kept confidential to protect the resource) is recorded at the outer edge of the 0.5-mile radius and outside of the Refinery boundary. Because the proposed project activities will occur entirely within the existing Refinery boundaries, site P-186856 would not be directly or indirectly impacted by the proposed project. Based on the results of these records searches, the proposed project will not cause an adverse change in the significance of a resource listed in the California Register of Historical Resources or in a local register of historical resources.

As a result, based on historical activities at the site, the proposed project was determined to not cause a potential "substantial adverse change in the significance of any historical resource" which would require a further evaluation of cultural resources in the draft EIR. See also Response 1-1.

Response 1-3

An archaeological inventory survey was not required to be performed for the proposed project. See responses 1-1 and 1-2 for reasons why a survey was not required because a previous 2005 survey of records indicated that no prehistoric or historic resources are located in the Refinery property or within a .05 mile radius of the Refinery.

Response 1-4

As noted in Response 1-1, additional archaeological investigations are not required for the Chevron Products El Segundo Refinery, so it is not necessary to contact the Native American Heritage Commission.

Construction activities for the proposed projects at the Chevron Products El Segundo Refinery include standard procedures for accidentally encountering any archaeological, Native American or cultural resources on-site. Compliance with all local, state and federal regulations (and notifications) will occur in the event of an accidental discovery of any cultural or historic resources.

A mailing list of the Native American contacts provided by the commentator has been created by SCAQMD. Notice of availability of the Draft EIR for Chevron's PRO project and all other projects where the SCAQMD is the lead agency under CEQA will be sent to the contacts provided by the commentator.

Response 1-5

As noted in Response 1-1, no previous excavation activities at the facility have discovered any cultural or archaeological resources. Further, as concluded on pages 2-14 through 2-17 of the NOP/IS for the Chevron Products El Segundo Refinery Product Reliability and Optimization Project, no impacts to cultural resources were determined to result from the proposed project. As a result, no further analysis of cultural resources is required.

Based on the historical use of the site and the numerous previous construction activities which included subsurface activities, the likelihood of encountering cultural resources is low.

Response 1-6

With regard to the potential for discovery of Native American remains, refer to Responses 1-1, 1-2 and 1-5.

As stated on pages 2-14 through 2-17, the NOP/IS study did not identify the presence or likely presence of Native American human remains. Therefore, agreements with Native Americans to assure appropriate treatment of Native American human remains are not required unless Native American human remains are discovered during site excavation. The Refinery will keep a record of Native American contacts if human remains are discovered and follow proper proceedure. See also Responses 1-1, 1-2 and 1-5.

As noted in Responses 1-1 and 1-2, discovery of human remains relative to the proposed project is not anticipated. However, the Chevron Products El Segundo Refinery Product Reliability and Optimization Project construction activities will cease to prevent further disturbance if human remains are unearthed, until the County Coroner has made the necessary findings with respect to origin and disposition, as required by Public Resources Code 5097.98-99 and Health and Safety Code 7050.5.

CEQA Guidelines §15370(a) defines avoidance as: "Avoiding the impact altogether by not taking a certain action or parts of an action." As stated on pages 2-14 through 2-17 of the NOP/IS, the presence or likely presence of Native American human remains was not identified as a potential significant impact. See also Responses 1-1 and 1-2. Therefore, it is not necessary to avoid potential impacts to cultural resources by not taking a certain action or parts of an action. However, in the event significant cultural resources in the form of Native American human remains are discovered, construction activities will cease and Chevron Products will comply with proper federal, state and local regulations as described in Response 1-5.

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF AERONAUTICS – M.S.#40
1120 N STREET
P. O. BOX 942873
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PHONE (916) 654-4959
FAX (916) 653-9531
TTY 711

Flex your power!
Be energy efficient!

August 22, 2007

Mr. Mike Krause
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765

Dear Mr. Krause:

Notice of Preparation of a Draft Environmental Impact Report for Chevron Products Company El Segundo Refinery Product Reliability and Optimization Project; SCH# 2007081057

The California Department of Transportation (Caltrans), Division of Aeronautics (Division), reviewed the above-referenced document with respect to airport-related noise and safety impacts and regional aviation land use planning issues pursuant to the California Environmental Quality Act (CEQA). The Division has technical expertise in the areas of airport operational safety, noise, and airport land use compatibility. We are a funding agency for airport projects and we have permit authority for public-use and special-use airports and heliports. 2-1

The proposal is for the modification to and installation of new equipment at the El Segundo Refinery. The project site is located approximately 6,400 feet south of the Los Angeles International Airport.

Page 2-25 of the Notice of Preparation states that the height of the proposed new process equipment will not exceed the 200-foot height threshold that would require Federal Aviation Administration (FAA) notification, as specified in "14 CFR § 17.13(a)" of the Federal Aviation Regulation (FAR) Part 77. Actually submission of a Notice of Proposed Construction or Alteration (Form 7460-1) will be required by the FAA in accordance with FAR Part 77 Section 77.13 (a)(2)(i), which states that the FAA must be notified for any construction within 20,000 feet of a public-use or military airport which exceeds the FAR Part 77 100:1 surface from any point on the runway of each airport with at least one runway more than 3,200 feet in length. Form 7460-1 is available on-line at https://oeaaa.faa.gov/oeaaa/external/portal.jsp and should be submitted electronically to the FAA. 2-2

The protection of airports from incompatible land use encroachment is vital to California's economic future. Los Angeles International Airport is an economic asset that should be protected through effective airport land use compatibility planning and awareness. Although the need for compatible and safe land uses near airports in California is both a local and a State issue, airport staff, airport land use commissions and airport land use compatibility plans are key to protecting an airport and the people residing and working in the vicinity of an airport. Consideration given to the issue of compatible land uses in the vicinity of an airport should help to relieve future conflicts between airports and their neighbors. 2-3

"Caltrans improves mobility across California"

Mr. Mike Krause
August 22, 2007
Page 2

These comments reflect the areas of concern to the Division with respect to airport-related noise and safety impacts and regional airport land use planning issues. We advise you to contact our Caltrans District 7 Los Angeles office concerning surface transportation issues. 2-4

Thank you for the opportunity to review and comment on this proposal. If you have any questions, please call me at (916) 654-5314.

Sincerely,

Sandy Hesnard

SANDY HESNARD
Aviation Environmental Specialist

c: State Clearinghouse, LAX, Los Angeles County Airport Land Use Commission

COMMENT LETTER NO. 2
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Response 2-1

The SCAQMD notes that Caltrans has technical expertise in airport-related land use and planning issues.

Response 2-2

The SCAQMD notes that Chevron may be required to comply with applicable reporting requirements of the Federal Aviation Administration. Please note that the Chevron Refinery is not located within the flight path of LAX and that there are numerous existing Refinery structures in excess of 200 feet in height at the Refinery including furnace stacks (215'), coke drums (240'), the FCCU reactor (230'), and flares. The proposed new structures will be similar in size and character to the existing structures. If required, Chevron will comply with any and all FAA notification requirements.

Response 2-3

The comments on land use compatibility are noted. The Refinery has been at the existing site since the 1920's and land use conflicts with LAX have not occurred. Also, please see pages 2-30 through 2-31 in the NOP/IS regarding land use compatibility. The land use at the Refinery and in the surrounding vicinity is consistent with the City of El Segundo General Plan land use designations. Also, please note that there are a number of existing multi-story buildings north of the Refinery between the Refinery and LAX. Also, see Response 2-2 regarding the height of existing Refinery structures.

Response 2-4

The SCAQMD appreciates your comments. Please see responses 2-1 through 2-3. Caltrans District 7 Los Angeles office was included on the list of Reviewing Agencies on the form sent to the State Clearinghouse.

SOUTHERN CALIFORNIA

ASSOCIATION of GOVERNMENTS

Main Office
818 West Seventh Street
12th Floor
Los Angeles, California
90017-3435

t (213) 236-1800
f (213) 236-1825

www.scag.ca.gov

August 24, 2007

Mr. Michael Krause
SCAQMD
21865 Copley Drive
Diamond Bar, CA 91765-4182

RE: SCAG Clearinghouse No. I 20070500 Chevron Products Company El Segundo Refinery

Dear Mr. Krause:

Thank you for submitting the **Chevron Products Company El Segundo Refinery** for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

We have reviewed the **Chevron Products Company El Segundo Refinery**, and have determined that the proposed Project is not regionally significant per SCAG Intergovernmental Review (IGR) Criteria and California Environmental Quality Act (CEQA) Guidelines (Section 15206). Therefore, the proposed Project does not warrant comments at this time. Should there be a change in the scope of the proposed Project, we would appreciate the opportunity to review and comment at that time. 3-1

A description of the proposed Project was published in SCAG's **August 1-15, 2007** Intergovernmental Review Clearinghouse Report for public review and comment.

The project title and SCAG Clearinghouse number should be used in all correspondence with SCAG concerning this Project. Correspondence should be sent to the attention of the Clearinghouse Coordinator. If you have any questions, please contact me at (213) 236-1856. Thank you.

Sincerely,

Laverne Jones for
SHERYLL DEL ROSARIO
Associate Planner
Intergovernmental Review

Doc #139268

COMMENT LETTER NO. 3
SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

Response 3-1

SCAQMD would like to thank SCAG for their review and comments. The SCAQMD understands that SCAG does not consider the Chevron Products El Segundo Refinery Product Reliability and Optimization Project regionally significant per its intergovernmental review responsibilities and, therefore, has no comments.

STATE OF CALIFORNIA ARNOLD SCHWARZENEGGER, *Governor*

PUBLIC UTILITIES COMMISSION
320 WEST 4TH STREET, SUITE 500
LOS ANGELES, CA 90013

September 7, 2007

Mike Krause
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765

Dear Mr. Krause:

Re: SCH# 2007081057; Chevron Products Company El Segundo Refinery Product Reliability and Optimization Project

The California Public Utilities Commission (Commission) has jurisdiction over the safety of highway-rail crossings (crossings) in California. The California Public Utilities Code requires Commission approval for the construction or alteration of crossings and grants the Commission exclusive power on the design, alteration, and closure of crossings 4-1

The Commission's Rail Crossings Engineering Section (RCES) is in receipt of the *Notice of Completion & Environmental Document Transmittal-NOP* from the State Clearinghouse. RCES is concerned that the proposed development at El Segundo Boulevard and Sepulveda Boulevard (Lat 33.916343, Long =-118.396128) may increase traffic volumes not only on streets and at intersections, but also at the Sepulveda Boulevard (DOT# 760615N) crossing. This includes considering pedestrian circulation patterns/destinations with respect to railroad. 4-2

Safety factors to consider include, but are not limited to, the planning for grade separations for major thoroughfares, improvements to existing at-grade highway-rail crossings due to increase in traffic volumes and appropriate fencing to limit the access of trespassers onto the railroad right-of-way. 4-3

Please advise us on the status of the project. If you have any questions in this matter, please contact me at (213) 576-7078 or at rxm@cpuc.ca.gov. 4-4

Sincerely,

Rosa Muñoz, PE
Utilities Engineer
Rail Crossings Engineering Section
Consumer Protection & Safety Division

C: Dan Miller, UPRR

COMMENT LETTER NO. 4
CALIFORNIA PUBLIC UTILITIES COMMISSION

Response 4-1

The SCAQMD notes that the Public Utilities Commission has jurisdiction over the safety of highway-rail crossing in California. The proposed project does not include design, alteration or closer of highway-rail crossings.

Response 4-2

Please see the Chapter 4, Subsection 4.8 – Traffic and Circulation in the Draft EIR for a discussion of the traffic impacts associated with the proposed project. The proposed project impacts on traffic are limited to the construction phase when approximately 900 construction workers are expected during peak construction periods. However, once construction is complete, no increase in traffic from current conditions is expected. Therefore, the proposed project is not expected to result in significant traffic impacts that could impact railroad crossings following completion of the project construction phase.

Response 4-3

See Response 4-2 regarding traffic impacts.

Response 4-4

The SCAQMD will include the Public Utilities Commission in any notifications regarding the proposed project.

MAIL UNIT
LOS ANGELES POLICE DEPARTMENT OR [redacted]
P. O. BOX 30158
LOS ANGELES, CA 90030

8-10-07
54499
DEIR request

Dear SIR/MADAM

Please send me a copy of the NOP and the IS for the CHEVRON PRODUCTS EL SEGUNDO PROJECT at either of the above PO Boxes. Due to its size, you may want to use my work PO Box (although the information is for my personal use). 5-1

I hope that I will receive copies of the EIR and future reports/documents on this project.

Please add me to the mailing list to receive reports on other major projects.

THANK YOU VERY MUCH.

Sincerely

Michael Pell

RECEIVED
AUG 14 2007
PUBLIC RECORDS UNIT

COMMENT LETTER NO. 5
MICHAEL PELL

Response 5-1

A copy of the NOP/IS has been sent per the request of the commentator. The SCAQMD will include the Mr. Pell in any further notifications regarding the proposed project.

APPENDIX B

PEAK CONSTRUCTION EMISSION CALCULATIONS

TABLE OF CONTENTS
CHEVRON EL SEGUNDO REFINERY
PRODUCT RELIABILITY AND OPTIMIZATION PROJECT

APPENDIX B
PEAK EMISSION CALCULATIONS

Table B-1
Chevron El Segundo Refinery
Product Reliability and Optimization Project
CONSTRUCTION SUMMARY

Construction Period		Estimated Emissions - 8/08						
		VOC	CO	NOx	SOx	PM10	PM2.5[1]	CO_2
Construction Equipment		70.73	231.99	459.34	0.45	30.79	17.86	38499.80
Vehicle Emissions		15.50	140.23	58.40	0.16	2.34	1.36	16027.02
Fugitive Construction		0.00	0.00	0.00	0.00	128.25	74.38	0.00
Fugitive Road Dust		0.00	0.00	0.00	0.00	15.63	9.07	0.00
Architectural Coatings		0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL EMISSIONS		86.23	372.23	517.74	0.61	177.00	102.66	54526.82
SCAQMD Thresholds		75	550	100	150	150	55	--
Significant		Yes	No	Yes	No	Yes	Yes	--

Construction Period		Estimated Emissions - 1/09						
		VOC	CO	NOx	SOx	PM10	PM2.5[1]	CO_2
Construction Equipment		117.85	372.32	671.58	0.66	50.19	29.11	56661.14
Vehicle Emissions		34.60	336.67	82.69	0.38	3.47	2.01	38867.44
Fugitive Construction		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive Road Dust		0.00	0.00	0.00	0.00	27.68	16.05	0.00
Architectural Coatings		0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL EMISSIONS		152.45	708.98	754.28	1.04	81.34	47.18	95528.58
SCAQMD Thresholds		75	550	100	150	150	55	--
Significant		Yes	Yes	Yes	No	No	No	--

(1) PM2.5 is calculated using Profile #391 from the SCAQMD Methodology to Calculate Particulate Matter (PM2.5) and PM2.5 CEQA Signficance Thresholds, SCAQMD , October 2006, https://www.aqmd.gov/ceqa/handbook/pm2_5/pm2_5ratio.xls.

Peak Value

Table B-2
Construction Equipment Emissions

Chevron El Segundo Refinery
Product Reliability and Optimization Project
Construction Equipment - August 2008

Equipment Type	Total Hours Per Day[1]	2008 Emission Factors lb/hr[1]						Daily Emissions (lbs/day)					
		VOC	CO	NOx	SOx	PM10	CO_2	VOC	CO	NOx	SOx	PM10	CO_2
Air Compressor	0	0.1112	0.3395	0.6505	0.0006	0.0578	46.9502	0.00	0.00	0.00	0.00	0.00	0.00
Air Compressor	70	0.1265	0.2903	0.2442	0.0003	0.0283	22.2713	8.86	20.32	17.09	0.02	1.98	1558.99
Backhoe	57	0.1405	0.5903	1.1212	0.0011	0.0634	101.3869	8.01	33.65	63.91	0.07	3.61	5779.05
Cherry Picker	85	0.0781	0.2542	0.4910	0.0004	0.0386	38.0718	6.64	21.61	41.74	0.04	3.29	3236.10
Concrete Finisher	14	0.0119	0.0617	0.0750	0.0002	0.0046	10.1073	0.17	0.86	1.05	0.00	0.06	141.50
Concrete Pump	30	0.1823	0.5452	2.1931	0.0023	0.0688	201.3693	5.47	16.36	65.79	0.07	2.06	6041.08
Concrete Saw	16	0.0206	0.0681	0.1344	0.0002	0.0079	16.4777	0.33	1.09	2.15	0.00	0.13	263.64
Crawler Crane	8	0.2012	0.7762	1.9878	0.0018	0.0771	180.1013	1.61	6.21	15.90	0.01	0.62	1440.81
Crawler Crane	8	0.1392	0.3881	1.3867	0.0013	0.0535	112.1589	1.11	3.10	11.09	0.01	0.43	897.27
Crawler Crane	8	0.1345	0.4936	1.0417	0.0009	0.0589	80.3446	1.08	3.95	8.33	0.01	0.47	642.76
Crawler Crane	0	0.1261	0.3807	0.7275	0.0006	0.0664	50.1480	0.00	0.00	0.00	0.00	0.00	0.00
Forklift	67	0.0724	0.2304	0.4055	0.0004	0.0402	31.2249	4.85	15.44	27.17	0.02	2.69	2092.07
Gas Engine Vibrator	3	0.0119	0.0617	0.0750	0.0002	0.0046	10.1073	0.04	0.19	0.22	0.00	0.01	30.32
Generator	110	0.1558	0.5141	0.9918	0.0009	0.0767	77.9494	17.14	56.55	109.09	0.10	8.44	8574.43
Grader	26	0.1956	0.7486	1.5300	0.0014	0.0864	123.9215	5.09	19.46	39.78	0.04	2.25	3221.96
Heavy Roller	24	0.1363	0.4271	0.8203	0.0007	0.0703	58.9888	3.27	10.25	19.69	0.02	1.69	1415.73
Lighting Center	0	0.1661	0.3989	0.3791	0.0005	0.0396	36.1908	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Catalyst Vacuum	0	0.0485	0.1221	0.1954	0.0002	0.0146	19.4874	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Diapragm Sump	14	0.0161	0.0545	0.0924	0.0001	0.0070	7.4238	0.23	0.76	1.29	0.00	0.10	103.93
Pump - Drum Sucker/Minute Man	0	0.0161	0.0545	0.0924	0.0001	0.0070	7.4238	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Dry Vacuum Unit	0	0.0161	0.0545	0.0924	0.0001	0.0070	7.4238	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Gully Sucker	0	0.0161	0.0545	0.0924	0.0001	0.0070	7.4238	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Hydrotest	0	0.1479	0.3563	0.3574	0.0004	0.0359	34.3349	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Hydrotest	0	0.0485	0.1221	0.1954	0.0002	0.0146	19.4874	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Trash	3	0.0485	0.1221	0.1954	0.0002	0.0146	19.4874	0.15	0.37	0.59	0.00	0.04	58.46
Skip Loader	0	0.1083	0.3703	0.6510	0.0006	0.0595	51.7280	0.00	0.00	0.00	0.00	0.00	0.00
Tamper - Plate Type - Gas	58	0.0052	0.0263	0.0328	0.0001	0.0021	4.3138	0.30	1.53	1.91	0.00	0.12	250.20
Tamper - Single Butt	64	0.0052	0.0263	0.0328	0.0001	0.0021	4.3138	0.33	1.69	2.10	0.00	0.13	276.08
Truck Crane	30	0.1261	0.3807	0.7275	0.0006	0.0664	50.1480	3.78	11.42	21.82	0.02	1.99	1504.44
Upright Jumper	122	0.005	0.026	0.033	0.000	0.002	4.314	0.63	3.21	4.01	0.01	0.25	526.28
Welder	21	0.028	0.071	0.113	0.000	0.008	11.286	0.59	1.49	2.38	0.00	0.18	237.01
Welder	8	0.134	0.313	0.279	0.000	0.031	25.958	1.07	2.50	2.23	0.00	0.25	207.66
Emission Totals								70.73	231.99	459.34	0.45	30.79	38499.80

(1) Total hours of multiple pieces of equipment concurrently operating in various Project Units.
Equipment listed with zero hours are not used during the peak month. However, the equipment is used at some time during the project.

Table B-3
Construction Equipment Emissions

Chevron El Segundo Refinery
Product Reliability and Optimization Project
Construction Equipment - January 2009

Equipment Type	Total Hours Per	2008 Emission Factors lb/hr[1]						Daily Emissions (lbs/day)					
	Day[1]	VOC	CO	NOx	SOx	PM10	CO_2	VOC	CO	NOx	SOx	PM10	CO_2
Air Compressor	63	0.1066	0.3375	0.6253	0.0006	0.0563	46.9502	6.71	21.26	39.39	0.03	3.55	2957.86
Air Compressor	98	0.1220	0.2867	0.2416	0.0003	0.0275	22.2713	11.96	28.10	23.68	0.03	2.69	2182.58
Backhoe	6	0.1307	0.5891	1.0398	0.0011	0.0597	101.3869	0.78	3.53	6.24	0.01	0.36	608.32
Cherry Picker	200	0.0743	0.2523	0.4715	0.0004	0.0375	38.0718	14.87	50.45	94.30	0.09	7.50	7614.36
Concrete Finisher	4	0.0118	0.0617	0.0739	0.0002	0.0037	10.1073	0.05	0.25	0.30	0.00	0.01	40.43
Concrete Pump	15	0.1710	0.5151	2.0962	0.0023	0.0649	201.3693	2.57	7.73	31.44	0.03	0.97	3020.54
Concrete Saw	0	0.0202	0.0678	0.1295	0.0002	0.0071	16.4777	0.00	0.00	0.00	0.00	0.00	0.00
Crawler Crane	29	0.1913	0.7157	1.8770	0.0018	0.0726	180.1012	5.55	20.76	54.43	0.05	2.11	5222.94
Crawler Crane	21	0.1314	0.3664	1.3105	0.0013	0.0501	112.1589	2.76	7.69	27.52	0.03	1.05	2355.34
Crawler Crane	59	0.1276	0.4905	0.9849	0.0009	0.0564	80.3446	7.53	28.94	58.11	0.05	3.33	4740.33
Crawler Crane	21	0.1187	0.3763	0.6901	0.0006	0.0633	50.1480	2.49	7.90	14.49	0.01	1.33	1053.11
Forklift	88	0.0662	0.2272	0.3757	0.0004	0.0373	31.2249	5.83	20.00	33.06	0.03	3.28	2747.79
Gas Engine Vibrator	0	0.0118	0.0617	0.0739	0.0002	0.0037	10.1073	0.00	0.00	0.00	0.00	0.00	0.00
Generator	180	0.1479	0.5099	0.9509	0.0009	0.0742	77.9494	26.63	91.78	171.16	0.16	13.36	14030.90
Grader	0	0.1846	0.7443	1.4391	0.0014	0.0823	123.9215	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Roller	0	0.1280	0.4221	0.7782	0.0007	0.0672	58.9887	0.00	0.00	0.00	0.00	0.00	0.00
Lighting Center	52	0.1582	0.3915	0.3741	0.0005	0.0381	36.1908	8.23	20.36	19.46	0.02	1.98	1881.92
Pump - Catalyst Vacuum	0	0.0462	0.1183	0.1920	0.0002	0.0140	19.4874	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Diapragm Sump	0	0.0155	0.0537	0.0894	0.0001	0.0066	7.4238	0.00	0.00	0.00	0.00	0.00	0.00
Pump - Drum Sucker/Minute Man	14	0.0155	0.0537	0.0894	0.0001	0.0066	7.4238	0.22	0.75	1.25	0.00	0.09	103.93
Pump - Dry Vacuum Unit	14	0.0155	0.0537	0.0894	0.0001	0.0066	7.4238	0.22	0.75	1.25	0.00	0.09	103.93
Pump - Gully Sucker	14	0.0155	0.0537	0.0894	0.0001	0.0066	7.4238	0.22	0.75	1.25	0.00	0.09	103.93
Pump - Hydrotest	20	0.1414	0.3503	0.3528	0.0004	0.0347	34.3349	2.83	7.01	7.06	0.01	0.69	686.70
Pump - Hydrotest	44	0.0462	0.1183	0.1920	0.0002	0.0140	19.4874	2.03	5.21	8.45	0.01	0.61	857.44
Pump - Trash	23	0.0462	0.1183	0.1920	0.0002	0.0140	19.4874	1.06	2.72	4.42	0.01	0.32	448.21
Skip Loader	4	0.0993	0.3661	0.6071	0.0006	0.0554	51.7280	0.40	1.46	2.43	0.00	0.22	206.91
Tamper - Plate Type - Gas	24	0.0051	0.0263	0.0321	0.0001	0.0018	4.3138	0.12	0.63	0.77	0.00	0.04	103.53
Tamper - Single Butt	18	0.0051	0.0263	0.0321	0.0001	0.0018	4.3138	0.09	0.47	0.58	0.00	0.03	77.65
Truck Crane	83	0.1187	0.3763	0.6901	0.0006	0.0633	50.1480	9.86	31.24	57.28	0.05	5.26	4162.28
Upright Jumper	60	0.005	0.026	0.032	0.000	0.002	4.314	0.31	1.58	1.93	0.00	0.11	258.83
Welder	30	0.027	0.069	0.111	0.000	0.008	11.286	0.80	2.06	3.34	0.00	0.24	338.58
Welder	29	0.129	0.308	0.276	0.000	0.030	25.958	3.75	8.94	8.00	0.01	0.87	752.78
Emission Totals								117.85	372.32	671.58	0.66	50.19	56661.14

(1) Total hours of multiple pieces of equipment concurrently operating in various Project Units.
Equipment listed with zero hours are not used during the peak month. However, the equipment is used at some time during the project.

Table B-4
Chevron El Segundo Refinery
Product Reliability and Optimization Project
Construction Vehicle Emissions for August 2008 and January 2009

Vehicle	Miles/Day/ Vehicle	No. of Vehicles 2008 Aug	No. of Vehicles 2009 Jan	Miles/Day 2008 Aug	Miles/Day 2009 Jan
Commuters	32.4	298	916	9655.2	29678.4
Pickup Trucks	10	49	121	490	1210
Van	10	14	35	140	350
Total Light Vehicle Miles				10285.2	31238.4
Flatbed Truck	10	10	16	100	160
Bus[1]	60	0	11	0	660
Bin Truck	10	0	0	0	0
Concrete Truck	50	10	4	500	200
Delivery Truck	50	0	0	0	0
Dump Truck	50	9	1	450	50
Lube Truck	10	10	14	100	140
Water Truck	10	9	0	90	0
Total Medium/Heavy Duty Truck Miles				1240	1210
Semi Tractor	50	9	13	450	650
Total Heavy-Heavy Duty Truck Miles				450	650

CO	Emission Rate (lb/mi)[2] 2008	Emission Rate (lb/mi)[2] 2009	2008 Aug	2009 Jan
Light Duty	0.0105342	0.0097518	108.35	304.63
Medium Duty	0.0210772	0.0198265	26.14	23.99
Heavy Duty	0.0127847	0.0123793	5.75	8.05
Total			140.23	336.67

NOx	Emission Rate (lb/mi)[2] 2008	Emission Rate (lb/mi)[2] 2009	2008 Aug	2009 Jan
Light Duty	0.0010088	0.0009276	10.38	28.98
Medium Duty	0.0235365	0.0226942	29.19	27.46
Heavy Duty	0.0418542	0.0403943	18.83	26.26
Total			58.40	82.69

CO_2	Emission Rate (lb/mi)[2] 2008	Emission Rate (lb/mi)[2] 2009	2008 Aug	2009 Jan
Light Duty	1.0368352	1.0432521	10664.06	32589.53
Medium Duty	2.8055029	2.8748941	3478.82	3478.62
Heavy Duty	4.1869739	4.3066017	1884.14	2799.29
Total			16027.02	38867.44

VOC	Emission Rate (lb/mi)[2] 2008	Emission Rate (lb/mi)[2] 2009	2008 Aug	2009 Jan
Light Duty	0.0010051	0.0009314	10.34	29.10
Medium Duty	0.0029281	0.0027894	3.63	3.38
Heavy Duty	0.0034094	0.0032809	1.53	2.13
Total			15.50	34.60

SOx	Emission Rate (lb/mi)[2] 2008	Emission Rate (lb/mi)[2] 2009	2008 Aug	2009 Jan
Light Duty	0.0000102	0.0000102	0.10	0.32
Medium Duty	0.0000274	0.0000282	0.03	0.03
Heavy Duty	0.0000399	0.0000421	0.02	0.03
Total			0.16	0.38

PM10	Emission Rate (lb/mi)[2] 2008	Emission Rate (lb/mi)[2] 2009	2008 Aug	2009 Jan
Light Duty Exhaust	0.0000397	0.0000410	0.41	1.28
Medium Duty Exhaust	0.0008391	0.0007996	1.04	0.97
Heavy Duty Exhaust	0.0019783	0.0018742	0.89	1.22
Total Exhaust PM			2.34	3.47
Light Duty Fugitive[3]	0.00038589		3.97	12.05
Medium Duty Fugitve[3]	0.00210368		2.61	2.55
Heavy Duty Fugitive[3]	0.02011945		9.05	13.08
Total Fugitive PM			15.63	27.68
Total			17.97	31.14

(1) Available parking onsite for work force in August 2008. Therefore, no buses required.

(2) Based on 2007 SCAQMD on-road emission rates. (http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html)

(3) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003
$E = k(sL/2)^{0.65} \times (W/3)^{1.5} - C$, where: k = 0.016 lb/VMT for PM10, sL = road silt loading (gms/m2) from CARB Methodology 7.9 for paved roads, (0.240 for local roads and 0.037 for major/collector roads), W = weight of vehicles (2.4 tons for light; 5 for medium trucks, and 20 for heavy trucks), and C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lbs/VMT).

Table B-5
Chevron El Segundo Refinery
Product Reliability and Optimization Project
Fugitive PM Construction Emissions for August 2008

Grading Operations	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor	Controlled Emissions: Average PM10 Emissions (lbs/day)	Controlled Emissions: Peak PM10 Emissions (lbs/day)	Uncontrolled Emissions: Average PM10 Emissions (lbs/day)	Uncontrolled Emissions: Peak PM10 Emissions (lbs/day)	SCAQMD Emission Factor Source
Construction Activities[1]	8	8	7.5	5.837	0.5	175.12	175.12	350.2373151	350.2373151	Table A9-9-F

TRENCHING OPERATIONS (Backhoe) TEMPORARY STOCKPILES	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions: Average PM10 Emissions Pounds/day	Controlled Emissions: Peak PM10 Emissions Pounds/day	Uncontrolled Emissions: Average PM10 Emissions Pounds/day	Uncontrolled Emissions: Peak PM10 Emissions Pounds/day	SCAQMD Emission Factor Source
Construction Activities[2]	1050	1050	0.0035	0.5	1.8375	1.8375	3.675	3.675	Table A9-9-G

Assumptions: 1cubic yard trench spoils = 1 ton

WIND EROSION Disturbed Area and Temporary Stockpiles	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year	SCAQMD Emission Factor Source
Construction Activities[3]	22	0.635	0.635	0.200	0.127	0.127	0.001	0.001	Table A9-9-E

TRUCK FILLING/DUMPING	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions: Average PM10 Emissions Pounds/day	Controlled Emissions: Peak PM10 Emissions Pounds/day	Uncontrolled Emissions: Average PM10 Emissions Pounds/day	Uncontrolled Emissions: Peak PM10 Emissions Pounds/day	SCAQMD Emission Factor Source
Truck Filling[4]	1050	1050	0.02205	0.5	11.57625	11.57625	23.1525	23.1525	Table A9-9
Truck Dumping	0	0	0.009075	0.5	0	0	0	0	Table A9-9

TOTAL PM10 Pounds/day	Average	Peak
(Controlled Emissions)	188.6591	188.65911
(Uncontrolled Emissions)	377.192	377.192
Mitigated Emissions[5]	128.245	128.245

(1) Emissions (lbs/hr) = $[0.75 \times (G^{1.5})/(H^{1.4}) \times J$
where G = silt content (7.5%), H = moisture content (2.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).
(2) Emissions (lbs/ton) = $0.00112 \times [(G/5)^{1.3}/(H/2)^{1.4}] \times I/J$
where G=mean wind speed (12 mph), H=moisture content of surface material (2%); I=lbs of dirt handled per day; and J=2,000 lbs/ton
(3) Emissions (lbs/day/acre) = $1.7 \times [(G/1.5)*(365-H)/235] \times I/15 \times J$
where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (50%) and J= fraction of TSP (0.5)
(4) Used SCAQMD Table 9-9 Default emission factors.
(5) Mitigated Emissions assume that watering 3 times per day controls emissions by 66 percent (Uncontrolled Emissions x 0.34)

Chevron El Segundo Refinery
Safety, Compliance and Optimization Project
SCAQMD Localized Significance Threshold Analysis

February 2008

Prepared for: Chevron El Segundo Refinery

By: Environmental Audit, Inc.

INTRODUCTION

The Chevron El Segundo Refinery, located at 324 West El Segundo Boulevard, in the City of El Segundo, is proposing a project at its El Segundo Refinery (Refinery) to increase the reliability, flexibility and capacity of specific Refinery equipment. The overall focus of this project is to increase the reliability of the Refinery's existing equipment, increase the capacity of certain existing equipment, and optimize the ability of specific processes to increase production of transportation fuels and other chemical products derived from the refining process. The Product Reliability and Optimization (PRO) project includes modifications to existing specific process units, and also new infrastructure that supports and links these units to other processes, units or facilities throughout the Refinery. The proposed project will involve physical changes and additions to multiple process units and operations as well as operational and functional improvements within the confines of the Refinery with no increase in crude throughput.

As part of the permitting process, Environmental Audit, Inc. (EAI) has calculated emissions to evaluate the potential localized impacts of criteria pollutants from construction activities as voluntarily required by South Coast Air Quality Management District (SCAQMD) Localized Significance Threshold Methodology. Criteria pollutants evaluated include carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than 10 microns in diameter (PM10), and particulate matter less than 2.5 microns (PM2.5) associated with the project. The results of this evaluation are provided below.

Based on information provided by Chevron, construction activities by month for the proposed project are calculated to determine the peak construction day. The peak construction day is expected to occur during January 2009 for CO and NO_2 and August 2008 for PM10. Construction activities included in this evaluation are the use of construction equipment, vehicle activities on-site (i.e., buses, contractors arriving and leaving the site), and fugitive dust emissions from earth moving activities. Criteria pollutants evaluated include CO, NO_2, PM10, and PM2.5 associated with the construction activities.

EMISSION ESTIMATES

Construction emission estimates for the peak day are calculated by each portion of the project that will be under construction during that period (see Table B-6). Construction emissions vary based on activities and the worst-case scenario has been evaluated. It is expected that the calculated peak day emissions estimates will occur infrequently during the proposed project construction activities and, most of the time, construction emissions will be less.

CRITERIA POLLUTANT IMPACT MODELING

In order to determine the groundlevel concentrations, the U.S. EPA ISCST3 (Version 02035) air dispersion model is used to calculate the annual average and maximum 1-hour, 8-hour, and 24-hour concentrations. Various construction areas are modeled as area sources with dimensions presented in Table B-6. The release height for all sources is 1.83 meters above the ground.

The location of the source is identified based on data provided by Chevron and the Venice USGS Quadrangle (see Figure B-1). The emissions for each pollutant are run in separate modeling runs using the emissions for each source in grams per second per square meter in the ISCST3 model. The ISCST3 model is run using the Long Beach meteorological data available from the SCAQMD. The following settings are used in running the ISCST3 dispersion model:

- Use stack-tip downwash;
- Use buoyancy-induced dispersion;
- Do not use gradual plume rise;
- Do not use calm wind processing routine;
- Do not use missing data processing routine;
- Use default wind profile exponents;
- Use default vertical potential temperature gradients; and
- Use urban mode dispersion.

ISCST3 is not set to include algorithms to model the effects of building downwash on emissions since area sources are not influenced by building downwash in ISCST3.

Terrain elevations are taken into account even though the facility and the vicinity are in a relatively flat area.

The ISCST3 model is run using a receptor grid of 100 meters, and extends at least 1,000 meters in every cardinal direction from the boundaries of the refinery (see Figure B-1).

The maximum impact location is determined for the applicable averaging periods from the ISCST3 model output. The maximum groundlevel concentration and the Universal Tranverse Mercator (NAD 27) coordinates for each maximum impact point are presented in Table B-7.

CRITERIA POLLUTANT IMPACT ANALYSIS

The project construction maximum groundlevel concentrations are compared to the significance thresholds established in SCAQMD Rule 1303, Appendix A, Table A-2 for CO and NO_2 to demonstrate that construction emissions will not cause a violation of any state or national ambient air quality standard. The ambient air quality data for Southwest Coastal Los Angeles County (Source No. 3) is used to establish background levels of CO and NO_2. Table B-8 identifies the ambient air quality data for CO and NO_2 published by the SCAQMD in the last three years (2004, 2005, and 2006). PM10 and PM2.5 are compared to 10.4 micrograms per cubic meter ($\mu g/m^3$), which is comparable to the requirement in Rule 403. PM10 and PM2.5 are evaluated differently that CO and NO_2 because PM10 in nearly the entire district exceeds the state or federal PM10 and PM2.5 standards.

The CO 1-hour, CO 8-hour, NO_2 1-hour, and NO_2 annual average concentrations are combined with the maximum ambient concentrations and compared to the Most Stringent Air Quality Standard. The results are presented in Table B-9.

The maximum CO impact concentrations for 1-hour and 8-hour averages are 179.1 and 68.9 $\mu g/m^3$, respectively. The maximum NO_2 impact concentrations for 1-hour and annual averages are 187.7 and 4.7 $\mu g/m^3$, respectively because NO_2 formation from nitrogen oxides (NOx) is a function of distance from the source (see SCAQMD Localized Significance Threshold Methodology (June 2003), page 2-8 for further discussion). Therefore, the maximum NO_2 1-hour and annual impact concentrations have been adjusted by a factor of 0.9 to account for the distance from the source to the receptor. The maximum PM10 impact concentration for 24-hour average is 9.7 $\mu g/m^3$. PM2.5 is a fraction of PM2.5. Therefore, the PM2.5 impact concentration for 24-hour average will be less than 9.7 $\mu g/m^3$.

The localized significance threshold analysis results in no significant change in air quality from construction activities for NO_2, CO, PM10, or PM2.5. Therefore, the proposed project complies with the localized significance threshold methodology.

MRB:dab/ss

Attachments

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TABLES

Table B-6. Peak Day Calculated Construction Emissions and Source Dimensions(1)

			Emissions (lb/day)			Emissions (g/s)				Emissions (g/s-m²)		
Phase	Source Description	Source Name	CO	NOx	PM10(2)(3)	CO	NOx	PM10	Area of Source (m^2)	CO	NOx	PM10
Aug '08 - Peak PM10	Cogen Train D	Area1	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	4180	N/A	N/A	0.00E+00
Aug '08 - Peak PM10	VRDS Modifications	Area2	N/A	N/A	2.02E+01	N/A	N/A	2.55E-01	17570	N/A	N/A	1.45E-05
Aug '08 - Peak PM10	Alky Modifications	Area3	N/A	N/A	2.03E+01	N/A	N/A	2.55E-01	28090	N/A	N/A	9.09E-06
Aug '08 - Peak PM10	Sulfur Recovery Facility	Area4	N/A	N/A	3.88E+01	N/A	N/A	4.88E-01	4640	N/A	N/A	0.000105
Aug '08 - Peak PM10	FCC Modifications	Area5	N/A	N/A	2.18E+01	N/A	N/A	2.74E-01	13820	N/A	N/A	1.98E-05
Aug '08 - Peak PM10	Cooling Tower	Area6	N/A	N/A	4.37E+00	N/A	N/A	5.50E-02	1490	N/A	N/A	3.69E-05
Aug '08 - Peak PM10	Isomax Modifications	Area7	N/A	N/A	0.00E+00	N/A	N/A	0.00E+00	33980	N/A	N/A	0
Aug '08 - Peak PM10	Tanks/Loading Racks	Area8	N/A	N/A	5.73E+00	N/A	N/A	7.22E-02	3715	N/A	N/A	1.94E-05
Aug '08 - Peak PM10	New Safety Flare	Area9	N/A	N/A	1.86E+01	N/A	N/A	2.34E-01	3715	N/A	N/A	6.31E-05
Aug '08 - Peak PM10	Tanks/Loading Racks	Area10	N/A	N/A	5.73E+00	N/A	N/A	7.22E-02	7190	N/A	N/A	1E-05
Aug '08 - Peak PM10	Tanks/Loading Racks	Area11	N/A	N/A	5.73E+00	N/A	N/A	7.22E-02	3620	N/A	N/A	1.99E-05
Aug '08 - Peak PM10	Tanks/Loading Racks	Area12	N/A	N/A	5.73E+00	N/A	N/A	7.22E-02	750	N/A	N/A	9.62E-05
Aug '08 - Peak PM10	OSBL/Edison/Basin	Area13	N/A	N/A	2.39E+01	N/A	N/A	3.01E-01	74320	N/A	N/A	4.05E-06
Aug '08 - Peak PM10	New Safety Flare	Parea1	N/A	N/A	1.49E+00	N/A	N/A	1.88E-02	13980	N/A	N/A	1.35E-06
Aug '08 - Peak PM10	FCC laydown area	Parea3	N/A	N/A	2.83E+00	N/A	N/A	3.57E-02	32160	N/A	N/A	1.11E-06
Aug '08 - Peak PM10	OSBL laydown area	Parea4	N/A	N/A	1.82E+00	N/A	N/A	2.29E-02	18960	N/A	N/A	1.21E-06
Jan '09 - Peak CO/NOx	Cogen Train D	Area1	4.35E+01	4.71E+01	N/A	2.74E-01	2.97E-01	N/A	4180	6.55E-05	7.10E-05	N/A
Jan '09 - Peak CO/NOx	VRDS Modifications	Area2	3.93E+01	5.49E+01	N/A	2.47E-01	3.46E-01	N/A	17570	1.41E-05	1.97E-05	N/A
Jan '09 - Peak CO/NOx	Alky Modifications	Area3	5.59E+01	5.84E+01	N/A	3.52E-01	3.68E-01	N/A	28090	1.25E-05	1.31E-05	N/A
Jan '09 - Peak CO/NOx	Sulfur Recovery Facility	Area4	7.94E+01	7.66E+01	N/A	5.00E-01	4.83E-01	N/A	4640	1.08E-04	1.04E-04	N/A
Jan '09 - Peak CO/NOx	FCC Modifications	Area5	8.86E+01	1.61E+02	N/A	5.58E-01	1.01E+00	N/A	13820	4.04E-05	7.33E-05	N/A
Jan '09 - Peak CO/NOx	Cooling Tower	Area6	3.00E+01	4.06E+01	N/A	1.89E-01	2.56E-01	N/A	1490	1.27E-04	1.72E-04	N/A
Jan '09 - Peak CO/NOx	Isomax Modifications	Area7	7.45E+01	7.22E+01	N/A	4.69E-01	4.55E-01	N/A	33980	1.38E-05	1.34E-05	N/A
Jan '09 - Peak CO/NOx	Tanks/Loading Racks	Area8	1.66E+01	1.38E+01	N/A	1.04E-01	8.70E-02	N/A	3715	2.81E-05	2.34E-05	N/A
Jan '09 - Peak CO/NOx	New Safety Flare	Area9	1.99E+01	3.41E+01	N/A	1.25E-01	2.15E-01	N/A	3715	3.37E-05	5.79E-05	N/A
Jan '09 - Peak CO/NOx	Tanks/Loading Racks	Area10	1.66E+01	1.38E+01	N/A	1.04E-01	8.70E-02	N/A	7190	1.45E-05	1.21E-05	N/A
Jan '09 - Peak CO/NOx	Tanks/Loading Racks	Area11	1.66E+01	1.38E+01	N/A	1.04E-01	8.70E-02	N/A	3620	2.88E-05	2.40E-05	N/A
Jan '09 - Peak CO/NOx	Tanks/Loading Racks	Area12	1.66E+01	1.38E+01	N/A	1.04E-01	8.70E-02	N/A	750	1.39E-04	1.16E-04	N/A
Jan '09 - Peak CO/NOx	OSBL/Edison/Basin	Area13	8.16E+01	1.19E+02	N/A	5.14E-01	7.47E-01	N/A	74320	6.92E-06	1.01E-05	N/A
Jan '09 - Peak CO/NOx	New Safety Flare	Parea1	8.55E+00	3.19E+00	N/A	5.39E-02	2.01E-02	N/A	13980	3.85E-06	1.44E-06	N/A
Jan '09 - Peak CO/NOx	FCC laydown area	Parea3	8.98E+01	1.33E+01	N/A	5.66E-01	8.38E-02	N/A	32160	1.76E-05	2.60E-06	N/A
Jan '09 - Peak CO/NOx	OSBL laydown area	Parea4	1.85E+01	4.14E+00	N/A	1.17E-01	2.61E-02	N/A	18960	6.15E-06	1.38E-06	N/A

(1) Emissions were allocated to each source by engineering estimates.

(2) PM10 emissions adjusted to remove off-site on-road fugitive dust emissions.

(3) The PM2.5 and PM10 significance thresholds are the same, since PM2.5 is a fraction of PM10 and PM10 is not significant for LST, PM2.5 is also not significant.

Table B-7. ISCST3 Modeling Results for November 2007 Peak Day Construction Emissions

Criteria Pollutant	Averaging Period	August 2008 Peak PM10 Max Conc. ($\mu g/m^3$)	January 2009 Peak CO/NOx Max Conc. ($\mu g/m^3$)	Absolute Max Conc. ($\mu g/m^3$)	UTM Coordinates	
					Easting	Northing
CO	1-hr	N/A	179.07	179.07	369254	3753640
	8-hr	N/A	68.88	68.88	369354	3753640
NO_2 (1)	1-hr	N/A	187.68	187.68	369754	3753640
	Annual	N/A	4.71	4.71	369754	3753640
PM10	24-hr	9.74	N/A	9.74	369854	3751840
PM2.5 (2)	24-hr	<9.74	N/A	<9.74	369854	3751840

(1) Project Construction Emissions adjusted to NO2 from NOx based on distance to receptor of 3000 meters for the 1-hour and annual averages. (See Table 2-4 of the SCAQMD Localized Significance Threshold Methodology, June 2003.)

(2) The PM2.5 and PM10 significance thresholds are the same, since PM2.5 is a fraction of PM10 and PM10 is not significant for LST, PM2.5 is also not significant.

Table B-8. Maximum Ambient Concentration Data[1]

Criteria Pollutant	Averaging Period	Concentration (ppm)			Max Conc.	
		2004[2]	2005	2006	(ppm)	(μg/m³)
CO	1-hr	6	3	3	6	6896.40
	8-hr	4.4	2.1	2.3	4.4	5057.36
NO_2	1-hr	0.09	0.09	0.1	0.1	188.80
	Annual	N/A	0.0134	0.0155	0.0155	29.26

(1) Data from Southwest Coastal LA County Station (No. 820)

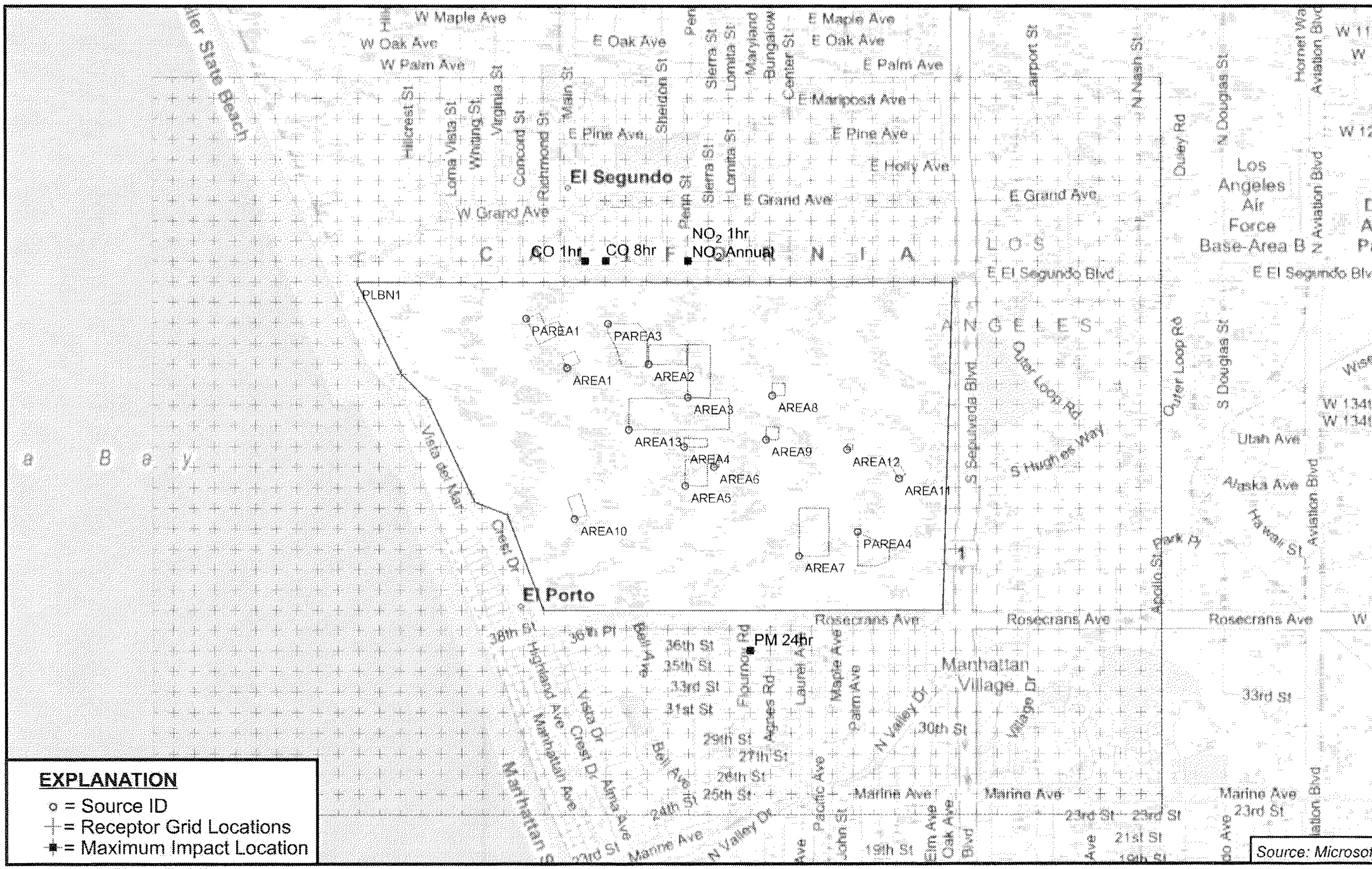
(2) Concentration readings were split between two stations in 2004. The highest 1-hr and 8-hr concentrations from the two stations were used. Annual averages were excluded.

Table B-9. Localized Significance Threshold Evaluation for Construction Emissions

Criteria Pollutant	Averaging Period	Ambient Background Conc. (μg/m^3)	Calculated Concentration (μg/m^3)	Total Conc. (μg/m^3)	Most Stringent Air Quality Standard (μg/m^3)	Localized Significance Threshold (μg/m^3)	Exceeds Threshold? Yes/No
CO	1-hr	6896.4	179.1	7075.5	23000		No
	8-hr	5057.4	68.9	5126.2	10000		No
NO_2	1-hr	188.8	187.7	376.5	500		No
	Annual	29.3	4.7	34.0	100		No
PM10	24-hr		9.7			10.4	No
PM2.5(1)	24-hr		<9.7			10.4	Yes

(1) The PM2.5 and PM10 significance thresholds are the same, since PM2.5 is a fraction of PM10 and PM10 is not significant for LST, PM2.5 is also not significant.

FIGURE



ENVIRONMENTAL AUDIT, INC.®

CHEVRON EL SEGUNDO REFINERY
Localized Significance Threshold Evaluation

Project No. 2505
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Figure B-1

CO Hotspots Analysis

TABLE B-10
Chevron El Segundo Refinery
Product Reliability and Optimization Project
CO Hotspots Analysis
Traffic Data for Aviation Blvd. at El Segundo Blvd.

Movement	Lanes	Capacity	Year 2007		Forecast Year 2008		w/ Proposed Project		w/ All Projects	
			Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C
NB LEFT	1	1600	150	0.094	151	0.094	151	0.094	151	0.094
THRU	2	3200	901	0.329	906	0.33	906	0.33	906	0.33
RIGHT	0	0	151	0	152	0	152	0	152	0
NB Total			1202		1209		**1209**	0.424	1209	
SB LEFT	1	1600	242	0.151	243	0.152	243	0.152	243	0.152
THRU	2	3200	804	0.251	808	0.253	808	0.253	808	0.253
RIGHT	1	1600	78	0.049	78	0.049	78	0.049	78	0.049
SB Total			1124		1129		**1129**	0.454	1129	
EB LEFT	2	3120	221	0.071	222	0.071	222	0.071	222	0.071
THRU	3	4800	1145	0.239	1151	0.24	1151	0.24	1387	0.289
RIGHT	1	1600	247	0.154	248	0.155	248	0.155	259	0.162
EB Total			1613		1621		**1621**	0.466	1868	
WB LEFT	2	3120	608	0.195	611	0.196	611	0.196	611	0.196
THRU	3	4800	609	0.158	612	0.159	612	0.159	612	0.159
RIGHT	0	0	149	0	150	0	150	0	150	0
WB Total			1366		1373		**1373**	0.355	1373	
Intersection Volume			5305		5332		5332		5579	

Notes:

NB and SB is Aviation Blvd.

EB and WB is El Segundo Blvd.

El Segundo Blvd is the primary street with Aviation being secondary.

TABLE B-11
Chevron El Segundo Refinery
Product Reliability and Optimization Project
CO Hotspots Analysis

Reference Data

Reference CO Concentrations, Cri (ppm)(1)		Emission Rate, EFi (grams/mile)(2)		Averaging Period	Ambient Concentration, Co (ppm)(3)		
Roadway	At Edge	Year	CO		2005	2006	Avg.
Primary Road	12.95	2008	4.05	1-hr	3	3	3
Secondary Road	3.7			8-hr	2.1	2.3	2.2

(1) Interpolated for 3 lane primary road and as written for 2 land secondary road from BAAQMD CEQA Guidlelines, Table 12.

(2) Inerpolated for model year 2008 from BAAQMD CEQA Guidelines, Table 10.

(3) For Receptor Areas Location 3 - Southwest Coastal LA County

Roadway Contributions

$C_i = C_{ri} * V_i * EF_i / 100{,}000$

where, C_i = is the individual road contribution,
C_{ri} = the reference case concentration,
V_i = the traffic volume from the individual roadway, and
EF_i = the emission factor for the individual roadway.

Roadway	Cri	Vi	EFi	Ci
NB	3.7	1209	4.05	0.18
SB	3.7	1129	4.05	0.17
EB	12.95	1621	4.05	0.85
WB	12.95	1373	4.05	0.72
Total at Intersection, Ct				1.92

Significance Evaluation

Averaging Period	C_o	C_t	C (ppm)	C ($\mu g/m^3$)	Most Stringent Air Quality Standard ($\mu g/m^3$)	Exceeds Threshold? Yes/No
1-hr	3	1.92	4.92	5656	23000	**NO**
8-hr	2.2	1.34	3.54	4074	10000	**NO**

$C = C_o + C_t$

APPENDIX C

OPERATIONAL EMISSION CALCULATIONS

TABLE OF CONTENTS
CHEVRON PRODUCTS COMPANY - EL SEGUNDO REFINERY
OPERATIONAL EMISSIONS CALCULATIONS

APPENDIX C

Table C-1
OPERATIONAL EMISSION SUMMARY

Source	Estimated Emissions (lbs/day)					
	CO	VOC	NOx	SOx	PM10	PM2.5
No. 2 Crude PRD Fugitive Emissions	--	10.3	--	--	--	--
No. 2 RSU PRD Fugitive Emissions	--	3.4	--	--	--	--
Minal/Merox PRD Fugitive Emissions	--	4.1	--	--	--	--
Waste Gas Compressors Fugitive Emissions(1)	--	0.0	--	--	--	--
FCCU Fugitive Emissions	--	10.8	--	--	--	--
Alkylation Unit Fugitive Emissions	--	15.8	--	--	--	--
VRDS Unit Fugitive Emissions	--	22.6	--	--	--	--
ISOMAX Fugitive Emissions	--	26.7	--	--	--	--
ISOMAX NOx Emissions Reduction	--	--	-555.7	--	--	--
Cogen Train D Combustion Emissions(2)	72.3	40.9	178.4	63.1	105.4	105.4
Cogen Train D Fugitive Emissions	--	7.3	--	--	--	--
Railcar Loading and Unloading Rack Fugitive Emiss	--	4.7	--	--	--	--
Sulfur Recovery Facilities						
Sour Water Stripper Fugitive Emissions	--	3.0	--	--	--	--
Sulfur Recovery Unit Fugitive Emissions	--	--	--	--	--	--
Tail Gas Unit Incinerator Emissions	304.6	4.1	133.5	139.3	5.7	5.7
Tail Gas Unit Fugitive Emissions	--	1.0	--	--	--	--
Vapor Revcovery and Safety Flare System						
Pilot Combustion Emissions	2.3	0.5	8.4	0.1	0.5	0.5
Fugitive Emissions	--	2.7	--	--	--	--
Tank Emissions						
Tank 302	--	14.9	--	--	--	--
Tank 303	--	14.6	--	--	--	--
Tank 447	--	12.8	--	--	--	--
Tank 722 Fugitive Emissions	--	3.3	--	--	--	--
Cooling Tower	--	--	--	--	5.76	5.76
Total Emissions from Stationary Sources	379.14	203.34	-235.47	202.41	117.36	
Workers Commuting	3.79	0.36	0.36	0.00	0.02	
Delivery Trucks	0.00	0.00	0.00	0.00	0.00	
Fugitive Road Dust	0.00	0.00	0.00	0	0.15	
Rail Cars	6.32	2.40	46.07	3.92	1.52	
Total Emissions from Mobile Sources	10.11	2.76	46.43	3.92	1.69	
TOTAL EMISSIONS	389.25	206.10	-189.04	206.33	119.05	

(1) Waste Gas Compressors are already vented to a vapor recovery system. Rerouting will not increase fugitive components. Therefore, there is no increase in fugitive emissions.

(2) The PM emissions from Cogen Train D will be grouped with the existing Cogen Units and capped at existing limits by permit conditions. Therefore, no increase PM10 and PM2.5 will occur from the facility by the addition of Cogen Train D.

Table C-2
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Cogen Plant Criteria Pollutant Emission Calculations

Pollutant	Basis	Emission Factor	Units	Emission Factor lb/MMBtu	Cogeneration Plant Emissions					
					MHU Lb/hr	MHC Lb/hr	MDU Lb/day	MDC Lb/day	AA Tons/yr	30-DA Lbs/day
NOx	Uncontrolled, assumed	25	ppmv @ 15% O_2	0.0936	49.12	---	259.7	259.7	---	259.7
NOx	Controlled, BACT	3.0	ppmv @ 15% O_2	0.0112	---	7.34	---	---	32.6	178.4
SO_2	Short-term, BACT	100	ppmv S, 24-hour ave	0.0161	10.52	10.52	252.4	252.4	---	252.4
SO_2	Annual, BACT	25	ppmv S, annual ave.	0.00403	---	---	---	---	11.5	63.1
PM10	Duct Burner	7.6	lbs/MMscf	0.00724	0.93	0.93	22.3	22.3	4.1	22.3
PM10	Gas Turbine	0.0066	lbs/mmBtu	0.00660	3.46	3.46	83.1	83.1	15.2	83.1
PM10 Total	Duct Burner & Gas Turbine	---	---	---	4.39	4.39	105.43	105.43	19.24	105.43
VOC	Uncontrolled, SCAQMD Default	7.0	lb/MMscf	0.00667	3.50	---	44.4	44.4	---	44.4
VOC	Controlled, BACT	2.0	ppmv @ 15% O_2	0.00261	---	1.70	---	---	7.5	40.9
CO	Uncontrolled, assumed	35.0	lbs/MMscf	0.0333	17.49	---	100.5	100.5	---	100.5
CO	Controlled, BACT	2.0	ppmv @ 3% O_2	0.00456	---	2.98	---	---	13.2	72.3

Parameters

Higher Heating Value of Fuel Gas	1,050	Btu/scf
Annual Operational Schedule	8,760	hrs/year
Daily Operational Schedule	24	hrs/day
F-factor	8,710	scf/MMBtu
Molar Volume	379	scf/mole
Number of Starts/Stops per year	10	each
Duration of Start/Stop	1	hours
Heat Input Combustion Turbine	524.7	MMBtu/hr
Heat Input Duct Burner	128.5	MMBtu/hr
Heat Input Total	653.2	MMBtu/hr

MHU = Maximum Hourly Uncontrolled
MHC = Maximum Hourly Controlled
MDU = Maximum Daily Uncontrolled
MDC = Maximum Daily Controlled
AA = Annual Average
30-DA = Thirty-day Average

TABLE C-3
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
SULFUR RECOVERY FACILITY EMISSIONS
FROM TAIL GAS TREATING PLANT INCINERATOR

Pollutant	**Units**	**CO**	**VOC**	**NO_x**	**SO_x**	**PM_{10}**
Permit Limit	ppmv, dry, 0% O_2	150		40	30	
Stack Flow	lb mols/hr, dry, 0% O	3022		3022	3022	
Pollutant Flow	lb mols/hr	0.4533		0.1209	0.0907	
Pollutant MW	lb/lb-mol	28		46	64	
Pollutant Flow	lb/hr	12.69		5.56	5.80	
Burner Duty	mmBTU/hr		32.7			32.7
Fuel Heating Value	BTU/scf (HHV)		1050			1050
Fuel Flow	scf/hr		31,143			31,143
Fuel Flow	mmscf/day		0.747			0.747
Emission Factor	lb/mmscf		5.5			7.6
Pollutant Flow	**lb/day**	**304.6**	**4.1**	**133.5**	**139.3**	**5.7**

Note:
Calculation of mass emission limits for criteria pollutants from anticipated permit limits
VOC and PM_{10} emission factors from SCAQMD General Instruction Book for 2006-2007 AER, Appendix A Table 1.

Table C-4
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Flare Emission Calculations

Pollutant	Emission factor	MHC	MDC	AA
	lbs/MMscf	lbs/hr	lbs/day	Tons/year
NOx	130	0.35	8.38	1.53
SOx	0.83	2.23E-03	0.05	0.01
CO	35	0.09	2.26	0.41
VOC	7	0.02	0.45	0.08
PM10	7.5	0.02	0.48	0.09

Parameters

Pilot Gas flow rate	100,000	BTU/hr
Number of Pilots	3	
Total Pilot Flow	300,000	BTU/hr
Heating Value NG	1,050	BTU/scf
Pilot Gas Flow Rate	285.7	scf/hr
Purge Gas Flow Rate	40	scf/min
Purge Gas Flow Rate	2,400	scf/hr
Total Combustion Flow	2.69E-03	MMscf/hr

MHU = Maximum Hourly Uncontrolled
MHC = Maximum Hourly Controlled
MDU = Maximum Daily Uncontrolled
MDC = Maximum Daily Controlled
AA = Annual Average
30-DA = Thirty-day Average

Table C-5
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
ISOMAX Furnace Burner Replacment

Furnace Information

Permitted Fired Duty (mmBtu/hr/furnace)(	57
No. of Furnaces Being Retrofitted	4

	Current Conditions	Post-Project Conditions	NOx Emissions Reduction (lbs/day)
Emission Factor (lbs/mmBtu)(2)	0.1492	0.04762	
NOx Emissions (lbs/hr)	34.01	10.86	
NOx Emissions (lbs/day)	816.3	260.6	**555.7**

(1) Permitted Fired Duty is appropriate because historical data indicates furnaces have operated at the permitted limit. Therefore, the potential to emit for current conditions are compared to the potential to emit for post-project conditions.

(2) Current emission factor based on 2-year average of CEMS monitoring data. Post-project emission factor from U.S. EPA AP-42 Table 1.4-1 (July 1998) converted to lbs/mmBtu using 1050 Btu/scf.

TABLE C-6
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 1 - System 3 No. 2 Crude Unit
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
No. 2 Crude PRDs- No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	92	23	2116
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	28	19	532
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	252	1.5	378
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	205	1.5	307.5
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	4	104	416
Pumps	Heavy Liquid	0	80	0
	(Non-Rule 1173)			
Pumps	< 10% HC	0	104	0
	(Non-Rule 1173)		(520 x 0.2= 104)	
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC	0	51.4	0
	(Non-Rule 1173)		(514 x 0.1 = 51.4)	
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		0	0	0
Drains (with water seals)		0	0	0
	Total Count:	581	Total (lb/yr)	**3,749.5**
			Hydrocarbon Emissions (lbs/day)	**10.3**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-7
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 01 - System 13 (2 Resid Unit)
Modification ID 01-13-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	33	23	1138.5
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	0	19	0
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	30	1.5	67.5
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	18	1.5	40.5
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	0	104	0
Pumps	Heavy Liquid	0	80	0
	(Non-Rule 1173)			
Pumps	< 10% HC	0	104	0
	(Non-Rule 1173)		(520 x 0.2= 104)	
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC	0	51.4	0
	(Non-Rule 1173)		(514 x 0.1 = 51.4)	
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		0	0	0
Drains		0	80	0
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	81	Total (lb/yr)	**1,246.5**
		Hydrocarbon Emissions (lbs/day)	**3.4**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

NOTE: It is assumed replacement of equipment in identical service in the absence of external piping or instrumentation configuration changes will not have impact on the respective fugitive emissions component count.

TABLE C-8
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 12 - System 18: Minalk/Merox Plant
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
Minalk PRDs- No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	48	23	1104
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	0	19	0
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	144	1.5	216
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	120	1.5	180
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	0	104	0
Pumps	Heavy Liquid	0	80	0
	(Non-Rule 1173)			
Pumps	< 10% HC	0	104	0
	(Non-Rule 1173)		(520 x 0.2= 104)	
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC	0	51.4	0
	(Non-Rule 1173)		(514 x 0.1 = 51.4)	
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		0	0	0
Drains (with water seals)		0	0	0
	Total Count:	312	Total (lb/yr)	**1,500.0**
			Hydrocarbon Emissions (lbs/day)	**4.1**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-9
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 03 - System 01 (FCCU)
Modification ID 03-01-001
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	79	23	2725.5
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	-50	19	-1425
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	35	3	157.5
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	74	1.5	166.5
Flanges	Heavy Liquid	61	1.5	137.25
Connectors	Light Liquid/Vapor	74	1.5	166.5
Connectors	Heavy Liquid	42	1.5	94.5
Pumps	Light Liquid	0	104	0
Pumps	Heavy Liquid	1	80	123.2
	(Non-Rule 1173)			
Pumps	< 10% HC	0	104	0
	(Non-Rule 1173)		(520 x 0.2= 104)	
Compressors	HC Gas/Vapor	2	514	1542
Compressors	< 10% HC	0	51.4	0
	(Non-Rule 1173)		(514 x 0.1 = 51.4)	
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		1	0	0
Drains		2	80	240
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	321	Total (lb/yr)	**3,928.0**
		Hydrocarbon Emissions (lbs/day)	**10.8**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

NOTE: It is assumed replacement of equipment in identical service in the absence of external piping or instrumentation configuration changes will not have impact on the respective fugitive emissions component count.

TABLE C-10
CHEVRON PRODUCTS COMPANY - EL SEGUNDO REFINERY
Process 08 - System 01 (Alkylation Plant)
Modification ID 08-01-XXX
REFINERY FUGITIVE EMISSIONS SUMMARY - AQMD FACTORS
Case: Valves Are Bellows Sealed per Existing Piping Specifications Only

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	16	23	368
	Bellows Sealed	2	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	160	19	3040
	Bellows Sealed	53	0	0
Valves	Heavy Liquid	28	3	84
	Bellows Sealed	18	0	0
Flanges	Light Liquid/Vapor	695	1.5	1042.5
Flanges	Heavy Liquid	78	1.5	117
Connectors	Light Liquid/Vapor	316	1.5	474
Connectors	Heavy Liquid	34	1.5	51
Pumps	Light Liquid	0	104	0
Pumps	Heavy Liquid (Non-Rule 1173)	1	80	80
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	1	514	514
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		19	0	0
Drains (non-emergency, without water seal and venting to atmosphere)		0	80	0

Total Count:	1,421	Total (lb/yr)	**5,770.5**
		Hydrocarbon Emissions (lbs/day)	**15.8**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.
Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

NOTE: It is assumed replacement of equipment in identical service in the absence of external piping or instrumentation configuration changes will not have impact on the respective fugitive emissions component count.

TABLE C-11
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 04 - System 11 (VRDS)
Modification ID 04-11-001
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	162	23	3726
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	40	19	760
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	306	3	918
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	368	1.5	552
Flanges	Heavy Liquid	302	1.5	453
Connectors	Light Liquid/Vapor	133	1.5	199.5
Connectors	Heavy Liquid	320	1.5	480
Pumps	Light Liquid	0	104	0
Pumps	Heavy Liquid	4	80	320
	(Non-Rule 1173)			
Pumps	< 10% HC	0	104	0
	(Non-Rule 1173)		(520 x 0.2= 104)	
Compressors	HC Gas/Vapor	1	514	514
Compressors	< 10% HC	0	51.4	0
	(Non-Rule 1173)		(514 x 0.1 = 51.4)	
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		10	0	0
Drains		4	80	320
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	1,650	Total (lb/yr)	**8,242.5**
		Hydrocarbon Emissions (lbs/day)	**22.6**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-12
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 07 - System 04 (ISOMAX)
Modification ID 07-04-001
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS

No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	146	23	3358
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	46	19	874
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	332	3	996
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	346	1.5	519
Flanges	Heavy Liquid	352	1.5	528
Connectors	Light Liquid/Vapor	354	1.5	531
Connectors	Heavy Liquid	618	1.5	927
Pumps	Light Liquid	2	104	208
Pumps	Heavy Liquid (Non-Rule 1173)	12	80	960
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	1	514	514
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		12	0	0
Drains		4	80	320
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	2,225	Total (lb/yr)	**9,735.0**
		Hydrocarbon Emissions (lbs/day)	**26.7**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-13
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 17 - System New (Cogen train D)
Modification ID XX-XX-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	102	23	2346
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	0	19	0
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	186	1.5	279
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	15	1.5	22.5
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	0	104	0
Pumps	Heavy Liquid (Non-Rule 1173)	0	80	0
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		0	0	0
Drains		0	0	0
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	303	Total (lb/yr)	**2,647.5**
		Hydrocarbon Emissions (lbs/day)	**7.3**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-14
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 16 - System New (Railcar Unloading Rack)
Modification ID XX-XX-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	34	23	782
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	32	19	608
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	84	1.5	126
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	138	1.5	207
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	0	104	0
Pumps	Heavy Liquid (Non-Rule 1173)	0	80	0
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		0	0	0
Drains		0	80	0
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	288	Total (lb/yr)	**1,723.0**
		Hydrocarbon Emissions (lbs/day)	**4.7**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-15
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 20 - System 00 (SWS Unit)
Modification ID XX-XX-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	6	23	138
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	23	19	437
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	63.5	1.5	95.25
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	75.5	1.5	113.25
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	3	104	312
Pumps	Heavy Liquid (Non-Rule 1173)	0	80	0
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		0	0	0
Drains		0	80	0
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	120	Total (lb/yr)	**1,095.5**
		Hydrocarbon Emissions (lbs/day)	**3.0**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-16
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 13 - System New (TGTU Fuel Gas)
Modification ID XX-XX-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
Fuel Gas - < 2-Inch Valves With Bellows Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	0	23	0
	Bellows Sealed	0	0	0
Valves	Fuel Gas	13	12	153.6
	Bellows Sealed	3	0	0
Valves	Light Liquid	0	19	0
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	74	1.5	111
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	63	1.5	93.8
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	0	104	0
Pumps	Heavy Liquid (Non-Rule 1173)	0	80	0
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		0	0	0
Drains		0	80	0
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	120	Total (lb/yr)	**358.4**
		Hydrocarbon Emissions (lbs/day)	**1.0**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-17
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 20 - System New (Flare)
Modification ID XX-XX-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS
No Bellow Seals

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	14	23	322
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	8	19	152
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	56	1.5	84
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	36	1.5	54
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	2	104	208
Pumps	Heavy Liquid	0	80	0
	(Non-Rule 1173)			
Pumps	< 10% HC	0	104	0
	(Non-Rule 1173)		(520 x 0.2= 104)	
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC	0	51.4	0
	(Non-Rule 1173)		(514 x 0.1 = 51.4)	
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		2	0	0
Drains		2	80	160
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	120	Total (lb/yr)	**980.0**
		Hydrocarbon Emissions (lbs/day)	**2.7**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-18
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 16 - System New (Tank New 722 - Sphere LPG)
Modification ID XX-XX-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	2	23	46
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	32	19	608
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	88	1.5	132
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	22	1.5	33
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	3	104	312
Pumps	Heavy Liquid (Non-Rule 1173)	0	80	0
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		1	0	0
Drains		1	80	80
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	149	Total (lb/yr)	**1,211.0**
		Hydrocarbon Emissions (lbs/day)	**3.3**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-19
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 16 - System New (Tank 302 - Floating Roof with External Fixed Dome)
Modification ID XX-XX-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	0	23	0
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	23	19	437
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	56	1.5	84
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	13	1.5	19.5
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	3	104	312
Pumps	Heavy Liquid (Non-Rule 1173)	0	80	0
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		2	0	0
Drains		4	80	320
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	101	Total (lb/yr)	**1,172.5**
		Hydrocarbon Emissions (lbs/day)	**3.2**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-20

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Tank302New-10-24-2007
City:	Los Angeles AP
State:	California
Company:	Chevron Products USA
Type of Tank:	Domed External Floating Roof Tank
Description:	New FCCU Light Gasoline (150' x 64')

Tank Dimensions

Diameter (ft):	150.00
Volume (gallons):	5,250,000.00
Turnovers:	67.20

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	26
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	46
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Pole Sleeve,Wiper	1

Meterological Data used in Emissions Calculations: Los Angeles AP, California (Avg Atmospheric Pressure = 14.67 psia)

TABLE C-20 (Continued)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Tank302New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Petroleum Hydrocarbon Product	All	71.00	62.31	79.70	65.19	10.9900	N/A	N/A	68.0000			114.00	
1,2,4-Trimethylbenzene						0.0314	N/A	N/A	120.1900	0.0479	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.5725	N/A	N/A	78.1100	0.0836	0.0201	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Butadiene, 1,3-						36.6817	N/A	N/A	54.1000	0.0010	0.0056	54.10	Option 2: A=6.8499, B=930.546, C=238.854
Cyclohexane						1.6200	N/A	N/A	84.1600	0.1172	0.0290	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1576	N/A	N/A	106.1700	0.0584	0.0014	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.5297	N/A	N/A	86.1700	0.2150	0.0830	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0040	N/A	N/A	128.2000	0.0178	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Propylene						140.8109	N/A	N/A	42.0800	0.0090	0.1933	42.08	Option 2: A=7.58, B=1133.65, C=283.26
Toluene						0.4611	N/A	N/A	92.1300	0.2000	0.0141	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						-26.5572	N/A	N/A	78.7864	0.0001	0.6484	-0.05	
Xylene (mixed isomers)						0.1317	N/A	N/A	106.1700	0.2500	0.0050	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TABLE C-20 (Continued)

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Tank302New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

Annual Emission Calcaulations	
Rim Seal Losses (lb):	2,034.2639
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Average Wind Speed (mph):	0.0000
Seal-related Wind Speed Exponent:	1.0000
Value of Vapor Pressure Function:	0.3324
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	10.9900
Tank Diameter (ft):	150.0000
Vapor Molecular Weight (lb/lb-mole):	68.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	562.0704
Annual Net Throughput (gal/yr.):	352,590,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	150.0000
Roof Fitting Losses (lb):	1,652.5004
Value of Vapor Pressure Function:	0.3324
Vapor Molecular Weight (lb/lb-mole):	68.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	73.1100
Average Wind Speed (mph):	0.0000
Total Losses (lb):	4,248.8347

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	36.1647
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	63.2882
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	10.6234
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	140.1382
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	26	1.20	0.14	0.65	705.2115
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	46	0.49	0.16	0.14	509.4701
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Pole Sleeve,Wiper	1	8.30	4.40	1.60	187.6043

TABLE C-20 (Concluded)

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Tank302New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Petroleum Hydrocarbon Product	2,034.26	562.07	1,652.50	0.00	4,248.83
Hexane (-n)	168.77	120.85	137.10	0.00	426.72
Benzene	40.79	46.99	33.14	0.00	120.92
Toluene	28.61	112.41	23.24	0.00	164.27
Ethylbenzene	2.86	32.82	2.32	0.00	38.00
Xylene (mixed Isomers)	10.22	140.52	8.30	0.00	159.04
1,2,4-Trimethylbenzene	0.47	26.92	0.38	0.00	27.77
Cyclohexane	58.92	65.87	47.86	0.00	172.65
Naphthalene	0.02	10.00	0.02	0.00	10.04
Butadiene, 1,3-	11.38	0.56	9.25	0.00	21.19
Propylene	393.26	5.06	319.46	0.00	717.78
Unidentified Components	1,318.95	0.06	1,071.43	0.00	2,390.43

TABLE C-21
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 16 - System New (Tank 303 - Floating Roof with External Fixed Dome)
Modification ID XX-XX-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	0	23	0
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	23	19	437
	Bellows Sealed	0	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	56	1.5	84
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	13	1.5	19.5
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	2	104	208
Pumps	Heavy Liquid (Non-Rule 1173)	0	80	0
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		2	0	0
Drains		4	80	320
(non-emergency, without water seal and venting to atmosphere)				
	Total Count:	100	Total (lb/yr)	**1,068.5**
			Hydrocarbon Emissions (lbs/day)	**2.9**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-22

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	Tank303New-10-24-2007
City:	Los Angeles AP
State:	California
Company:	Chevron Products USA
Type of Tank:	Domed External Floating Roof Tank
Description:	New FCCU Light Gasoline (150' x 64')
Tank Dimensions	
Diameter (ft):	150.00
Volume (gallons):	5,250,000.00
Turnovers:	67.20
Paint Characteristics	
Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Characteristics	
Type:	Pontoon
Fitting Category	Detail
Tank Construction and Rim-Seal System	
Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	26
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	46
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Pole Sleeve,Wiper	1

Meterological Data used in Emissions Calculations: Los Angeles AP, California (Avg Atmospheric Pressure = 14.67 psia)

TABLE C-22 (Continued)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Tank303New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Petroleum Hydrocarbon Product	All	71.00	62.31	79.70	65.19	10.9900	N/A	N/A	68.0000			114.00	
1,2,4-Trimethylbenzene						0.0314	N/A	N/A	120.1900	0.0479	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.5725	N/A	N/A	78.1100	0.0836	0.0201	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Butadiene, 1,3-						36.6817	N/A	N/A	54.1000	0.0010	0.0056	54.10	Option 2: A=6.8499, B=930.546, C=238.854
Cyclohexane						1.6200	N/A	N/A	84.1600	0.1172	0.0290	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1576	N/A	N/A	106.1700	0.0584	0.0014	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.5297	N/A	N/A	86.1700	0.2150	0.0830	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0040	N/A	N/A	128.2000	0.0178	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Propylene						140.8109	N/A	N/A	42.0800	0.0090	0.1933	42.08	Option 2: A=7.58, B=1133.65, C=283.26
Toluene						0.4611	N/A	N/A	92.1300	0.2000	0.0141	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						-26.5572	N/A	N/A	78.7864	0.0001	0.6484	-0.05	
Xylene (mixed isomers)						0.1317	N/A	N/A	106.1700	0.2500	0.0050	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TABLE C-22 (Continued)

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Tank303New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

Annual Emission Calcaulations	
Rim Seal Losses (lb):	2,034.2639
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Average Wind Speed (mph):	0.0000
Seal-related Wind Speed Exponent:	1.0000
Value of Vapor Pressure Function:	0.3324
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	10.9900
Tank Diameter (ft):	150.0000
Vapor Molecular Weight (lb/lb-mole):	68.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	562.0704
Annual Net Throughput (gal/yr.):	352,590,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	150.0000
Roof Fitting Losses (lb):	1,652.5004
Value of Vapor Pressure Function:	0.3324
Vapor Molecular Weight (lb/lb-mole):	68.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	73.1100
Average Wind Speed (mph):	0.0000
Total Losses (lb):	4,248.8347

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	36.1647
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	63.2882
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	10.6234
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	140.1382
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	26	1.20	0.14	0.65	705.2115
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	46	0.49	0.16	0.14	509.4701
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Pole Sleeve,Wiper	1	8.30	4.40	1.60	187.6043

TABLE C-22 (Concluded)

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Tank303New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Petroleum Hydrocarbon Product	2,034.26	562.07	1,652.50	0.00	4,248.83
Hexane (-n)	168.77	120.85	137.10	0.00	426.72
Benzene	40.79	46.99	33.14	0.00	120.92
Toluene	28.61	112.41	23.24	0.00	164.27
Ethylbenzene	2.86	32.82	2.32	0.00	38.00
Xylene (mixed isomers)	10.22	140.52	8.30	0.00	159.04
1,2,4-Trimethylbenzene	0.47	26.92	0.38	0.00	27.77
Cyclohexane	58.92	65.87	47.86	0.00	172.65
Naphthalene	0.02	10.00	0.02	0.00	10.04
Butadiene, 1,3-	11.38	0.56	9.25	0.00	21.19
Propylene	393.26	5.06	319.46	0.00	717.78
Unidentified Components	1,318.95	0.06	1,071.43	0.00	2,390.43

TABLE C-23
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Process 16 - System 10 (ISOMAX Tank 447 - Floating Roof with Dome)
New ID 16-10-XXX
REFINERY FUGITIVE EMISSIONS - AQMD FACTORS

EQPT. TYPE	SERVICE	No. of Sources	Controlled Emission Factors lbs/yr*	Annual ROG Emission lbs/yr
Valves	HC Vapor	0	23	0
	Bellows Sealed	0	0	0
Valves	Fuel Gas	0	12	0
	Bellows Sealed	0	0	0
Valves	Light Liquid	0	19	0
	Bellows Sealed	23	0	0
Valves	Heavy Liquid	0	3	0
	Bellows Sealed	0	0	0
Flanges	Light Liquid/Vapor	8	1.5	12
Flanges	Heavy Liquid	0	1.5	0
Connectors	Light Liquid/Vapor	0	1.5	0
Connectors	Heavy Liquid	0	1.5	0
Pumps	Light Liquid	2	104	208
Pumps	Heavy Liquid (Non-Rule 1173)	0	80	0
Pumps	< 10% HC (Non-Rule 1173)	0	104 (520 x 0.2= 104)	0
Compressors	HC Gas/Vapor	0	514	0
Compressors	< 10% HC (Non-Rule 1173)	0	51.4 (514 x 0.1 = 51.4)	0
PRV's Heavy Liquid (To Atmosphere)		0	1,135	0
PRV's Heavy Liquid (Closed System)		0	0	0
PRV's Light Liquid/Vapor (To Atmosphere)		0	1,135	0
PRV's Light Liquid/Vapor (Closed System)		7	0	0
Drains		2	80	160
(non-emergency, without water seal and venting to atmosphere)				

Total Count:	42	Total (lb/yr)	**389.0**
		Hydrocarbon Emissions (lbs/day)	**1.1**

Light liquid and gas/liquid streams: Liquid or gas/liquid stream with a vapor pressure greater than that of

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatile class present at > 20% by volume.

kerosene (> 0.1 psia @ 100°F or 689 Pa @ 38°C), based on the most volatitle class present at > 20% by volume.

Heavy liquid: Streams with a vapor pressure equal to or less than that of kerosene (= 0.1 psia @ 100°F or 689 Pa @ 38°C) based on the most volatile class present > 20% by volume.

* Emission factors for all components based on factors used for Chevron Reformulated Gasoline Project.

TABLE C-24

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Tank447New-10-24-2007
City:	Los Angeles AP
State:	California
Company:	Chevron Products USA
Type of Tank:	Domed External Floating Roof Tank
Description:	Tank 447Storage (New)

Tank Dimensions

Diameter (ft):	125.00
Volume (gallons):	3,360,000.00
Turnovers:	182.50

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	3
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	2
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	22
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	28
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Pole Sleeve,Wiper	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Los Angeles AP, California (Avg Atmospheric Pressure = 14.67 psia)

TABLE C-24(Continued)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Tank447New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Petroleum Hydrocarbon Product	All	71.00	62.31	79.70	65.19	10.9900	N/A	N/A	68.0000			114.00	
1,2,4-Trimethylbenzene						0.0314	N/A	N/A	120.1900	0.0479	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.5725	N/A	N/A	78.1100	0.0836	0.0201	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Butadiene, 1,3-						36.6817	N/A	N/A	54.1000	0.0010	0.0056	54.10	Option 2: A=6.8499, B=930.546, C=238.854
Cyclohexane						1.6200	N/A	N/A	84.1600	0.1172	0.0290	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1576	N/A	N/A	106.1700	0.0584	0.0014	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.5297	N/A	N/A	86.1700	0.2150	0.0830	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0040	N/A	N/A	128.2000	0.0178	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Propylene						140.8109	N/A	N/A	42.0800	0.0090	0.1933	42.08	Option 2: A=7.58, B=1133.65, C=283.26
Toluene						0.4611	N/A	N/A	92.1300	0.2000	0.0141	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						-26.5572	N/A	N/A	78.7864	0.0001	0.6484	-0.05	
Xylene (mixed isomers)						0.1317	N/A	N/A	106.1700	0.2500	0.0050	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TABLE C-24(Continued)

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Tank447New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

Annual Emission Calcaulations	
Rim Seal Losses (lb):	1,695.2199
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Average Wind Speed (mph):	0.0000
Seal-related Wind Speed Exponent:	1.0000
Value of Vapor Pressure Function:	0.3324
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	10.9900
Tank Diameter (ft):	125.0000
Vapor Molecular Weight (lb/lb-mole):	68.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	1,173.0166
Annual Net Throughput (gal/yr.):	613,200,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	7.1000
Tank Diameter (ft):	125.0000
Roof Fitting Losses (lb):	1,427.6012
Value of Vapor Pressure Function:	0.3324
Vapor Molecular Weight (lb/lb-mole):	68.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	63.1600
Average Wind Speed (mph):	0.0000
Total Losses (lb):	4,295.8376

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	3	1.60	0.00	0.00	108.4941
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	63.2882
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	2	0.47	0.02	0.97	21.2468
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	22	1.20	0.14	0.65	596.7174
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Sock	28	0.49	0.16	0.14	310.1122
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Pole Sleeve,Wiper	1	8.30	4.40	1.60	187.6043
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	140.1382

TABLE C-24 (Concluded)

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Tank447New-10-24-2007 - Domed External Floating Roof Tank
Los Angeles AP, California

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Petroleum Hydrocarbon Product	1,695.22	1,173.02	1,427.60	0.00	4,295.84
Hexane (-n)	140.65	252.20	118.44	0.00	511.29
Benzene	34.00	98.06	28.63	0.00	160.69
Toluene	23.85	234.60	20.08	0.00	278.53
Ethylbenzene	2.38	68.50	2.00	0.00	72.89
Xylene (mixed isomers)	8.52	293.25	7.17	0.00	308.94
1,2,4-Trimethylbenzene	0.39	56.19	0.33	0.00	56.90
Cyclohexane	49.10	137.48	41.35	0.00	227.92
Naphthalene	0.02	20.88	0.02	0.00	20.91
Butadiene, 1,3-	9.49	1.17	7.99	0.00	18.65
Propylene	327.72	10.56	275.98	0.00	614.26
Unidentified Components	1,099.12	0.12	925.61	0.00	2,024.85

TABLE C-25
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
COOLING TOWER EMISSION CALCULATIONS

Variable	Value[1]	Units
Cooling Tower Circluation Rate (Q):	12,000	gal/min
Total Dissolved solid in water (TDS)	4,000	ppmw
Drift Loss (η):	0.001	%
Density of water (ρ):	8.34	lb/gal
Annual Operating Hours (OH):	8760	hours/yr
PM Emissions[2]:	2104	lbs/yr
PM Emissions:	5.76	lbs/day

(1) Values are from data for existing equipment or vendor design specifications.

(2) PM Emissions (lbs/yr) = Q x TDS/106 x η/100 x ρ x 60 x OH from SCAQMD Guidelines for Calculating Emissions from Cooling Towers, June 2006.

Note: Facility data shows no other criteria pollutants expected to be emitted.

TABLE C-26
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Fugitive Dust Emission Estimates
From Vehicles (Operational Emissions)

Source Type	Number of Vehicles	Fuel	Peak Daily Trips	One-way Distance	Emission Factor (lb/vmt)	Peak PM-10 Emissions (lbs/day)
Passenger Vehicle/ On Paved Roadways	12	Gasoline	2	16.2	0.000386	0.15
On-site cars	0	Gasoline	1	2.5	0.000386	0.00
Light Duty Trucks on Paved Roadways	0	Gasoline	2	16.2	0.00213	0.00
Buses	0	Diesel	2	2.5	0.02013	0.00
Trucks on Paved Roadways	0	Diesel	2	44	0.02013	0.00
Total	12					0.15

* Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003

$E = k(sL/2)^{0.65} \times (W/3)^{1.5} - C$

Where: k = 0.016 lb/VMT for PM10, sL = road silt loading (gms/m2) from CARB Methodology 7.9 for paved roads (0.240 for local roads and 0.037 for major/collector roads), W = weight of vehicles (2.4 tons for cars; 5 for pickup trucks, and 20 for heavy trucks), and C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lbs/VMT).

TABLE C-27
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Off-site Vehicle Emissions
(Operational Emissions)

On Road Mobile Emission Factors from California ARB EMFAC2007 Scenario Year 2009 (Model Years 1965 to 2009)

Vehicle Type	CO Emissions	VOC Emission	NOx Emissions Factor	SOx Emissions Factor	PM10 Emissions
Workers Commuting	0.009752	0.000931	0.000928	0.000010	0.000041
Delivery Trucks	0.012379	0.003281	0.040394	0.000042	0.001874

	Parameters				Peak Day Emissions, lbs/day				
Source	Number of Vehicles per Day	Trips per Day per Vehicle	Distance Traveled per Trip	Distance Traveled per Day	CO Emissions	VOC Emissions	NOx Emissions	SOx Emissions	PM10 Emissions
Workers Commuting	12	2	16.2	388.8	3.79	0.36	0.36	0.00	0.02
Delivery Trucks(1)	0	2	30	0	0.00	0.00	0.00	0.00	0.00
Totals					3.79	0.36	0.36	0.00	0.02

Based on 2007 SCAQMD on-road emission rates. (http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html)

Peak Day Emissions = Emission Factor x Distance Travelled per Day

(1) The proposed project will result in a reduction of daily delivery trucks. Therefore, no emissions increase will result from delivery trucks.

TABLE C-28
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
Railcar Emissions Associated with Increased LPG Movement at the LPG Loading/Unloading Rack

Cargo Weight (Rail Car and Freight)		
Number of Railcars	12	cars/day
Rail car tare weight[1]	31	tons/one car
Weight of Product	77	tons/car
Gross Weight	1,296	tons/day
Fuel Consumption		
Distance within CA outside of Air Basin	160	miles
Fuel Factor[2]	1.329	gal/1000 GTM[3]
Total ton-miles	207,360	ton-miles
Total Fuel consumption	275.6	gal/day
Distance within CA inside of Air Basin	60	miles
Fuel Factor[2]	1.329	gal/1000 GTM[3]
Total tons-mile	77,760	ton-miles
Total Fuel consumption	103.3	gal/day

(1) Oteko, 2007. www.oteko.com

(2) Port of Los Angeles, 2004

(3) GTM = gross ton miles

EMISSION FACTORS[4]	CO	VOC	NOx	SOx	PM10
gram/gallon	27.4	10.4	199.8	17	6.6
lbs/gallon	0.0604	0.0229	0.4405	0.0375	0.0146

(4) Emission Factors for Locomotives, U.S. EPA 420-F-97-05, December 1997, Table 9.

Link	EMISSIONS				
	CO	VOC	NOx	SOx	PM10
Within Basin (lbs/day)	6.243	2.369	45.520	3.873	1.504
Outside Basin (lbs/day)	16.647	6.318	121.387	10.328	4.010

Idling Emissions at Site[5]	EMISSIONS				
	CO	VOC	NOx	SOx	PM10
Locomotive Idling (lbs/day)	0.076	0.029	0.551	0.047	0.018

(5) Idling Emissions = Emission factor (lbs/gal) x Fuel Use (gal/hr) x Idling Time (hr/day)

Where: Fuel use = 5 gallons/hour (SCAQMD, 2003b) and idling time is a maximum of 15 minutes per day.

TOTAL RAILCAR EMISSIONS	EMISSIONS				
	CO	VOC	NOx	SOx	PM10
Within Basin (lbs/day)	6.318	2.398	46.071	3.920	1.522
Outside Basin (lbs/day)	16.647	6.318	121.387	10.328	4.010

TABLE C-29
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
COMPARATIVE CO_2 EMISSIONS
NEW COGEN VS UTILITY-SUPPLIED POWER AND NEW FIRED BOILER

New Cogen Train D

GHG	Fuel Input		Emission Factor		Emissions (lbs/day)	CO_2e Emissions (metric tons/yr)
	MMBTUH	MMSCFD				
CO_2						
CGT	524.7	11.99	110	lb/mm/Btu	1,385,208	229,339
Duct Burners	128.5	2.94	120000	lb/MMSCF	352,457	58,354
Total Fuel Input	653.2					
N_2O						
CGT	524.7	11.99	0.003	lb/mm/Btu	38	1,851
Duct Burners	128.5	2.94	0.64	lb/MMSCF	2	92
Methane (CH_4)						
CGT	524.7	11.99	0.0086	lb/mm/Btu	108	412
Duct Burners	128.5	2.94	2.3	lb/MMSCF	7	26
Total CO_2e Emissions (metric tons/yr)						290,075

Currently Supplied SCE Power

GHG	Fuel Input		Emission Factor		Emissions (lbs/day)	CO_2e Emissions (tonnes/yr)
	MMBTUH	MMSCFD				
CO_2	200.0	4.57	120000	lb/MMSCF	548,571	90,823
N_2O	200.0	4.57	0.64	lb/MMSCF	3	143
Methane (CH_4)	200.0	4.57	2.3	lb/MMSCF	11	40
Total CO_2e Emissions (metric tons/yr)						91,007

Aux Boiler Emissions

GHG	Fuel Input		Emission Factor		Emissions (lbs/day)	CO_2e Emissions (metric tons/yr)
	MMBTUH	MMSCFD				
CO_2	105.9	2.42	120000	lb/MMSCF	290,469	48,091
N_2O	105.9	2.42	0.64	lb/MMSCF	2	76
Methane (CH_4)	105.9	2.42	2.3	lb/MMSCF	6	21
Total CO_2e Emissions (metric tons/yr)						48,189

PRO Project Power Demand (without Cogen)

GHG	Fuel Input		Emission Factor		Emissions (lbs/day)	CO_2e Emissions (metric tons/yr)
	MMBTUH	MMSCFD				
CO_2	299.0	6.83	120000	lb/MMSCF	820,114	135,781
N_2O	299.0	6.83	0.64	lb/MMSCF	4	214
Methane (CH_4)	299.0	6.83	2.3	lb/MMSCF	16	60
Total CO_2e Emissions (metric tons/yr)						136,056

TABLE C-29 (concluded)
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
COMPARATIVE CO_2 EMISSIONS
NEW COGEN VS UTILITY-SUPPLIED POWER AND NEW FIRED BOILER

New Fired Boiler

GHG	Fuel Input		Emission Factor		Emissions (lbs/day)	CO_2e Emissions (metric tons/yr)
	MMBTUH	MMSCFD				
CO_2	330.2	7.55	120,000	lb/MMSCF	905,691	149,949
N_2O	330.2	7.55	0.64	lb/MMSCF	4.83	237
Methane (CH_4)	330.2	7.55	2.3	lb/MMSCF	17.359	66
Total CO_2e Emissions (metric tons/yr)						150,252

Notes

Basis: 49.9 mW power plus 270,000 lb/hr 850 psig steam

Heat inputs for cogeneration and fired boiler from manufacturer's estimates

Edison heat input based on 10,000 BTU/kWH

Assumed natural gas fuel at 1020 BTU/SCF HHV

CO_2 factor is from EPA AP-42

TABLE C-30
CHEVRON PRODUCTS COMPANY
EL SEGUNDO REFINERY
COGEN TRAIN "D" GREENHOUSE GAS INTENSITY
COMPARED TO CEC STANDARD

Cogen CO_2e Emissions

GHG	Fuel Input MMBTUH	Fuel Input MMSCFH	Emission Factor		Emissions (lbs/hr)	CO_2e Emissions (lbs/hr)
CO_2						
CGT	524.7	0.50	110	lb/mm/Btu	57,717	57,717
Duct Burners	128.5	0.12	120000	lb/MMSCF	14,686	14,686
Total Fuel Input	653.2					
N_2O						
CGT	524.7	0.50	0.003	lb/mm/Btu	2	465.93
Duct Burners	128.5	0.12	0.64	lb/MMSCF	0.08	23.18
Methane (CH_4)						
CGT	524.7	0.50	0.0086	lb/mm/Btu	5	103.79
Duct Burners	128.5	0.12	2.3	lb/MMSCF	0.28	6.47
					CO_2e Emissions Total	73,002

Electrical Output

	Electrical Output MW-hr
Gas Turbine	42.15
Steam Turbine	7.75
Total Electrical	**49.90**

Thermal Output

	Flow lb	Energy Content over datum BTU/lb	Thermal Output BTU	Thermal Output MW-hr
850 psig Steam	40,000	1319.4	52,776,000	**15.47**
150 psig Steam	230,000	1204.2	276,966,000	**81.17**
15 psig Steam MU	25,000	1136.0	-28,400,000	**-8.32**
Stm. Cond. MU	170,000	119.8	-20,366,000	**-5.97**
NOx Inj. Steam	24,000	1175.0	-28,200,000	**-8.26**
Boiler BD	10,000	190.7	-1,907,000	**-0.56**
		Total	**250,869,000**	**73.53**

Energy Efficiency

Efficiency	lb CO_2(e)/MW-hr
Cogen	**591**

Notes

CEC STANDARD: 1100 lb CO_2 per MW-hr

Basis: One hour of operation

CO_2, N_2O, and CH_4 factors for CGT is from EPA AP-42 for stationary gas turbines burning natural gas

CO_2, N_2O, and CH_4 factors for duct burners is from EPA AP-42 for external combustion sources burning natural gas

Fuel quantities and factors based on HHV

Thermal datum is liquid water at 60^{o} F.

Steam Generator steam throughput based on 70% overall turbine/generator efficiency

Methodology per Jim Ross of RCS, Inc.

Energy Efficiency = CO_2e Emissions /(Electrical Output + Thermal Output)

Chevron El Segundo Refinery
Product Reliability and Optimization Project
Ambient Air Quality Report

January 22, 2008

Prepared for Chevron El Segundo Refinery
Environmental Audit, Inc.

Chevron El Segundo Refinery
PRO Project
Ambient Air Quality Analysis

INTRODUCTION

The Chevron Products Company (Chevron) El Segundo Refinery (Refinery) is located at 324 West El Segundo Boulevard in the City of El Segundo, California, as shown in C- 1. The El Segundo Refinery occupies an irregularly shaped parcel of land, between Vista Del Mar on the west, El Segundo Boulevard on the north, Sepulveda Boulevard on the east, and Rosecrans Avenue on the south. Chevron is proposing modifications to existing specific process units, new process units, and also new infrastructure that supports and links these units to other processes, units or facilities throughout the Refinery as part of their Product Reliability and Optimization (PRO) project. The proposed project will involve physical changes and additions to multiple process units and operations as well as operational and functional improvements primarily within the confines of the Refinery. The proposed locations within the Refinery for the units are shown in Figure C-2.

As part of the permitting process, Environmental Audit, Inc. (EAI) has calculated emissions to evaluate the potential impacts of the criteria pollutants carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than 10 microns in diameter (PM10), and particulate matter less than 2.5 microns in diameter (PM2.5). Based on information provided by Chevron, the sections of the project that will include the criteria pollutants are the new Safety Flare, the new Congeneration train, the Tail Gas Unit (TGU) from the new Sulfur Recovery Facility, and the new Cooling Tower. The project descriptions and the results of this evaluation are provided below.

PROJECT DESCRIPTIONS

The Pressure Relief Devices (PRDs) on the No. 2 Crude Unit, the No. 2 Residuum Stripper Unit, the waste gas compressors, and the Minalk/Merox Unit that currently may vent to atmosphere under upset conditions will be routed to this new Vapor Recovery and Safety Flare System. In addition, PRDs from the new Sour Water Stripper (SWS), Sulfur Recovery Unit (SRU) and TGU will be routed to this new Vapor Recovery and Safety Flare System. The recovered gases will be treated prior to being added to the existing refinery fuel gas system.

The new 49 MW Cogen Train D includes a natural gas and refinery gas-fired turbine electric generator, a new steam-driven turbine electrical generator, feed gas compressors, knockout and surge pots, waste heat boilers (including duct burners) to generate steam, a carbon monoxide oxidation catalyst unit, and a Selective Catalytic Reactor (SCR) unit to control emissions.

A new SRU with a capacity of 175 long tons per day will be installed to process increased amounts of H_2S to commercial grade, molten sulfur for sale. Ammonia in the feed stream to the SRU will be converted to atmospheric nitrogen and water and exhausted through the TGU to the atmosphere. The exhaust from the SRU will be vented to a new TGU for further processing before discharging to the atmosphere. The TGU will include a new incinerator.

A new cooling tower with a water circulation rate of approximately 12,000 gpm will be constructed to support cooling needs at the existing Alkylation Unit, new SRU, new SWS, and new TGU. The cooling tower has two exhaust fans.

EMISSION ESTIMATES

The emissions estimates emissions associated with the project were provided by Chevron. No best available control technology (BACT) considerations were used in these calculations to create a worst-case scenario for the evaluation. BACT, however, will be applied to the actual units, as required. The calculated emissions are presented in Table C-31.

CRITERIA POLLUTANT IMPACT MODELING

In order to determine the ground level concentrations, the U.S. EPA ISCST3 (Version 02035) air dispersion model is used to calculate the annual average and maximum 1-hour, 8-hour, and 24-hour concentrations. While the U.S. EPA has approved AERMOD to replace ISCST3, the necessary area-specific meteorological data are not readily available. Therefore, ISCST3 is an appropriate model for determining the worst-case air quality impacts from a site.

The location of the source is identified based on data provided by Chevron and the Venice USGS Quadrangle (see attached Figures C-1 and C-2). Calculated emissions rates were used in the ISCST3 model. The ISCST3 model is run using the Lennox meteorological data available from the SCAQMD. The following settings are used in running the ISCST3 dispersion model:

- Use stack-tip downwash;
- Use buoyancy-induced dispersion;
- Do not use gradual plume rise;
- Do not use calm wind processing routine;
- Do not use missing data processing routine;
- Use default wind profile exponents;
- Use default vertical potential temperature gradients; and
- Use urban mode dispersion.

ISCST3 also is set to include algorithms to model the effects of building downwash on emissions from nearby or adjacent point sources. The model makes use of direction-specific information for all building downwash cases. Terrain elevations were taken into account even though the Refinery and the vicinity are in a relatively flat area.

The receptors used in the model include a fenceline receptors and a fine receptor grid. The terrain surrounding the facility is relatively constant; however, terrain variations were included for the receptor networks. The fenceline receptors (maximal spacing every 100 meters(m)) were used to determine the maximum concentrations at the property line of the Refinery. A fine receptor grid (100 m x 100 m spacing) was used to identify maximum impact locations. The grid originates near the southwestern corner of the facility and extends 3,900 meters to the west, and 3,600 meters to the north.

The maximum impact location is determined for the applicable averaging periods from the ISCST3 model output. The summary tables from the ISCST3 output files are included in Attachment A.

The maximum ground level concentration and the Universal Tranverse Mercator (NAD 27) coordinates for each maximum impact point are presented in Table C-32. Figure C-2 show the maximum impact locations.

CRITERIA POLLUTANT IMPACT ANALYSIS

The proposed project maximum ground level concentrations are compared to the significance thresholds established in Rule 1303, Appendix A, Table A-2 to demonstrate that the project will not cause a violation of any state or national ambient air quality standard. The ambient air quality data for Southwest Coastal Los Angeles County (Station No. 820) is used to establish background levels of NOx, CO, and PM10. Table C-33 identifies the maximum concentration published by the SCAQMD in the last three years (2004, 2005, and 2006) for each of the pollutants.

The CO 8-hour, PM10 24-hour, and PM10 annual average concentrations are compared to the Significant Change in Air Quality Concentration thresholds. The CO 1-hour, NO_2 1-hour, and NO_2 annual average concentrations are combined with the maximum ambient concentrations and compared to the Most Stringent Air Quality Standard. The results are presented in Table C-34.

The maximum NO_2 impact concentrations for 1-hour and annual averages are 101.66 and 5.05 micrograms per cubic meter ($\mu g/m^3$), respectively. The maximum CO impact concentrations for 1-hour and 8-hour averages are 233.91 and 93.67 $\mu g/m^3$, respectively. The maximum PM10 impact concentrations for 24-hour and annual averages are 0.70 and 0.28 $\mu g/m^3$, respectively. Since PM2.5 is either equal to or a fraction of PM10 and the thresholds are the same, PM2.5 was not modeled. The maximum PM2.5 impact concentration will be equal to or less than the PM10 impact concentrations.

CONCLUSIONS

The criteria pollutant analysis results in no significant change in air quality and no exceedance of the most stringent air quality standard for NO_2, CO, PM10, or PM2.5. Therefore, the proposed project complies with Ambient Air Quality Standards.

MRB:mc

Attachments

M:\Mrb\2505 Chevron\AAQ\2505 AAQ report.doc

TABLES

TABLE C-31

Chevron PRO Project
Criteria Pollutant Emission Rates

Source	CO (lb/hr)	NOx (lb/hr)	PM10 (lb/hr)
Flare	9.40E-02	3.49E-01	2.01E-02
Cogen	2.98E+00	1.08E+01	0.00E+00
TGU	1.30E+01	5.69E+00	2.76E-01
Cooling Tower Fan 1	0.00E+00	0.00E+00	1.20E-01
Cooling Tower Fan 2	0.00E+00	0.00E+00	1.20E-01

TABLE C-32

Chevron PRO Project
Criteria Pollutant Groundlevel
Concentration Calculations

NOx Groundlevel Concentrations

Averaging Period	Coordinates		Calculated Concentration ($\mu g/m^3$)
	UTME	UTMN	
1 Hour	370054	3752640	101.6594
Annual	370354	3752740	5.0512

CO Groundlevel Concentrations

Averaging Period	Coordinates		Calculated Concentration ($\mu g/m^3$)
	UTME	UTMN	
1 Hour	370054	3752640	233.9060
8 Hour	370054	3752640	93.6725
Annual	370054	3752640	8.8753

PM10 Groundlevel Concentrations

Averaging Period	Coordinates		Calculated Concentration ($\mu g/m^3$)
	UTME	UTMN	
24	370254	3752640	0.6987
Annual	370254	3752640	0.2846

Calculated emission are outputs from the ISCST3 model (v.02035).

TABLE C-33

Chevron PRO Project
Criteria Pollutant Ambient
Concentration Calculations

Criteria Pollutant	Averaging Period	Concentration (ppm)			Max Conc.	
		2004	2005	2006	(ppm)	(μg/m³)
NO2	1-hr	0.09	0.09	0.02	0.09	169.92
	Annual	0.0136	0.0134	0.002	0.0136	25.68
CO	1-hr	4	3	3	4	4597.60
	8-hr	3	2.1	2.3	3	3448.20
		Concentration (ug/m3)				
PM10	24-hr	47	44	45		47
	AAM	25.1	22.9	26.5		26.5

Data from Source No. 3 Southwestern Coastal Los Angeles Station number 820

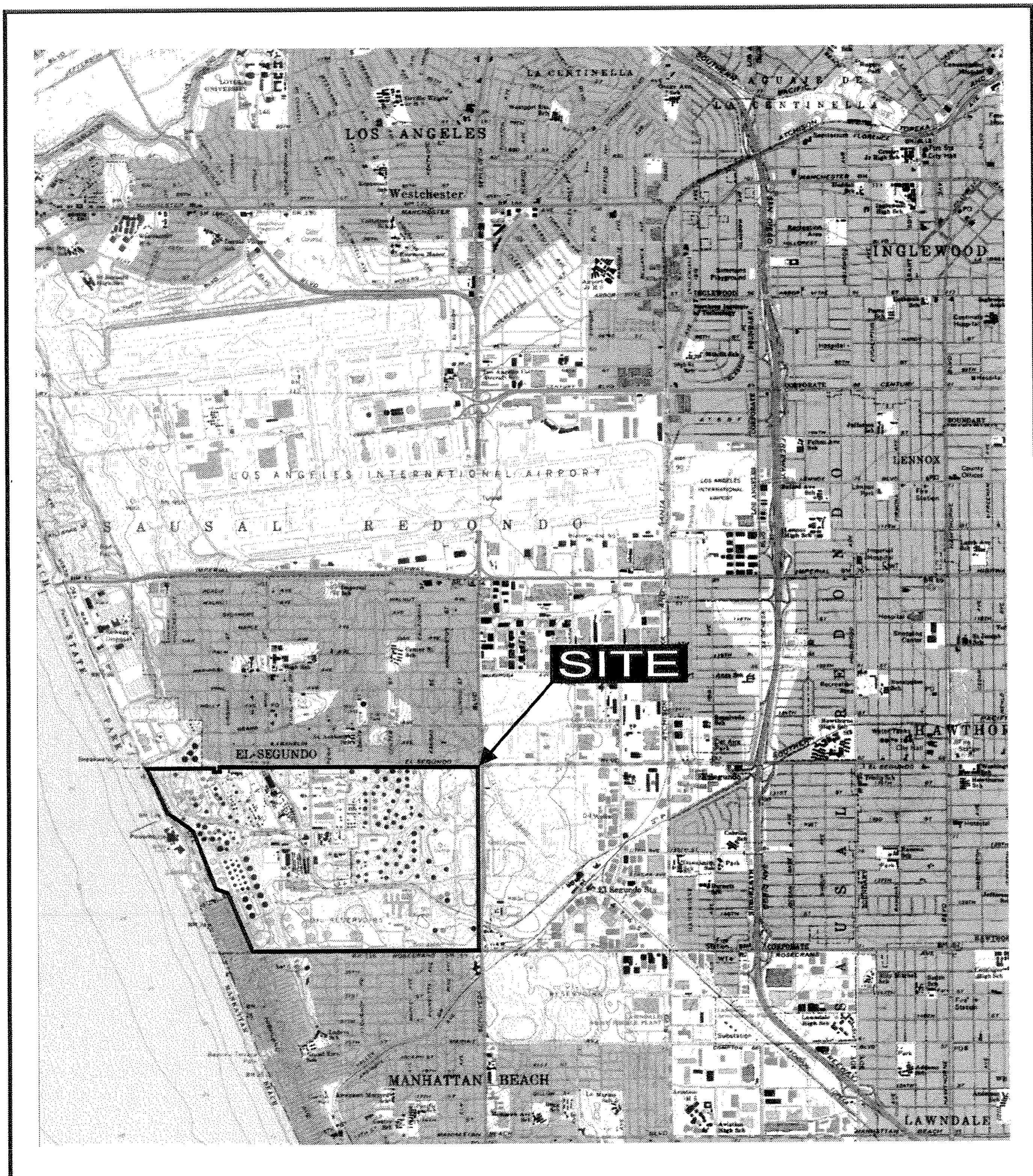
TABLE C-34

Chevron PRO Project
Significance Threshold Evaluation

Criteria Pollutant	Averaging Period	Ambient Background Conc. (μg/m³)	Calculated Conc. (μg/m³)	Total Conc. (μg/m³)	Most Stringent Air Quality Standard (μg/m³)	Significant Change in Air Quality Conc. (μg/m³)	Below Threshold? Yes/No
NO2	1-hr	169.9	101.659	**271.6**	**500**	20	Yes
	Annual	25.7	5.051	**30.7**	**100**	1	Yes
CO	1-hr	4597.6	233.906	**4831.5**	**23000**	1100	Yes
	8-hr	3448.2	93.672	**3541.9**	**10000**	500	Yes
PM10	24-hr	47.0	**0.699**	47.7	50	**2.5**	Yes
	AAM	26.5	**0.285**	26.8	30	**1**	Yes

PM2.5 will be equal to PM10 with the same threshold and therefore, below significance.
Evaluation Criteria **Bolded**

FIGURES



Environmental Audit, Inc.

0 4,000'

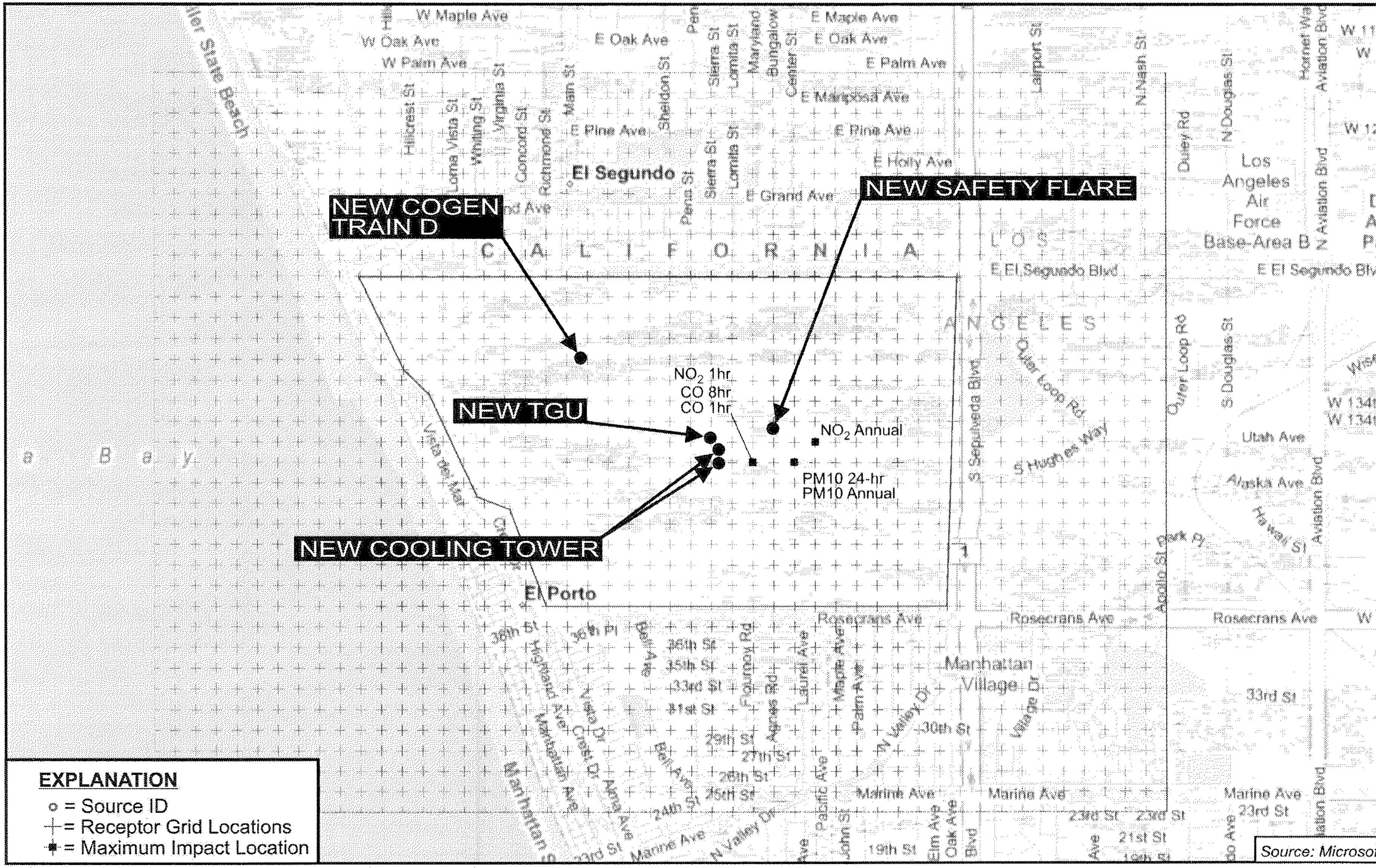
N

SITE LOCATION MAP
324 West El Segundo Boulevard
El Segundo, California

Project No. 2505

Figure C-1

N:\2505\Site Map Topo (rev.1).cdr



ENVIRONMENTAL AUDIT, INC.

CHEVRON EL SEGUNDO REFINERY
Ambient Air Quality Evaluation

Project No. 2505
N:\2505-1\AAQ (all).cdr

Figure C-2

ATTACHMENT A

ISCST3 Model Output Summary Tables

```
 *** ISCST3 - VERSION 02035 ***    *** C:\Documents and Settings\Micheal\My Documents\My Projects\2505Chev\ ***      12/07/07
                                   *** NOx                                                                ***      14:20:00
**MODELOPTs:                                                                                                       PAGE  61
CONC                       URBAN ELEV         TOXICS        NOSTD

                                                 *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***

                                         ** CONC OF AAQ      IN MICROGRAMS/M**3                         **

                                                         DATE                                                         NETWORK
GROUP ID                            AVERAGE CONC     (YYMMDDHH)           RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       HIGH  1ST HIGH VALUE IS     101.65942  ON 81111204: AT (  370054.00,  3752640.00,    121.40,      0.00)  GC   1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

Attachment C -1

```
*** ISCST3 - VERSION 02035 ***    *** C:\Documents and Settings\Micheal\My Documents\My Projects\2505Chev\ ***    12/07/07
                                   *** NOx                                                                 ***     14:20:00
**MODELOPTs:                                                                                                        PAGE  60
CONC                   URBAN ELEV          TOXICS        NOSTD

                                           *** THE SUMMARY OF MAXIMUM ANNUAL (   1 YRS) RESULTS ***


                                       ** CONC OF AAQ      IN MICROGRAMS/M**3                            **

                                                                                                      NETWORK
GROUP ID                         AVERAGE CONC               RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       5.05122 AT (  370354.00,  3752740.00,    162.00,      0.00)  GC   1
          2ND HIGHEST VALUE IS       4.18024 AT (  370254.00,  3752740.00,    142.40,      0.00)  GC   1
          3RD HIGHEST VALUE IS       3.94573 AT (  370454.00,  3752740.00,    166.00,      0.00)  GC   1
          4TH HIGHEST VALUE IS       3.93552 AT (  370054.00,  3752640.00,    121.40,      0.00)  GC   1
          5TH HIGHEST VALUE IS       3.91792 AT (  370254.00,  3752640.00,    158.80,      0.00)  GC   1
          6TH HIGHEST VALUE IS       3.42418 AT (  370354.00,  3752640.00,    158.80,      0.00)  GC   1
          7TH HIGHEST VALUE IS       3.26237 AT (  370154.00,  3752640.00,    126.00,      0.00)  GC   1
          8TH HIGHEST VALUE IS       3.00345 AT (  370354.00,  3752840.00,    152.20,      0.00)  GC   1
          9TH HIGHEST VALUE IS       2.86308 AT (  370054.00,  3752740.00,    108.20,      0.00)  GC   1
         10TH HIGHEST VALUE IS       2.81882 AT (  370054.00,  3752540.00,    131.20,      0.00)  GC   1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

Attachment C -2

```
 *** ISCST3 - VERSION 02035 ***    *** C:\Documents and Settings\Micheal\My Documents\My Projects\2505Chev\ ***        01/30/08
                                   *** CO                                                                   ***        12:42:49
**MODELOPTs:                                                                                                           PAGE 194
CONC                     URBAN ELEV          TOXICS          NOSTD

                                            *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                    ** CONC OF AAQ      IN MICROGRAMS/M**3                          **

                                                      DATE                                                            NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

FLARE    HIGH  1ST HIGH VALUE IS      4.17648  ON 81120624: AT (  370254.00,  3752640.00,    158.80,      0.00)  GC    1

COGEN    HIGH  1ST HIGH VALUE IS      6.25046  ON 81061522: AT (  368554.00,  3753540.00,    178.40,      0.00)  GC    1

TGU      HIGH  1ST HIGH VALUE IS    232.44193  ON 81111204: AT (  370054.00,  3752640.00,    121.40,      0.00)  GC    1

ALL      HIGH  1ST HIGH VALUE IS    233.90604  ON 81111204: AT (  370054.00,  3752640.00,    121.40,      0.00)  GC    1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

Attachment C -3

```
 *** ISCST3 - VERSION 02035 ***    *** C:\Documents and Settings\Micheal\My Documents\My Projects\2505Chev\ ***        01/30/08
                                   *** CO                                                                  ***        12:42:49
**MODELOPTs:                                                                                                          PAGE 195
CONC                     URBAN ELEV          TOXICS        NOSTD

                                                 *** THE SUMMARY OF HIGHEST  8-HR RESULTS ***

                                         ** CONC OF AAQ      IN MICROGRAMS/M**3                          **

                                                        DATE                                                             NETWORK
GROUP ID                            AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

FLARE    HIGH  1ST HIGH VALUE IS       1.57589c ON 81030724: AT (  370354.00,  3752740.00,    162.00,      0.00)  GC   1

COGEN    HIGH  1ST HIGH VALUE IS       2.77006c ON 81031408: AT (  368854.00,  3752840.00,    169.20,      0.00)  GC   1

TGU      HIGH  1ST HIGH VALUE IS      92.93473c ON 81072208: AT (  370054.00,  3752640.00,    121.40,      0.00)  GC   1

ALL      HIGH  1ST HIGH VALUE IS      93.67245c ON 81072208: AT (  370054.00,  3752640.00,    121.40,      0.00)  GC   1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

Attachment C -4

```
 *** ISCST3 - VERSION 02035 ***    *** C:\Documents and Settings\Micheal\My Documents\My Projects\2505Chev\ ***        01/30/08
                                   *** CO                                                                   ***        12:42:49
**MODELOPTs:                                                                                                           PAGE 193
CONC                      URBAN ELEV          TOXICS         NOSTD

                                              *** THE SUMMARY OF MAXIMUM ANNUAL (   1 YRS) RESULTS ***


                                          ** CONC OF AAQ       IN MICROGRAMS/M**3                          **

                                                                                                         NETWORK
GROUP ID                        AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS      8.87525 AT (  370054.00,  3752640.00,    121.40,      0.00)  GC    1
          2ND HIGHEST VALUE IS      8.47523 AT (  370254.00,  3752740.00,    142.40,      0.00)  GC    1
          3RD HIGHEST VALUE IS      8.32280 AT (  370354.00,  3752740.00,    162.00,      0.00)  GC    1
          4TH HIGHEST VALUE IS      7.49533 AT (  370254.00,  3752640.00,    158.80,      0.00)  GC    1
          5TH HIGHEST VALUE IS      7.16834 AT (  370154.00,  3752640.00,    126.00,      0.00)  GC    1
          6TH HIGHEST VALUE IS      6.59772 AT (  370454.00,  3752740.00,    166.00,      0.00)  GC    1
          7TH HIGHEST VALUE IS      6.36653 AT (  370054.00,  3752740.00,    108.20,      0.00)  GC    1
          8TH HIGHEST VALUE IS      6.11926 AT (  370054.00,  3752540.00,    131.20,      0.00)  GC    1
          9TH HIGHEST VALUE IS      6.11320 AT (  370354.00,  3752640.00,    158.80,      0.00)  GC    1
         10TH HIGHEST VALUE IS      5.83212 AT (  369954.00,  3752640.00,    111.50,      0.00)  GC    1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

Attachment C -5

```
 *** ISCST3 - VERSION 02035 ***     *** C:\Documents and Settings\Micheal\My Documents\My Projects\2505Chev\ ***        01/30/08
                                    *** PM10                                                                ***        10:58:46
**MODELOPTs:                                                                                                           PAGE  64
CONC                    URBAN ELEV         TOXICS        NOSTD

                                                 *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

                                        ** CONC OF AAQ      IN MICROGRAMS/M**3                        **

                                                      DATE                                                              NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)           RECEPTOR  (XR, YR, ZELEV, ZFLAG)      OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       HIGH  1ST HIGH VALUE IS       0.69865  ON 81070124: AT (  370254.00,  3752640.00,     48.00,      0.00)  GC   1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

```
*** ISCST3 - VERSION 02035 ***     *** C:\Documents and Settings\Micheal\My Documents\My Projects\2505Chev\ ***        01/30/08
                                    *** PM10                                                           ***            10:58:46
**MODELOPTs:                                                                                                          PAGE  61
CONC                     URBAN ELEV          TOXICS        NOSTD

                                              *** THE SUMMARY OF MAXIMUM ANNUAL (   1 YRS) RESULTS ***


                                          ** CONC OF AAQ      IN MICROGRAMS/M**3                              **

                                                                                                           NETWORK
GROUP ID                        AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       0.28455 AT (  370254.00,  3752640.00,     48.00,      0.00)  GC   1
          2ND HIGHEST VALUE IS       0.23739 AT (  370254.00,  3752740.00,     44.00,      0.00)  GC   1
          3RD HIGHEST VALUE IS       0.21928 AT (  370354.00,  3752740.00,     50.00,      0.00)  GC   1
          4TH HIGHEST VALUE IS       0.21253 AT (  370354.00,  3752640.00,     49.00,      0.00)  GC   1
          5TH HIGHEST VALUE IS       0.16868 AT (  370454.00,  3752740.00,     50.00,      0.00)  GC   1
          6TH HIGHEST VALUE IS       0.15861 AT (  370454.00,  3752640.00,     45.00,      0.00)  GC   1
          7TH HIGHEST VALUE IS       0.14626 AT (  370254.00,  3752540.00,     41.00,      0.00)  GC   1
          8TH HIGHEST VALUE IS       0.12519 AT (  370354.00,  3752540.00,     41.00,      0.00)  GC   1
          9TH HIGHEST VALUE IS       0.12512 AT (  370554.00,  3752740.00,     37.00,      0.00)  GC   1
         10TH HIGHEST VALUE IS       0.12362 AT (  370554.00,  3752640.00,     41.00,      0.00)  GC   1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
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Attachment C -7

APPENDIX D

HAZARD ANALYSIS

WORST-CASE CONSEQUENCE ANALYSIS
FOR
CHEVRON'S
PRODUCT RELIABILITY AND OPTIMIZATION PROJECT
FOR THE EL SEGUNDO REFINERY

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08-02-6626
February 4, 2008

QUEST

WORST-CASE CONSEQUENCE ANALYSIS FOR CHEVRON'S PRODUCT RELIABILITY AND OPTIMIZATION PROJECT FOR THE EL SEGUNDO REFINERY

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QUEST

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SECTION 1
INTRODUCTION

Quest Consultants Inc. was retained by Environmental Audit, Inc. and Chevron to perform a worst-case consequence analysis on the process unit modifications and additions to Chevron's El Segundo Refinery. The proposed process modifications and additions are related to the refinery's Product Reliability and Optimization (PRO) Project. The objective of the study was to compute the potential increase or decrease in hazard to the public due to the proposed process unit modifications and additions.

The study was divided into three tasks.

Task 1. Determine the maximum credible potential releases, and their consequences, for existing process units, transfer systems (e.g., railcar unloading), and storage areas.

Task 2. Determine the maximum credible potential releases and their consequences for the units which have been proposed for modification by Chevron.

Task 3. Determine whether the consequences associated with the proposed modifications generate a potential hazard that is larger or smaller than the potential hazard which currently exists at the facilities.

Potential hazards from the existing, modified, and new equipment are associated with accidental releases of toxic/flammable gas, toxic/flammable liquefied gas, and flammable and combustible liquids. Hazardous events associated with gas releases include toxic gas clouds, torch fires, and vapor cloud explosions. Hazardous events associated with potential releases of toxic/flammable liquefied gases include toxic clouds, torch fires, flash fires, and vapor cloud explosions. Releases of flammable or combustible liquids may result in pool fires.

One hazard of interest for a release of toxic/flammable gas or liquefied gas is exposure to a gas cloud. For such releases, this study evaluates the extent of possible exposure to gas clouds containing hydrogen sulfide (H_2S) and ammonia (NH_3).

The hazard of interest for flash fires is direct exposure to the flames. Flash fire hazard zones are determined by calculating the maximum size of the flammable gas cloud prior to ignition. These hazard zones are defined by the lower flammable limit (LFL) of the released hydrocarbon mixture. The hazard of interest for torch fires and pool fires is fire radiation.

For vapor cloud explosions, the hazard of interest is the overpressure created by the blast wave. For Boiling Liquid–Expanding Vapor Explosions (BLEVEs), the hazard of interest is the radiation produced by the fireball.

For each type of hazard identified (toxic, radiant, overpressure), maximum distances to potentially injurious levels are determined. The hazard levels used are those that have been developed by the U.S. EPA and AIHA for risk management purposes.

SECTION 2
OVERVIEW OF CHEVRON'S EL SEGUNDO REFINERY

2.1 Facility Location

Chevron's El Segundo Refinery is approximately one mile south of the Los Angeles International Airport (LAX) in El Segundo, California. The northern portion of the plant is bounded by El Segundo Boulevard. North Sepulveda Boulevard bounds the eastern side of the refinery while Rosecrans Avenue forms the southern boundary. To the west of the refinery is the Pacific Ocean. The layout of the refinery and the major roads bounding the plant are presented in Figure 2-1. The location of several of the existing and proposed units evaluated in this study are marked in Figure 2-1.

The process units, auxiliary systems, and storage facilities included in the PRO Project are listed in Table 2-1. Table 2-1 identifies which of the existing process units involved in the project will be modified as part of the project. Several new atmospheric storage tanks are to be added to the refinery.

Table 2-1
Process Units and Facilities Involved in the PRO Project

Designation	Description	Existing/New	To Be Modified
Process Units			
CRUDE-2	Crude Unit Number 2	Existing	Yes
RESID-2	Residuum Stripper Unit Number 2	Existing	Yes
MEROX	Minalk/Merox Unit	Existing	Yes
FCCU	Fluidized Catalytic Cracking Unit	Existing	Yes
ALKY	Alkylation Unit	Existing	Yes
VRDS	Vacuum Residuum Desulfurization Unit	Existing	Yes
ISOMAX	Isomax Unit	Existing	Yes
COGEN	Cogenration Unit	Existing and New	Yes
SRF	Sulfur Recovery Facility	Existing and New	Yes
H2COMP	Hydrogen Compression Unit	Existing and New	Yes
Storage			
TANK	Atmospheric and Pressurized Storage	Existing and New	Yes
Product Transfer			
RAILCAR	Railcar Loading/Unloading	Existing and New	Yes

QUEST

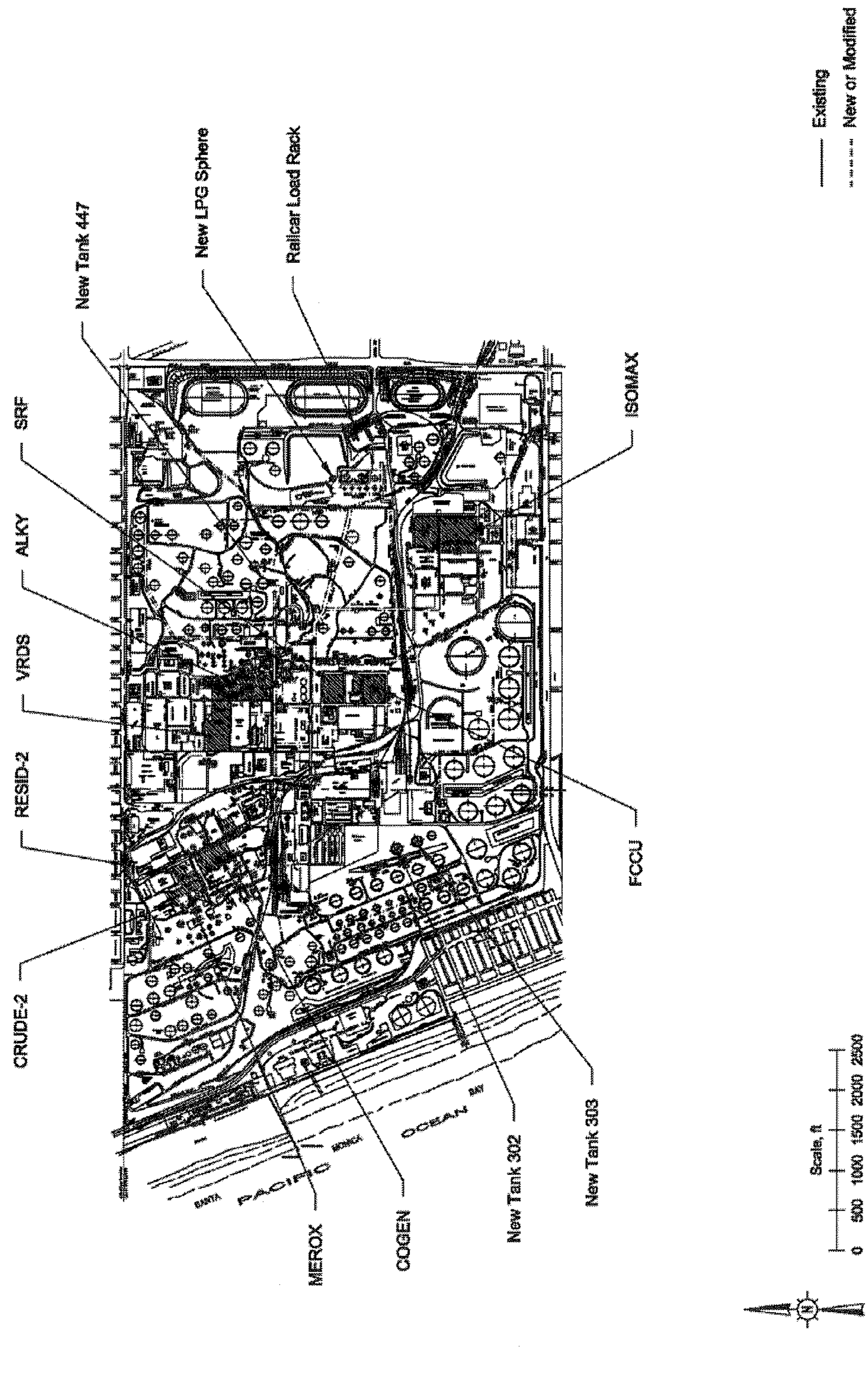

Figure 2-1
Location of Process Units within Chevron's El Segundo Refinery

2.2 Meteorological Data

Meteorological data for the central Los Angeles area were obtained from the National Climatic Center (NCC) for Los Angeles. Data for the calendar years 1964–1969 were used in the analysis. Los Angeles International Airport (LAX) is the nearest weather station reporting complete meteorological data. It is approximately one mile north of the El Segundo refinery.

A summary of the meteorological data is presented as a series of wind roses in Figures 2–2 and 2–3. Figure 2–2 presents the annual wind rose data by stability class (Pasquill-Gifford A through F). Figure 2–3 presents the annual wind rose data for all stability classes. The length and width of a particular arm of the rose define the frequency and speed at which the wind blows from the direction the arm is pointing. Meteorological data show the wind blows predominantly from the west.

Although the meteorological data could be used in the calculation of the frequency associated with the release of toxic/flammable materials, it was not required for this worst-case analysis. The frequencies at which the wind blows in specific directions, with specific speed, and under specific atmospheric stabilities are often incorporated into the analysis. In this study, a low wind speed/stable condition (2.0 m/s, F) was evaluated for the dispersion releases, and a high wind speed condition (9.0 m/s) was used in the pool fire radiation calculations. These conditions often approximate the worst-case weather conditions for hazards analysis.

2.3 Description of Units and Modifications Involved in the PRO Project

The proposed Refinery modifications are summarized in this section. The locations of the proposed new and modified units are shown in Figure 2-1. The PRO Project includes modifications to existing specific process units, new process units, and also new infrastructure that supports and links these units to other processes, units or facilities throughout the Refinery. The proposed project will involve physical changes and additions to multiple process units and operations as well as operational and functional improvements primarily within the confines of the Refinery.

2.4 Proposed Process Unit Modifications

2.4.1 No. 2 Crude Unit (CRUDE-2)

The No. 2 Crude Unit provides the initial separation of crude oil by distillation. The various distillates are then further refined in other processing units in the Refinery. The proposed modifications to the No. 2 Crude Unit include rerouting atmospheric Pressure Relief Devices (PRDs) to the proposed new Vapor Recovery and Safety Flare System. In addition, two knock-out drums will be added to the unit to collect, for recovery purposes, any liquids released from the PRDs in the No. 2 Crude Unit, the No. 2 Residuum Stripper Unit, and the Minalk/Merox Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere in the event of a process upset.

2.4.2 No. 2 Residuum Stripper Unit (RESID-2)

The No. 2 Residuum Stripper Unit (RSU) processes the heavy hydrocarbons from the bottom of the No. 2 Crude Unit using vacuum distillation to produce various weight gas oils. The proposed modifications to the No. 2 RSU are limited to rerouting PRDs to the proposed new Vapor Recovery and Safety Flare System via the two new knock-out drums in the No. 2 Crude Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere in the event of a process upset.

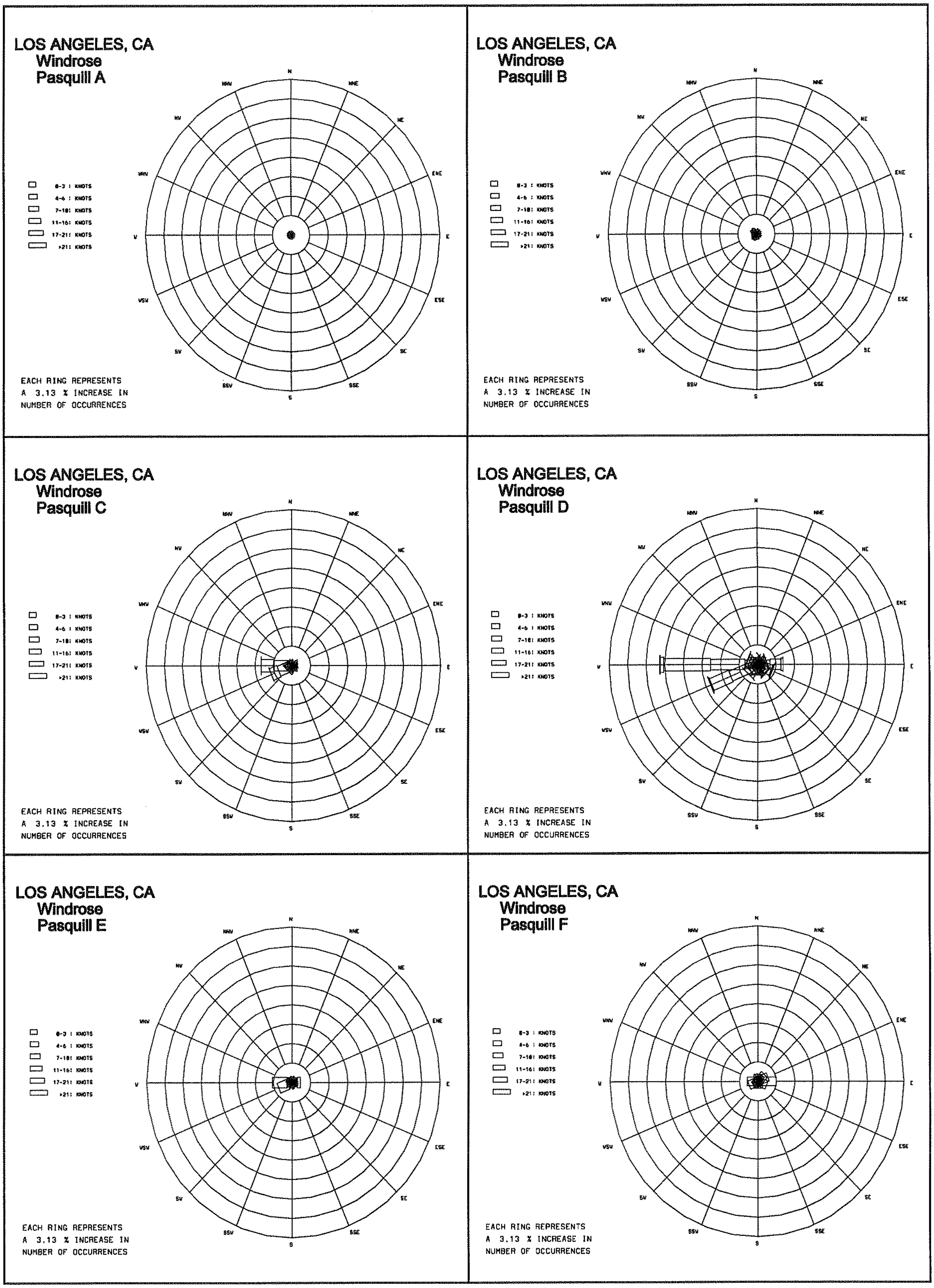

Figure 2-2
Annual Wind Roses by Stability Class - Los Angeles International Airport, California

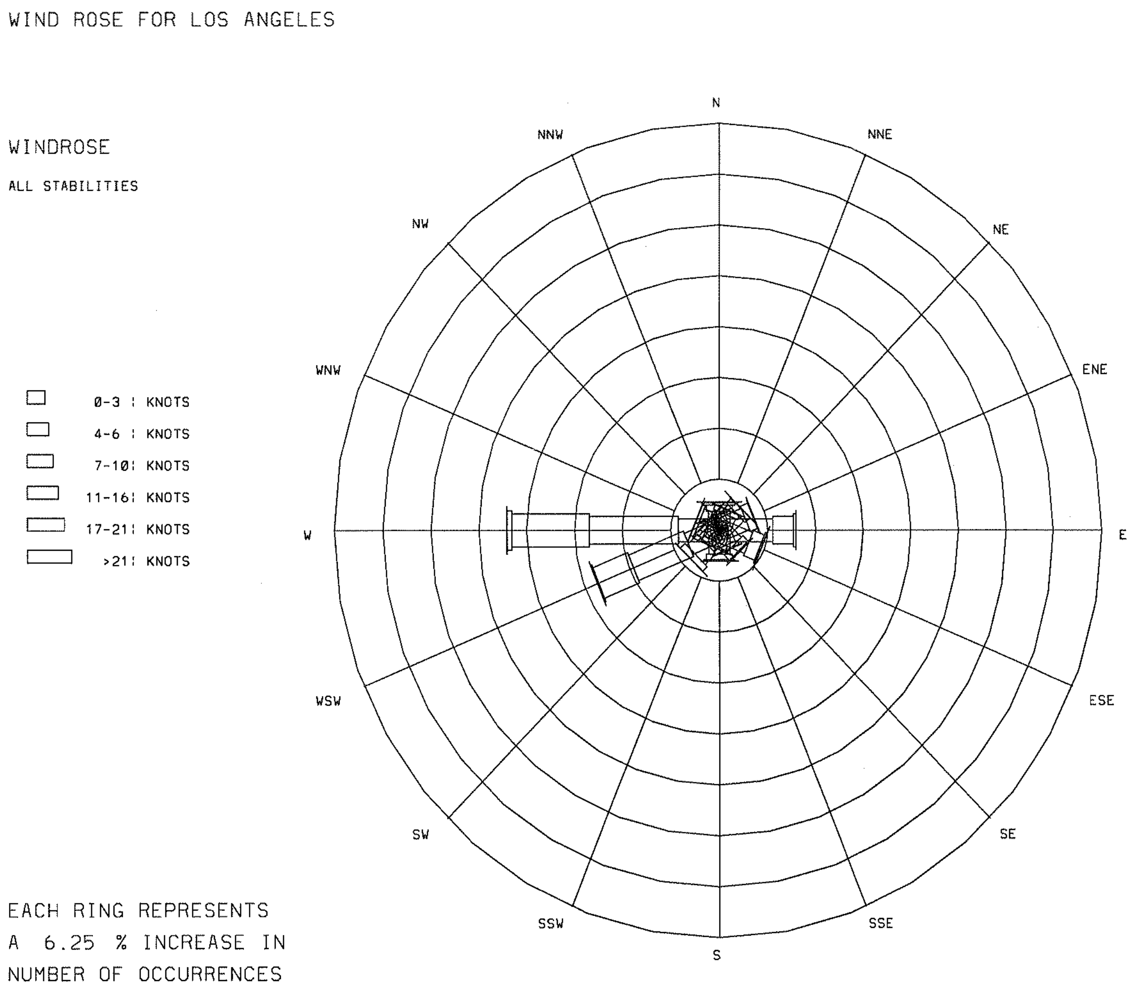

Figure 2-3
Annual Wind Rose - Los Angeles International Airport, California

2.4.3 Minalk/Merox Unit (MEROX)

The Minalk/Merox Unit converts sulfur compounds (mercaptans) to disulfides using a catalyst. The proposed modifications to the Minalk/Merox Unit are limited to rerouting PRDs to the proposed new Vapor Recovery and Safety Flare System via a new knock-out drum in the No. 2 Crude Unit. The purpose of this modification is to voluntarily reduce potential emissions from PRDs that currently vent to atmosphere in the event of a process upset.

2.4.4 Waste Gas Compressors

The Waste Gas Compressors at the No. 2 Crude Unit are currently connected to the Low Sulfur Fuel Oil vapor recovery system and safety flare. As part of connecting PRDs to the New Safety Flare, the Waste Gas Compressors will be rerouted to the New Safety Flare. The purpose of this modification is to align all PRDs from the No. 2 Crude Unit, No.2 Residuum Unit, Minalk/Merox Unit, and the Waste Gas Compressors to a common vapor recovery and safety flare system.

The changes to the No. 2 Crude Unit, No. 2 Residuum Stripper Unit, Minalk/Merox Unit, and Waste Gas Compressors result in a reduction of possible emissions to the atmosphere, but do not pose any new or significant hazards by any of the units.

2.4.5 Fluidized Catalytic Cracking Unit (FCCU)

The purposes of the modifications to the FCCU are to increase reliability, consolidate existing equipment, more efficiently separate intermediate streams, increase production of CARB gasoline components, and to improve energy efficiency. The modifications and equipment additions include; installing a new motorized main air blower replacing the existing steam turbine driven main air blower (the existing equipment will be idled); installing a new depropanizer column replacing three smaller existing distillation columns; installing a new deethanizer column; installing new pumps; and, installing new heat exchangers.

2.4.6 Alkylation Unit (ALKY)

The Alkylation Unit combines light olefins (propylene, butylene and pentenes) with isobutane to produce an alkylate product for use as a gasoline blending component. The proposed modifications to the Alkylation Unit include supplemental cooling that will be supplied by a new cooling tower and additional heat exchangers. The depropanizer, located in the older section of the Alkylation area, will be removed. This column is one of the three depropanizer columns being removed as part of FCCU upgrades. The purpose of the modifications is to improve reliability through more efficient cooling (i.e., heat removal) and improve product separation in the Unit.

2.4.7 Vacuum Residuum Desulfurization Unit (VRDS)

The VRDS Unit desulfurizes and denitrifies gas oil feedstock for the FCCU. The purpose of the modification to the VRDS Unit is to allow taking one of the parallel reactor trains out of service to replace the catalyst while the other train remains in service. The unit modifications and additions include: installing valve manifolds to separate the reactor trains; installing a new, parallel high pressure separator; re-piping of the existing Recycle Hydrogen Heat Exchangers and Recycle Hydrogen Air Coolers to split them between the two trains; and, installing new facilities to allow sulfiding of fresh catalyst in one reactor train with the other train in operation. This includes installation of two new separator vessels, a new sulfiding recycle hydrogen compressor, and a new recycle hydrogen air cooler. In addition, the existing VRDS Product Coolers will be re-piped so they can be used in the catalyst sulfiding loop.

2.4.8 ISOMAX Unit (ISOMAX)

The ISOMAX Unit converts light and intermediate gas oils into jet fuel, motor gasoline, and Liquid Petroleum Gas (LPG). The unit will be modified to increase the feed capacity by approximately 10,000 Barrels Per Day (BPD), and to produce two additional products, Ultra Low Sulfur Diesel (ULSD) fuel and desulfurized FCCU feed. The purpose of the modifications is to accommodate gas oil production and optimize output from the Unit. Modifications will be made to the CKN and distillation sections. A Pressure Swing Absorption Unit will be installed to recover hydrogen for reuse in existing Refinery hydrocracking and hydrotreating processes. Heaters in the ISOMAX Unit will be retrofitted with low nitrogen oxides (NOx) burners to reduce NOx emissions. Firing rates for the heaters will operate within existing permit limits.

2.4.9 Cogeneration Facilities (COGEN)

The Refinery currently operates a multi-train cogeneration plant to supply most of the electricity and steam used by processing equipment. To supplement electrical needs, electricity is purchased from offsite sources (e.g., Southern California Edison (SCE)). The existing cogeneration facility will be expanded by an additional 49 MW. The new 49 MW Cogen Train D includes a natural gas and refinery gas-fired turbine electric generator, a new steam-driven turbine electrical generator, feed gas compressors, knockout and surge pots, waste heat boilers (including duct burners) to generate steam, a carbon monoxide oxidation catalyst unit, and a Selective Catalytic Reactor (SCR) unit to control emissions. Expansion of this facility will decrease the Refinery's need for offsite sources of electricity.

2.4.10 Railcar Loading/Unloading Rack (RAILCAR)

The Refinery currently ships and receives LPG by trucks and rail cars. As part of the PRO Project, the LPG Loading/Unloading Rack will be expanded by the addition of four new loading/unloading positions for added flexibility that will increase the ability to optimize CARB-gasoline blending.

2.4.11 Utility Improvements

SCE and the West Basin Municipal Water District (WBMWD) may improve systems to service the proposed project. SCE improvements expected to be made include adding new 66 kilovolt (kV) circuit breakers in their existing Chevmain Substation, new transformers east of their existing ISOMAX Substation, and about 500 feet of overhead or underground cables. WBMWD currently provides boiler feed and cooling tower water from secondary-treated effluent from the Hyperion Wastewater Treatment Plant that has been further processed by filtration, chlorination, demineralization by reverse osmosis, and/or denitrification. Improvements as part of the PRO project at WBMWD, include increasing reverse osmosis and denitrification water production facilities.

2.5 Proposed New Process Units

2.5.1 Sulfur Recovery Facilities (SRF)

Sour Water Stripper (SWS)

A new Sour Water Stripper (SWS) will be constructed to supplement the existing plants. This stripper will allow for increased processing of sour water and production of commercial grade sulfur. The overhead stream from the stripper, containing hydrogen sulfide (H_2S), ammonia, and water vapor, will be fed to a new Sulfur Recovery Unit (SRU).

Sulfur Recovery Unit (SRU)

A new SRU with a capacity of 175 long tons per day will be installed to process increased amounts of H_2S to commercial grade, molten sulfur for sale. Ammonia in the feed stream to the SRU will be converted to atmospheric nitrogen and water and exhausted through the Tail Gas Unit (TGU) to the atmosphere.

Tail Gas Unit (TGU)

The exhaust from the SRU will be vented to a new TGU for further processing before discharging to the atmosphere. The TGU will include a new incinerator.

2.5.2 Vapor Recovery and Safety Flare System

A new closed relief system, including vapor recovery compressors and an elevated safety flare, will be installed. The PRDs on the No. 2 Crude Unit, the No. 2 Residuum Stripper Unit, the waste gas compressors, and the Minalk/Merox Unit that currently may vent to atmosphere under upset conditions will be routed to this new Vapor Recovery and Safety Flare System. In addition, PRDs from the new SWS, SRU, and TGU will be routed to this new Vapor Recovery and Safety Flare System. The recovered gases will be treated prior to being added to the existing refinery fuel gas system.

2.5.3 Additional Storage Capacity (TANK)

The proposed project will require additional segregation and storage of intermediate hydrocarbon streams and products. A new LPG sphere (Tank 722), two new FCCU light gasoline tanks (Tanks 302 and 303), and a new ISOMAX diesel tank (Tank 447) with the flexibility to store other products will be added. In addition, new pumps will be added to transfer materials to and from the new tanks.

2.5.4 Cooling Tower

A new cooling tower with a water circulation rate of approximately 12,000 gpm will be constructed to support cooling needs at the existing Alkylation Unit, new SRU, new SWS, and new TGU.

2.5.5 Hydrogen Compression and Transfer Facilities (H2COMP)

Additional hydrogen compression and transfer facilities will be installed to supply Refinery units with hydrogen at the required pressures.

SECTION 3
POTENTIAL HAZARDS

3.1 Hazards Identification

The potential hazards associated with Chevron's El Segundo Refinery and those associated with the proposed modifications and additions which form the basis of the PRO Project are common to most refineries worldwide, and are a function of the materials being processed, processing systems, procedures used for operating and maintaining the facility, and hazard detection and mitigation systems. The hazards that are likely to exist are identified by the physical and chemical properties of the materials being handled and the process conditions. For hydrocarbon fuel and petrochemical facilities, the common hazards are:

- toxic gas clouds (gas with hydrogen sulfide, ammonia, etc.)
- torch fires (gas and liquefied gas releases)
- flash fires (liquefied gas releases)
- pool fires (flammable/combustible liquid releases)
- vapor cloud explosions (gas and liquefied gas releases)
- BLEVEs (major failures of liquefied gas storage tanks)

The Chevron facility under evaluation was divided into three types of areas: process, storage, and product transfer. The hazards expected to be identified in each of the three areas are listed in Table 3-1.

3.2 Introduction to Physiological Effects of Toxic Gases, Fires, and Explosions

The analysis to be performed on the Chevron El Segundo Refinery modifications involves the evaluation of hundreds of potential hazardous material releases. The potential releases may result in one or more of the following hazards:

- Exposure to toxic gas
  - Ammonia
  - Hydrogen sulfide
  - Sulfuric acid
- Exposure to flame radiation
  - Pool fires (tank fires, spills into diked areas)
  - Torch fires (rupture of line followed by ignition)
  - BLEVEs (Boiling Liquid–Expanding Vapor Explosion of a pressurized storage vessel)
  - Flash fires (ignition of slow-moving flammable vapors)
- Exposure to explosion overpressure
  - Vapor cloud explosion (release, dispersion, and explosion of a flammable vapor cloud)
  - Confined explosion (ignition and explosion of flammable vapors within a building or confined area)

In order to compare the hazards associated with each type of hazard listed above, a common measure of consequence or damage must be defined. In consequence and risk analysis studies, a common measure for such hazards is their impact on humans. For each of the toxic, fire, and explosion hazards listed, there are data available that define the effect of the hazard on humans.

Table 3-1
Summary of Hazards

Area Description	Type of Hazards Found in Area
Process FCCU ALKY VRDS ISOMAX COGEN SRF	Breach of liquid line or vessel resulting in: Pool fire Breach of flashing liquid line or vessel resulting in: Flash fire VCE Pool fire Torch fire Toxic cloud (ammonia, hydrogen sulfide, etc.) Breach of vapor line or vessel resulting in: Torch fire VCE Toxic cloud (hydrogen sulfide, etc.)
Storage TANK	Breach of atmospheric storage tank resulting in: Tank fire Breach of flashing liquid piping resulting in: Flash fire VCE Torch fire BLEVE of pressurized storage vessel
Product transfer RAILCAR	Breach of flashing liquid piping resulting in: Flash fire VCE Torch fire Breach of vapor line resulting in: Torch fire BLEVE of pressurized storage vessel

When comparing a toxic hazard to a flammable or explosive hazard, the magnitude of the hazard's impact on humans must be identically defined. For instance, it would not be meaningful to compare human exposure to nonlethal overpressures (low overpressures which break windows) to human exposure to lethal fire radiation (34,500 Btu/(hr·ft^2) for five seconds). Thus, in order to compare the hazards of toxic gases, fires, and explosions on humans, equivalent levels of hazard must be defined.

The endpoint hazard criterion defined in this study corresponds to a hazard level which might cause an injury. With this definition, the injury level must be defined for each type of hazard (toxic, radiant heat, or overpressure exposure). Fortunately, data exist which define an equivalent injury level for each of the hazards listed. Table 3-2 presents the endpoint hazard criteria approved by the South Coast Air Quality Management District (SCAQMD) for this work.

Table 3-2
Consequence Analysis Hazard Levels
(Endpoint Criteria for Consequence Analysis)

Hazard Type	Injury Threshold		
	Exposure Duration	Hazard Level	Reference
Ammonia inhalation	Up to 60 min	150 ppm	ERPG-2 [AIHA, 2007] 40 CFR 68 [EPA, 1996]
Hydrogen sulfide inhalation	Up to 60 min	30 ppm	ERPG-2 [AIHA, 2007] 40 CFR 68 [EPA, 1996]
Sulfuric acid inhalation	Up to 60 min	10 mg/m^3	ERPG-2 [AIHA, 2007] 40 CFR 68 [EPA, 1996]
Radiant heat exposure	40 sec	1,600 $Btu/(hr{\cdot}ft^2)$ †	40 CFR 68 [EPA, 1996]
Explosion overpressure	Instantaneous	1.0 psig ‡	40 CFR 68 [EPA, 1996]
Flash fires (fireballs)	40 sec	1,600 $Btu/(hr{\cdot}ft^2)$ †	40 CFR 68 [EPA, 1996]
Flash fires (flammable vapor clouds)	Instantaneous	LFL	40 CFR 68 [EPA, 1996]

ERPG-2. The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action.

40 CFR 68. United States Environmental Protection Agency RMP endpoints.

† Corresponds to second-degree skin burns.
‡ An overpressure of 1 psi may cause partial demolition of houses, which can result in serious injuries to people, and shattering of glass windows, which may cause skin laceration from flying glass.

3.3 Selection of Accidental Release Case Studies

3.3.1 Overview of Methodology

The purpose of the hazard case selection methodology is to define the maximum credible hazard scenario for each unit that might result in an impact to the public. The methodology is developed in seven increments:

- Initial review of available documentation
- Detailed review of process flow diagrams (PFDs)
- Review of process material balances
- Review of available safety studies
- Development of hazard scenarios
- Screening of hazard scenarios via hazards analysis
- Final selection of hazard cases

3.3.2 Initial Review of Available Documentation

The analysis begins with a general review of the process. Any written description of the new or modified processes is studied to determine the physical and chemical transformations occurring and the general flow of material in the unit. After the process features are known, process flow diagrams (PFDs) are reviewed and compared to the written descriptions.

3.3.3 Detailed Review of Process Flow Diagrams

The detailed review of the PFDs begins by tracing the major process flow lines in the unit. When the major flows within the unit are found, the material balances are reviewed for each major line to determine the exact nature of the material within the line or vessel.

Each of the major flow lines is taken individually and evaluated to determine the potential for producing a major hazard if a leak or rupture occurred. At this point in the analysis, a list of potential areas of concern is started; this list is continually refined and added to during the remaining analysis steps.

Several factors are involved in the initial selection of hazard areas:

- Flammability and/or toxic nature of the chemicals
- Potential for aerosol formation (releases of streams considerably above their atmospheric boiling point)
- Size of a line
- Normal flow rate in the line
- Severity of the process conditions

The factors described above are not weighted equally in the evaluation. The flammability and/or toxic nature, potential for aerosol formation, and process conditions are given more weight than the other factors.

3.3.4 Review of Process Material Balances

Although the process material balances have been reviewed for each major process flow line, they are more thoroughly reviewed during this stage of the analysis to locate points in the process where toxic materials and/or materials sensitive to detonation are used.

A spreadsheet describing the material balances for the identified hazard locations is begun. The material balance gives the molar flows, the mass flows, and the mole fraction of each chemical. The stream temperature, pressure, and line size are also noted in the spreadsheet. As additional hazard areas are found, their stream summaries are added to the spreadsheet.

3.3.5 Review of Available Safety Studies

Available safety studies, including HAZOP reports, "What if?" analyses, safety audits, etc., are reviewed to determine if all potential hazard areas have been adequately identified. Any potential hazards identified in these work products are added to the list of potential areas of concern that was started during the detailed review of the PFDs.

3.3.6 Development of Hazard Scenarios

The list of potential hazard areas developed in the preceding analysis stages is put into a spreadsheet. The spreadsheet contains the following information:

- Case number
- Description of the area where release originates (line, vessel, etc.)
- Stream number found on the PFDs
- Stream or vessel temperature
- Stream or vessel pressure
- Assessment of the physical state of the stream (gas, liquid, two-phase)
- Total volume of the vessel or the nearest vessel
- Liquid volume of the vessel or the nearest vessel
- Line size
- Normal flow rate of the line or vessel

3.3.7 Initial Screening via Hazard Zone Analysis

The hazard zones resulting from the worst-case releases of similar hazard scenarios are evaluated to determine the process areas that could release material with a potential for public impact. When performing site-specific consequence analysis studies, the ability to accurately model the release, dilution, and dispersion of gases and aerosols is important if an accurate assessment of potential exposure is to be attained. For this reason, Quest uses a modeling package, CANARY by Quest®, that contains a set of complex models that calculate release conditions, initial dilution of the vapor (dependent upon the release characteristics), and the subsequent dispersion of the vapor introduced into the atmosphere. The models contain algorithms that account for thermodynamics, mixture behavior, transient release rates, gas cloud density relative to air, initial velocity of the released gas, and heat transfer effects from the surrounding atmosphere and the substrate. The release and dispersion models contained in the QuestFOCUS package (the predecessor to CANARY by Quest) were reviewed in a United States Environmental Protection Agency (EPA) sponsored study [TRC, 1991] and an American Petroleum Institute (API) study [Hanna, Strimaitis, and Chang, 1991]. In both studies, the QuestFOCUS software was evaluated on technical merit (appropriateness of models for specific applications) and on model predictions for specific releases. One conclusion drawn by both studies was that the dispersion software tended to overpredict the extent of the gas cloud travel, thus resulting in too large a cloud when compared to the test data (i.e., a conservative approach).

A study prepared for the Minerals Management Service [Chang, et al.,1998] reviewed models for use in modeling routine and accidental releases of flammable and toxic gases. CANARY by Quest received the highest possible ranking in the science and credibility areas. In addition, the report recommends CANARY by Quest for use when evaluating toxic and flammable gas releases. The specific models (e.g., SLAB) contained in the CANARY by Quest software package have also been extensively reviewed. Technical descriptions of the CANARY models used in this study are presented in Appendix A.

3.3.8 Final Selection of Hazard Cases

Using the hazard area spreadsheet, the material balance spreadsheet, and the initial screening hazard zone calculations, a final selection of hazard cases is made. These selections generally define the maximum extent of any credible potential hazard that could occur in the process area being evaluated.

SECTION 4
WORST-CASE CONSEQUENCE MODELING RESULTS

The results of the worst-case consequence modeling calculations for the new, modified, and existing units are presented in this section. In addition, for several units, the hazard zone which extends the greatest distance from the point of release is overlaid onto the local area in order to determine the possible public exposure to the defined hazard levels.

4.1 Release Resulting in the Largest Downwind Hazard Zones

With the completion of the hazard identification and consequence modeling calculations described in Section 3 for both the existing and proposed refinery configurations, the releases which generate the largest hazard zone can be defined for each unit. Table 4-1 lists the potential releases identified. As can be seen from Table 4-1, most of the proposed modifications do not affect the size of the largest potential release. That is to say, the potential releases which would result in the largest hazard zones are already in place for many of the units. For example, in the Fluidized Catalytic Cracking Unit (FCCU), a large release from the absorber/stripper results in the largest potential hazard zone (flash fire). The modifications to FCCU involving the increased efficiency do not result in releases which could create hazard zones larger than those from the existing unit.

4.2 Description of Potential Hazard Zones

4.2.1 Toxic Vapor Clouds

For a potential accident (e.g., pipe break, hole in vessel, etc.), one particular set of release conditions/atmospheric conditions will create the largest potential hazard zone. As an example, for the post-project operation of the new Sulfur Recovery Facility (SRF), this accident is a rupture of the line leading to the SRU without immediate ignition of the flammable/toxic cloud, thus resulting in possible exposure to a cloud containing H_2S downwind of the release. Under the worst-case atmospheric conditions evaluated, the toxic hazard zone (as defined by the ERPG-2 H_2S concentration level, 30 ppm) extends 4,390 ft downwind from the point of release. The hazard "footprint" associated with this event is illustrated in two ways in Figure 4-1. One method presents the footprint as a circle which extends 4,390 ft around the point of release from the reactor. This presentation is misleading since everyone within the circle cannot be simultaneously exposed to a 30 ppm H_2S level from any single accident. A more realistic illustration of the potential hazard zone around the release point is given by the darkened cloud in Figure 4-1. The cloud area illustrates the H_2S hazard footprint that would be expected IF a rupture of the line were to occur, AND the wind is blowing at a low speed to the west, AND the atmosphere is calm, AND the vapor cloud does not ignite upon release. This circular presentation is referred to as a vulnerability zone. For comparison purposes, the H_2S vulnerability for an existing SRF is also shown on Figure 4-1.

4.2.2 Vapor Cloud Explosions

One of the possible results of a flammable liquid or gas release is the potential ignition of the vapor which would then result in a vapor cloud explosion (VCE). An example of an event tree showing the sequence of events which could lead to a VCE is presented in Figure 4-2. As an example, the vapor cloud explosion overpressure hazard footprint for the 1.0 psig overpressure level for the existing and proposed Hydrogen Compression Unit configurations is presented in Figure 4-3.

Table 4-1
Potential Accidents Resulting in Maximum Potential Hazard

Process Unit/Area	Status of Potential Hazard (E) Existing (M) Modified (N) New	Potential Release (Hazard)
FCCU	E	Rupture of liquid line leaving absorber/stripper (flash fire)
	M	Rupture of liquid line leaving C-5720 accumulator (flash fire)
VRDS	E	Rupture of line leaving E-1542 exchanger (torch fire)
	M	Rupture of line leaving V-1581 Sulfiding separator (torch fire)
ISOMAX	E	Rupture of liquid line leaving C-730 accumulator (flash fire)
	M	Rupture of liquid line leaving C-730 accumulator (flash fire)
COGEN	E	Rupture of fuel gas line in Train C (torch fire)
	N	Rupture of fuel gas line in Train D (torch fire)
SRF	E	Rupture of combined gas stream from V-7600 (H2S toxicity)
	N	Rupture of combined gas stream from V-7301 (H2S toxicity)
H2COMP	E	Rupture of feed line to existing hydrogen compressor (explosion overpressure)
	N	Rupture of feed line to new hydrogen compressor (explosion overpressure)
TANK	E	Tank 990 - Gasoline tank fire (fire radiation)
	N	Tank 303 - Gasoline tank fire (fire radiation)
	E	BLEVE of Sphere 718 (fire radiation)
	N	BLEVE of Sphere 722 (fire radiation)
RAILCAR	E	BLEVE of LPG railcar (fire radiation)
	N	BLEVE of LPG railcar (fire radiation)

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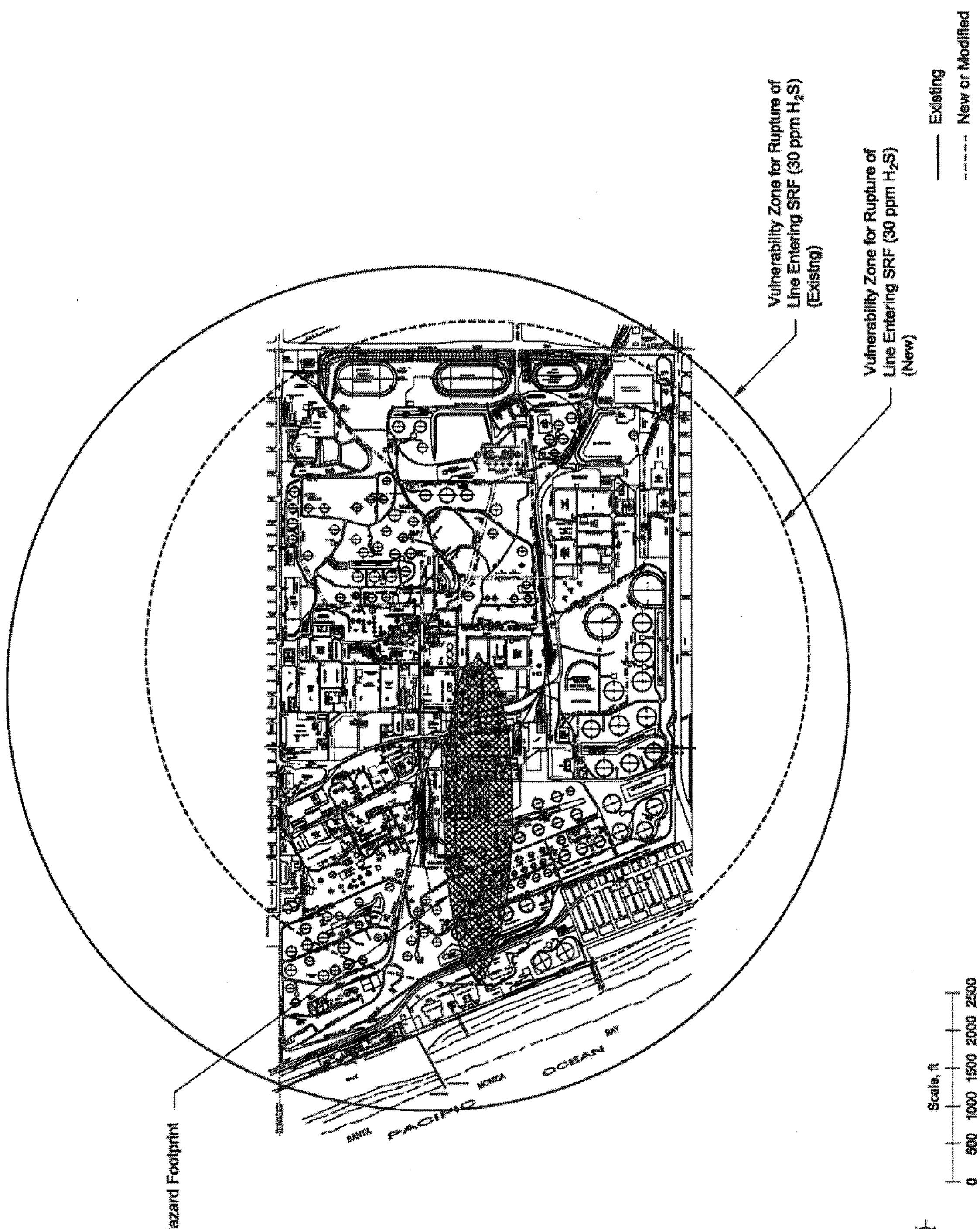

Figure 4-1
Worst-Case Consequence Analysis Hazard Footprint – SRF
(H_2S Toxicity – Existing and New Units)

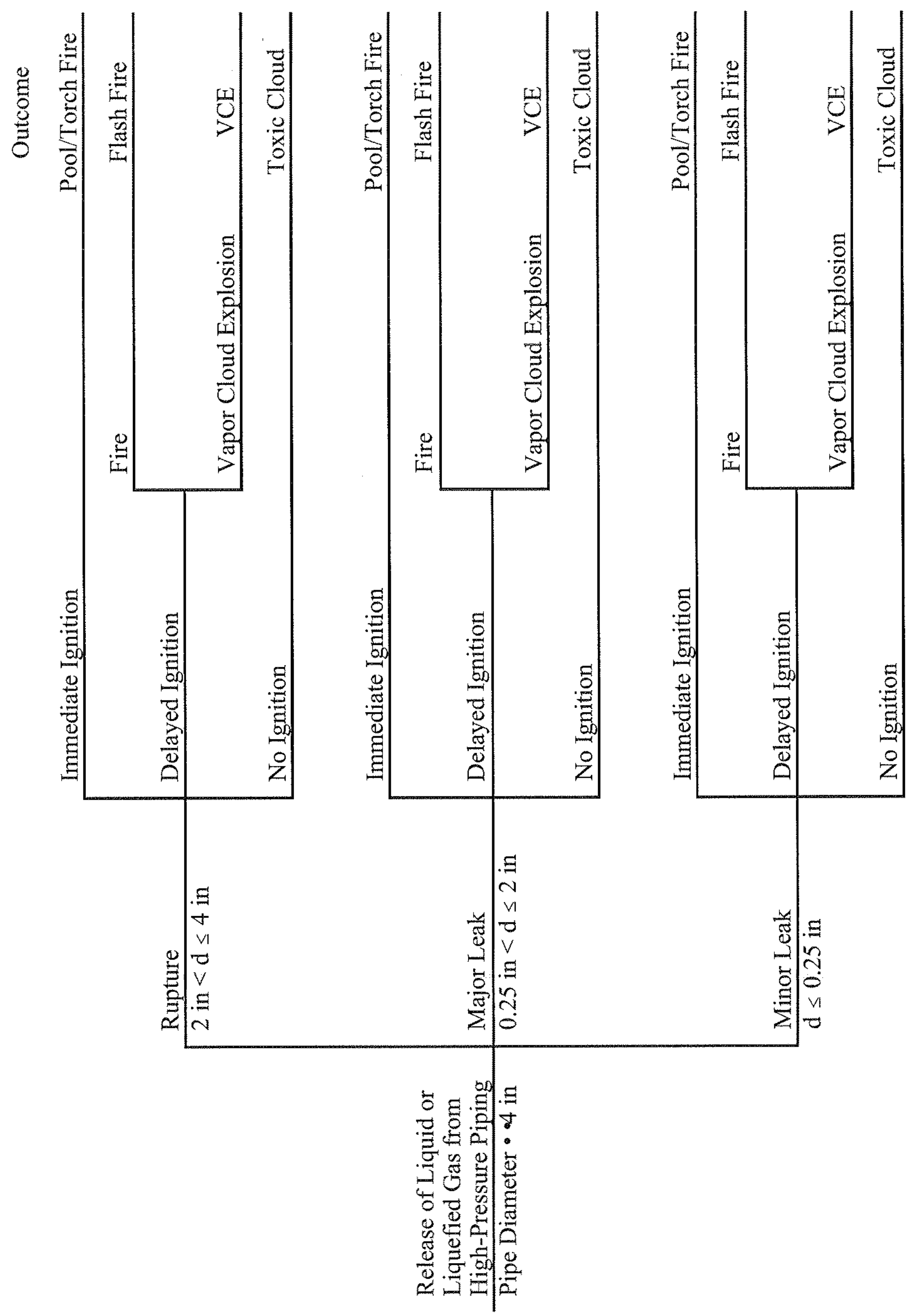

Figure 4-2
Event Tree for a Flammable/Toxic Release

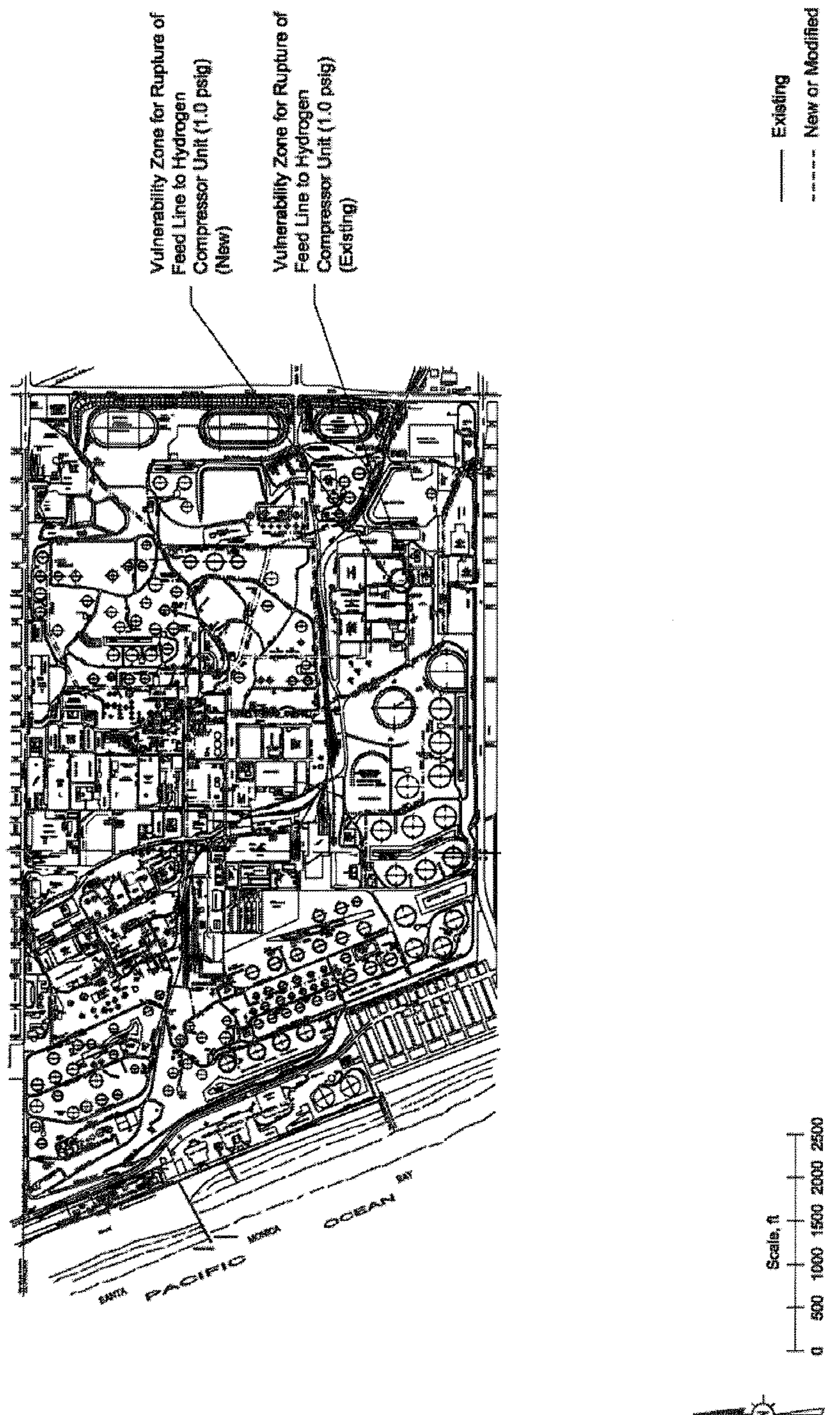

Figure 4-3
Worst-Case Consequence Analysis Hazard Footprint – H2COMP
(Explosion Overpressure – Existing and New Units)

4.2.3 Flash Fires

In most cases, the flash fire hazard zones associated with the release of liquefied gas were slightly larger than the potential hazard zones due to the explosive overpressures. As an example, the flash fire hazard footprint and vulnerability zone for a release from the new depropanizer column in the modified FCCU is presented in Figure 4-4.

4.2.4 Fire Radiation

The most significant fire radiation hazards which might occur are torch fires from liquefied gas releases. Unlike the dispersion calculations, the worst-case atmospheric conditions for torch fire radiation calculations occur when the winds are high, allowing the flame to "bend" downwind. The largest potential pool fire hazard zones are due to storage tank fires. An example of the radiant hazard zone for the largest torch fire following the rupture sulfiding separator liquid line in the modified Vacuum Residuum Desulfurization Unit (VRDS) is presented in Figure 4-5.

The evaluation of the project modifications to the refinery involved performing fire radiation calculations for the existing and proposed atmospheric storage tank configurations. In all cases where a new tank was added to other tanks in the immediate area, the potential fire radiation impacts were similar.

For the railcar loading and unloading operations, the addition of an additional unloading bay does not produce any potential hazards larger than those already in place.

The project calls for the construction of a new 28,666 barrel mixed butane sphere. The sphere will be located in the existing yard located in the east end of the refinery. Fire radiation calculations were performed for a BLEVE of the new sphere as well as for an existing 28,600 barrel sphere containing pentane. The results from the calculation is presented in Figure 4-6. As can be seen in the figure, the 1,600 Btu/(hr·ft^2) radiation level extends past the plant boundary, but is no larger than the 28,600 barrel pentane sphere located nearby.

4.3 <u>Summary of Maximum Hazard Zones</u>

Table 4-2 presents a listing of the type and size of potential hazards which dominate each of the units and storage tanks evaluated. Note that for each unit, the status is defined as E, M, and N (existing, modified, and new). The largest hazards are listed for releases from the existing units or storage tanks, before and after the proposed modifications.

In all cases, the addition of new equipment and modification of existing equipment in the refinery did not significantly increase the size of the potential hazard zones already in place. In the refinery, the railcar loading/unloading areas already handle flammable liquids; having a greater number of loadings and unloadings does not increase the maximum potential hazard zone.

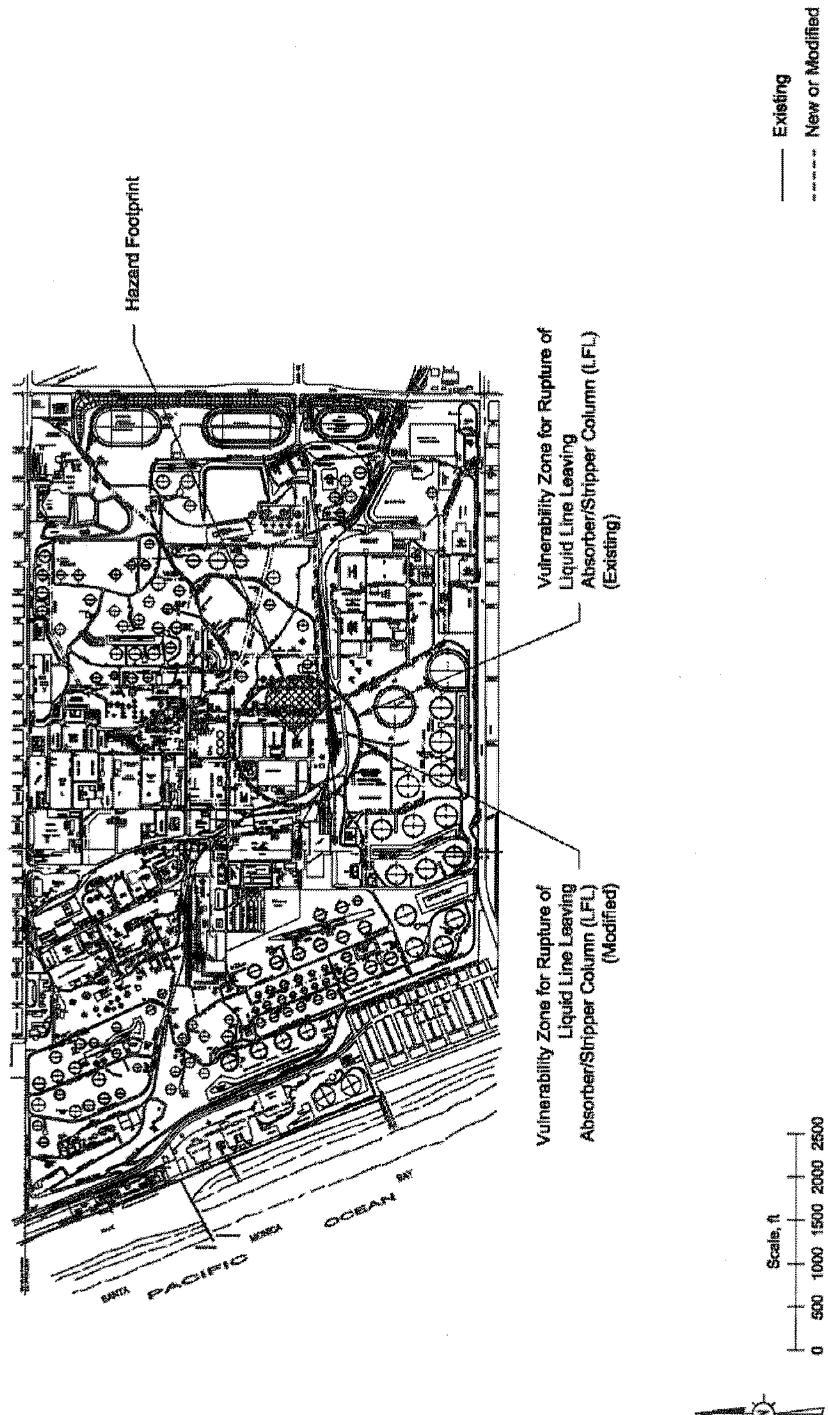

Figure 4-4
Worst-Case Consequence Analysis Hazard Footprint – FCCU
(Flash Fire – Modified Unit)

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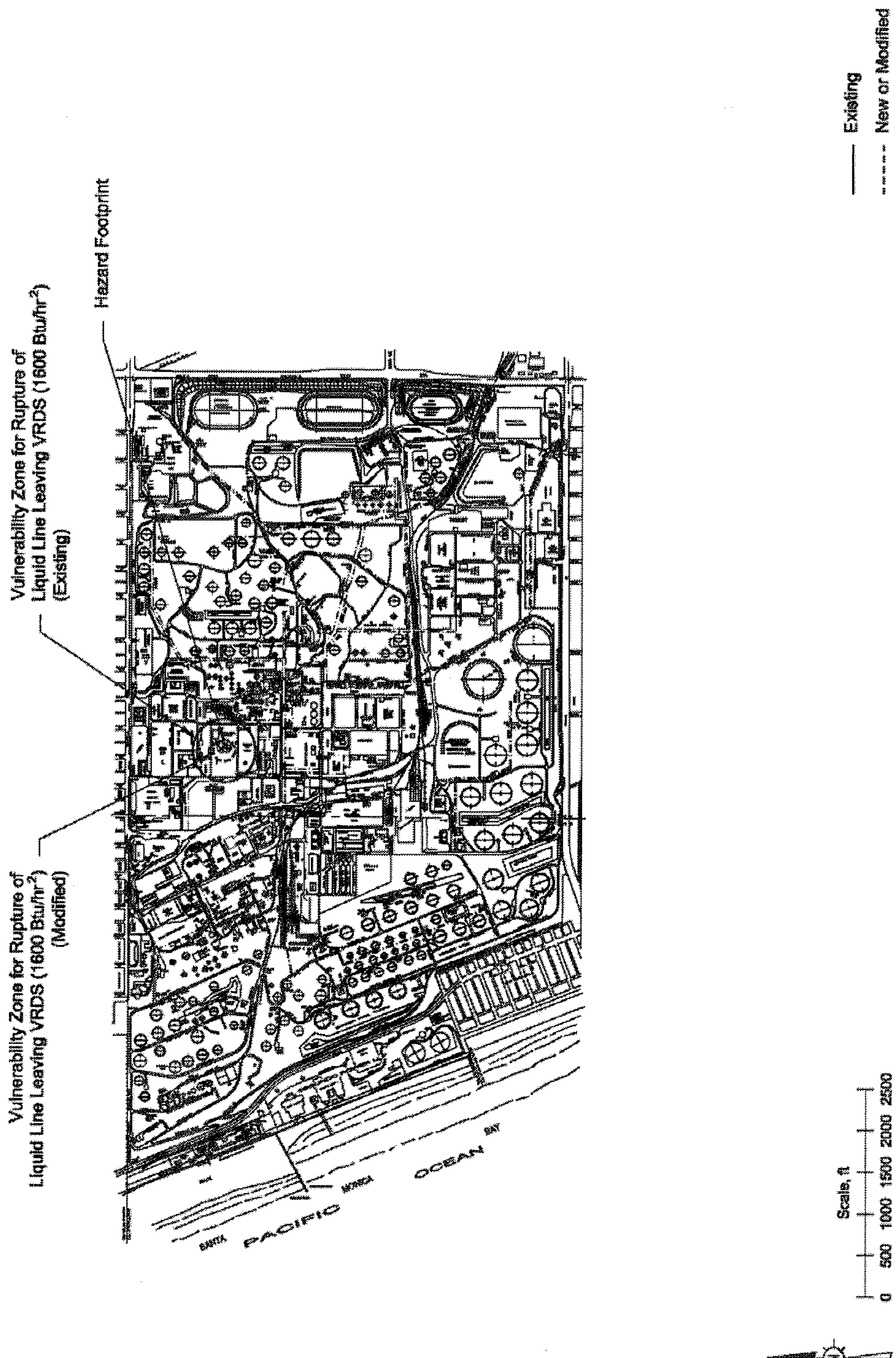

Figure 4-5
Worst-Case Consequence Analysis Hazard Footprint – VRDS
(Fire Radiation – Modified Unit)

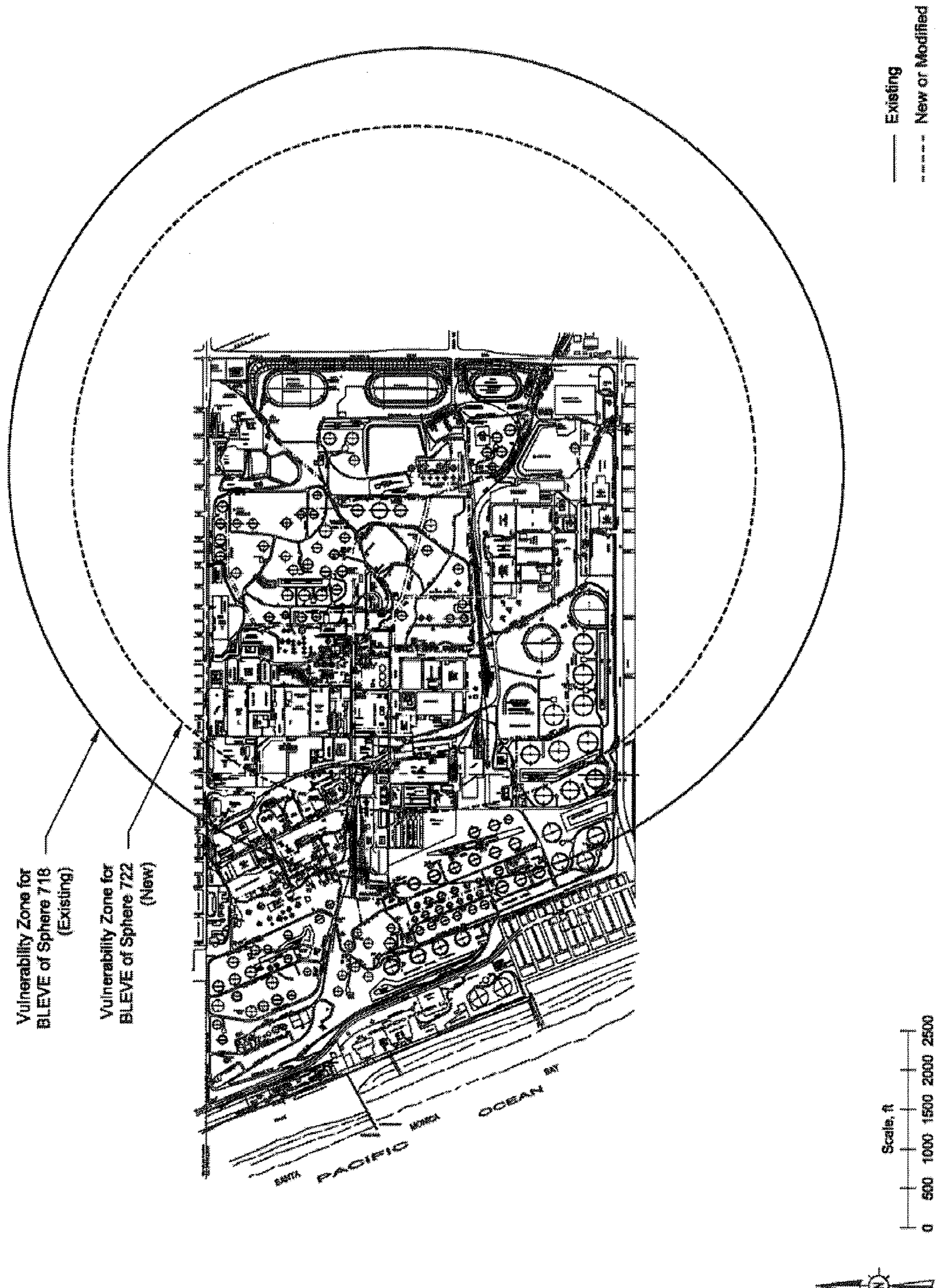

Figure 4-6
Worst-Case Consequence Analysis Hazard Footprint – SPHERE
(BLEVE Fire Radiation – New and Existing Spheres)

Table 4-2
Maximum Hazard Distances for Maximum Credible Events in Each Process Unit/Area

Unit	Process Unit/Release	Status of Potential Hazard (E) Existing (M) Modified (N) New	Maximum Distance (ft) from Center of Unit to: Flash Fire (LFL)	Explosion Overpressure (1.0 psig)	Pool/Torch Fire Thermal Radiation (1,600 Btu/(hr·ft^2))	H_2S Gas Concentration (30 ppm for 60 min)
FCCU	Rupture of liquid line leaving absorber/stripper (flash fire)	E	730			
FCCU	Rupture of liquid line leaving C-5720 accumulator (flash fire)	M	755			
VRDS	Rupture of line leaving E-1542 exchanger (torch fire)	E			380	
VRDS	Rupture of line leaving V-1581 Sulfiding separator (torch fire)	M			130	
ISOMAX	Rupture of liquid line leaving C-730 accumulator (flash fire)	E	1,145			
ISOMAX	Rupture of liquid line leaving C-730 accumulator (flash fire)	M	830			
COGEN	Rupture of fuel gas line in Train C (torch fire)	E			70	
COGEN	Rupture of fuel gas line in Train D (torch fire)	N			105	
SRF	Rupture of combined gas stream from V-7600 (H_2S toxicity)	E				5,580
SRF	Rupture of combined gas stream from V-7301 (H_2S toxicity)	N				4,390

Table 4-2
Maximum Hazard Distances for Maximum Credible Events in Each Process Unit/Area
(Continued)

	Process Unit/Release	Status of Potential Hazard (E) Existing (M) Modified (N) New	Maximum Distance (ft) from Center of Unit to			
			Flash Fire (LFL)	Explosion Overpressure (1.0 psig)	Pool/Torch Fire Thermal Radiation (1,600 Btu/(hr·ft^2))	H_2S Gas Concentration (30 ppm for 60 min)
H2COMP	Rupture of feed line to existing hydrogen compressor (explosion overpressure)	E		135		
	Rupture of feed line to new hydrogen compressor (explosion overpressure)	N		135		
TANK	Tank 990 - Gasoline tank fire (fire radiation)	E			340	
	Tank 303 - Gasoline tank fire (fire radiation)	N			340	
	BLEVE of Sphere 718 (fire radiation)	E			5,300	
	BLEVE of Sphere 722 (fire radiation)	N			4,750	
RAILCAR	BLEVE of LPG railcar (fire radiation)	E			4,700	
	BLEVE of LPG railcar (fire radiation)	N			4,700	

SECTION 5
CONCLUSIONS

The primary conclusion that can be drawn from the worst-case consequence modeling results is that for all potential releases, the proposed modifications and additions do not result in larger potential hazard zones than those posed by the existing El Segundo Refinery configuration. This result is primarily due to the nature of many of the modifications, which can best be described in the following manner.

- Slight modification of a unit such that the vessel(s) generating the largest potential hazard is unchanged (e.g., Fluidized Catalytic Cracking Unit [FCCU]).
- Addition of equivalent equipment such that the potential hazards added are the same as those which already exist (e.g., railcar [RAILCAR] and atmospheric storage [TANK]).

With the maximum hazard zones defined for each release, the units and storage tanks can be divided into four categories, dependent on their potential to impact the public. The categories are defined as:

- Units and terminals with no potential off-site impacts (hazard zones are contained onsite).
  - FCCU
  - COGEN
  - H2COMP
  - VRDS
  - TANK
- Units and terminals with potential off-site impacts, but no public exposure (hazard levels extend offsite, but census data indicate no public exposure).
  - None
- Units and terminals with potential off-site impacts and potential public exposure to defined hazard levels, but project modified impacts are no larger than existing impacts.
  - ISOMAX
  - SRF
  - SPHERE
  - RAILCAR
- Units with potential off-site impacts and potential public exposure to defined hazard levels. Post-project impacts are larger than existing impacts.
  - None

These conclusions are driven by the nature of the PRO project objective for the El Segundo refinery. The replacement of some equipment with more reliable and efficient equipment has little to do with the potential consequence if a release occurs. The consequences are driven by the process conditions at the time of release and the PRO project is not expected to significantly change those conditions. Thus, for the purposes of this study, using the hazard endpoints developed by the U.S. EPA, there are no significant off-site project impacts due to the proposed project modifications.

SECTION 6
REFERENCES

AIHA, Emergency Response Planning Guidelines threshold values. American Industrial Hygiene Association, found at http://www.aiha.org/1documents/Committees/ERP-erpglevels.pdf.

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Hanna, S. R., D. G. Strimaitis, and J. C. Chang (1991), *Hazard Response Modeling Uncertainty (A Quantitative Method), Volume II, Evaluation of Commonly-Used Hazardous Gas Dispersion Models*. Study cosponsored by the Air Force Engineering and Services Center, Tyndall Air Force Base, Florida, and the American Petroleum Institute; performed by Sigma Research Corporation, Westford, Massachusetts, September, 1991.

TRC (1991), *Evaluation of Dense Gas Simulation Models*. Prepared for the U.S. Environmental Protection Agency by TRC Environmental Consultants, Inc., East Hartford, Connecticut 06108, EPA Contract No. 68-02-4399, May, 1991.

SECTION 7
GLOSSARY

The following definitions are intended to apply to Consequence Analysis and Quantitative Risk Analysis studies of facilities that produce, process, store, or transport hazardous materials. Due to the limited scope of such studies, some of these definitions are more narrow than the common definitions.

ACCIDENT. An unplanned event that interrupts the normal progress of an activity and has undesirable consequences, and is preceded by an unsafe act and/or an unsafe condition.

ACCIDENT EVENT SEQUENCE. A specific series of unplanned events that has specific undesirable consequences (e.g., a pipe ruptures, allowing flammable gas to escape, the gas forms a flammable vapor cloud that ignites after some delay, resulting in a flash fire).

ACCIDENT SCENARIO. The detailed description of an accident event sequence.

AIR DISPERSION MODELING. The use of mathematical equations (models) to predict the rate at which vapors or gases released into the air will be diluted (dispersed) by the air. The purpose of air dispersion modeling is to predict the extent of potentially toxic or flammable gas concentrations, in air, by calculating the change in concentration of the vapor or gas in the air as a function of distance from the source of the vapor or gas.

BLAST WAVE. An atmospheric pressure pulse created by an explosion.

BLEVE (Boiling Liquid–Expanding Vapor Explosion). The sudden, catastrophic failure of a pressure vessel at a time when its liquid contents are well superheated. (BLEVE is normally associated with the rupture, due to fire impingement, of pressure vessels containing liquefied gases.)

CONDITIONAL PROBABILITY. The probability of occurrence of an event, given that one or more precursor events have occurred (e.g., the probability of ignition of an existing vapor cloud).

CONSEQUENCES. The expected results of an incident outcome.

CONSEQUENCE ANALYSIS. Selection and definition of specific accident event sequences, coupled with consequence modeling.

CONSEQUENCE ANALYSIS. Evaluation of the adverse effects that are predicted as a result of a hazardous event. It is a quantitative measure of short-term impact; it is not a measure of the long-term result (e.g., health effects, economic loss).

CONSEQUENCE MODELING. The use of mathematical models to predict the potential extent of specific hazard zones or effect zones that would result from specific accident event sequences.

DEFLAGRATION. See explosion.

DETONATION. See explosion.

EFFECT ZONE. The area over which the airborne gas concentration, radiant heat flux, or blast wave overpressure is predicted to equal or exceed some specified value. In contrast to a hazard zone, the endpoint for an effect zone need not be capable of producing injuries or damage.

ENDPOINT. The specified value of airborne gas concentration, radiant heat flux, or blast wave overpressure used to define the outer boundary of an effect zone or hazard zone. Endpoints typically correspond to specific levels of concern (e.g., IDLH, LFL, onset of fatality, 50% mortality, odor threshold, etc.).

EVENT TREE. A diagram that illustrates accident event sequences. It begins with an initiating event (e.g., a release of hydrogen sulfide gas), passes through one or more intermediate events (e.g., ignition or no ignition), resulting in two or more incident outcomes (e.g., flash fire or toxic vapor cloud).

EXPLOSION. A rapid release of energy, resulting in production of a blast wave. There are two common types of explosions—physical explosions (sudden releases of gas or liquefied gas from pressurized containers) and chemical explosions (rapid chemical reactions, including rapid combustion). Chemical explosions can be further subdivided into deflagrations and detonations. In a deflagration, the velocity of the blast wave is lower than the speed of sound in the reactants. In a detonation, the velocity of the blast wave exceeds the speed of sound in the reactants. For a given mass of identical reactants, a detonation is capable of producing more damage than a deflagration. Solid and liquid explosives, such as dynamite and nitroglycerine, typically detonate, whereas vapor cloud explosions are nearly always deflagrations.

FIRE RADIATION. See thermal radiation.

FLAMMABLE VAPOR CLOUD. A vapor cloud consisting of flammable gas and air, within which the gas concentration equals or exceeds its lower flammable limit.

FLASH FIRE. Transient combustion of a flammable vapor cloud.

HAZARD. A chemical or physical condition that presents a potential for causing injuries or illness to people, damage to property, or damage to the environment.

HAZARD ZONE. The area over which a given incident outcome is capable of producing undesirable consequences (e.g., skin burns) that are equal to or greater than some specified injury or damage level (e.g., second-degree skin burns). (Sometimes referred to as a "hazard footprint.")

INCIDENT OUTCOME. The result of an accident event sequence. The incident outcomes of interest in a typical study are toxic vapor clouds; fires (flash fire, torch fire, pool fire, or fireball); and explosions (confined, unconfined, or physical).

INITIATING EVENT. The first event in an accident event sequence. Typically a failure of containment (e.g., gasket failure, corrosion hole in a pipe, hose rupture, etc.).

INTERMEDIATE EVENT. An event that propagates or mitigates the previous event in an accident event sequence (e.g., operator fails to respond to an alarm, thus allowing a release to continue; excess flow valve closes, thus stopping the release).

ISOPLETH. The locus of points at which a given variable has a constant value. In consequence modeling, the variable can be airborne gas concentration, radiant heat flux, or blast wave overpressure. The value of the variable is equal to the specified endpoint. The area bounded by an isopleth is an effect zone.

LOWER FLAMMABLE LIMIT. The lowest concentration of flammable gas in air that will support flame propagation.

MISSILES. See shrapnel.

POOL FIRE. Continuous combustion of the flammable gas emanating from a pool of liquid.

QUANTITATIVE RISK ANALYSIS. The development of a quantitative estimate of risk based on engineering evaluation and mathematical techniques for combining estimates of incident consequences and frequencies.

RISK. A measure of economic loss or human injury in terms of both the incident likelihood and the magnitude of the loss or injury.

RISK ASSESSMENT. The process by which the results of a risk analysis are used to make decisions, either through relative ranking of risk reduction strategies or through comparison with risk targets.

SHRAPNEL. Solid objects projected outward from the source of an explosion. Sometimes referred to as missiles or projectiles.

SUPERHEATED LIQUID. A liquid at a temperature greater than its atmospheric pressure boiling point.

THERMAL RADIATION. The transfer of heat by electromagnetic waves. This is how heat is transferred from flames to an object or person not in contact with or immediately adjacent to the flames. This is also how heat is transferred from the sun to the earth.

TORCH FIRE. Continuous combustion of a flammable fluid that is being released with considerable momentum.

TOXIC. Describes a material with median lethal doses and/or median lethal concentrations listed in OSHA 29 CFR 1910.1200, Appendix A.

TOXIC VAPOR CLOUD. A vapor cloud consisting of toxic gas and air, within which the gas concentration equals or exceeds a concentration that could be harmful to humans exposed for a specific time.

VAPOR CLOUD. A volume of gas/air mixture within which the gas concentration equals or exceeds some specified or defined concentration limit.

VAPOR CLOUD EXPLOSION. Extremely rapid combustion of a flammable vapor cloud, resulting in a blast wave.

VULNERABILITY ZONE. The area within the circle created by rotating a hazard zone around its point of origin. Any point within that circle could, under some set of circumstances, be exposed to a hazard level that equals or exceeds the endpoint used to define the hazard zone. However, except for accidents that produce circular hazard zones (e.g., BLEVEs and confined explosions), only a portion of the area within the vulnerability zone can be affected by a single accident.

APPENDIX A
CANARY BY QUEST® MODEL DESCRIPTIONS

The following model descriptions are taken from the CANARY by Quest User Manual.

Section A	Engineering Properties
Section B	Pool Fire Radiation Model
Section C	Torch Fire and Flare Radiation Model
Section D	Fireball Model
Section E	Fluid Release Model
Section F	Momentum Jet Dispersion Model
Section G	Heavy Gas Dispersion Model
Section I	Vapor Cloud Explosion Model

Engineering Properties

Purpose

The purpose of this model is to provide an accurate means of computing physical and thermodynamic properties of a wide range of chemical mixtures and pure components using a minimum of initial information.

Required Data

(a) Fluid composition
(b) Temperature and pressure of the fluid prior to release

Methodology

Basic thermodynamic properties are computed using the Peng-Robinson equation of state [Peng and Robinson, 1976]. The necessary physical and thermodynamic properties are calculated in the following manner.

Step 1: The temperature and pressure of the fluid at storage conditions and the identity and mole fraction of each component of the fluid are obtained. Mixture parameters are determined using data from the extensive properties data base within CANARY.

Step 2: Each calculation begins with the computation of the vapor and liquid fluid composition. For cases where the temperature and pressure result in only one phase being present, the vapor or liquid composition will be the same as the initial feed composition. The composition calculation is an iterative procedure using a modification of the techniques described by Starling [1973].

Step 3: Once the vapor and liquid compositions are known, the vapor and liquid densities, enthalpies, entropies, and heat capacities can be computed directly. Other physical properties (viscosity, thermal conductivity, surface tension, etc.) are computed using correlations developed in Reid, Prausnitz, and Poling [1987].

Step 4: A matrix of properties is computed over a range of temperatures and pressures. Physical and thermodynamics properties required by other models within CANARY are then interpolated from this table.

Basic Thermodynamic Equations

$$Z^3 - (1-B) \cdot Z^2 + \left(A - 3 \cdot B^2 - 2 \cdot B\right) \cdot Z - \left(A \cdot B - B^2 - B^3\right) = 0 \tag{1}$$

where: Z = fluid compressibility factor, $\frac{P \cdot V}{R \cdot T}$, dimensionless

P = system pressure, kPa

V = fluid specific volume, $m^3/kmol$

R = gas constant, 8.314 $m^3 \cdot$ kPa/(kmol$\cdot$K)

T = absolute temperature, K

$$A = \frac{a \cdot P}{R^2 \cdot T^2}$$

$$a = 0.45724 \cdot \frac{R^2 \cdot T^2}{P_c} \cdot \alpha$$

$$\alpha = \left[1 + m \cdot \left(1 - T_r^{0.5}\right)^2\right]$$

$$m = 0.37464 + 1.54226 \cdot \omega - 0.26992 \cdot \omega^2$$

ω = acentric factor

$$T_r = \frac{T}{T_c}$$

T_c = pseudo-critical temperature, K

P_c = pseudo-critical pressure, kPa

$$B = \frac{b \cdot P}{R \cdot T}$$

$$b = 0.0778 \cdot R \cdot \frac{T_c}{P_c}$$

$$H = H^o + \frac{P}{\rho} - R \cdot T + \int_0^{\rho} \left[P - T \cdot \left(\frac{\partial P}{\partial T}\right)_{\rho}\right] \cdot \left(\frac{d\rho}{\rho^2}\right) \tag{2}$$

where: H = enthalpy of fluid at system conditions, kJ/kg
H^o = enthalpy of ideal gas at system temperature, kJ/kg

$$S = S^o - R \cdot \ln\left(\rho \cdot R \cdot T\right) + \int_0^{\rho} \left[\rho \cdot R - \left(\frac{\partial P}{\partial T}\right)_{\rho}\right] \cdot \left(\frac{d\rho}{\rho^2}\right) \tag{3}$$

where: S = entropy of fluid at system conditions, kJ/(kg$\cdot$K)
S^o = entropy of ideal gas at system temperature, kJ/(kg$\cdot$K)

$$R \cdot T \cdot \ln\left(\frac{f_i}{f_i^o}\right) = \left[\left(H_i - H_i^o\right) - T \cdot \left(S_i - S_i^o\right)\right] \tag{4}$$

where: f_i = fugacity of component i, kPa
f_i^o = standard state reference fugacity, kPa

References

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Reid, R. C., J. M. Prausnitz, and B. E. Poling, *The Properties of Gases and Liquids* (Fourth Edition). McGraw-Hill Book Company, New York, New York, 1987.

Starling, K. E., *Fluid Thermodynamic Properties for Light Petroleum Systems*. Gulf Publishing Company, Houston, Texas, 1973.

Pool Fire Radiation Model

Purpose

The purpose of this model is to predict the impact of fire radiation emitted by flames that are fueled by vapors emanating from liquid pools. Specifically, the model predicts the maximum radiant heat flux incident upon a target as a function of distance between the target and the flame.

Required Data

(a) Composition of the liquid in the pool
(b) Temperature of the liquid in the pool
(c) Wind speed
(d) Air temperature
(e) Relative humidity
(f) Elevation of the target (relative to grade)
(g) Elevation of the pool (relative to grade)
(h) Dimensions of the free surface of the pool
(i) Orientation of the pool (relative to the wind direction)
(j) Spill surface (land or water)

Methodology

Step 1: The geometric shape of the flame is defined. The flame column above a circular pool, square pool, or rectangular pool is modeled as an elliptical cylinder.

Step 2: The dimensions of the flame column are determined. The dimensions of the base of the flame are defined by the pool dimensions. An empirical correlation developed by Thomas [1965] is used to calculate the length (height) of the flame.

$$L = 42 \cdot D_h \cdot \left(\frac{\dot{m}}{\rho_a \cdot (g \cdot D_h)^{0.5}} \right)^{0.61}$$

where: L = length (height) of the flame, m
D_h = hydraulic diameter of the liquid pool, m
$\dot{m}$ = mass burning flux, kg/(m^2•s)
ρ_a = density of air, kg/m^3
g = gravitational acceleration, 9.8 m/s^2

Notes: Mass burning fluxes used in the Thomas equation are the steady-state rates for pools on land (soil, concrete, etc.) or water, whichever is specified by the user.

For pool fires with hydraulic diameters greater than 100 m, the flare length, L, is set equal to the length calculated for $D_h = 100$ m.

Step 3: The angle (Φ) to which the flame is bent from vertical by the wind is calculated using an empirical correlation developed by Welker and Sliepcevich [1970].

$$\frac{\tan(\Phi)}{\cos(\Phi)} = 3.2 \cdot \left(\frac{D_h \cdot u \cdot \rho_a}{\mu_a}\right)^{0.07} \cdot \left(\frac{u^2}{g \cdot D_h}\right)^{0.7} \cdot \left(\frac{\rho_v}{\rho_a}\right)^{-0.6}$$

where: Φ = angle the flame tilts from vertical, degrees
u = wind speed, m/s
μ_a = viscosity of air, kg/(m•s)
ρ_v = density of fuel vapor, kg/m^3

Step 4: The increase in the downwind dimension of the base of the flame (flame drag) is calculated using a generalized form of the empirical correlation Moorhouse [1982] developed for large circular pool fires.

$$D_w = 1.5 \cdot D_x \cdot \left(\frac{u^2}{g \cdot D_x}\right)^{0.069}$$

where: D_w = downwind dimension of base of tilted flame, m
D_x = downwind dimension of the pool, m

Step 5: The flame is divided into two zones: a clear zone in which the flame is not obscured by smoke; and a smoky zone in which a fraction of the flame surface is obscured by smoke. The length of the clear zone is calculated by the following equation, which is based on an empirical correlation developed by Pritchard and Binding [1992].

$$L_c = 55.05 \cdot D_h^{-0.6} \cdot \left(\frac{\dot{m}}{\rho_a}\right)^{1.13} \cdot (u+1)^{0.179} \cdot \left(\frac{C}{H}\right)^{-2.49}$$

where: L_c = length of the clear zone, m
$\frac{C}{H}$ = carbon/hydrogen ratio of fuel, dimensionless

Step 6: The surface flux of the clear zone is calculated using the following equation.

$$q_{cz} = q_{sm} \cdot \left(1 - e^{-b \cdot D_h}\right)$$

where: q_{cz} = surface flux of the clear zone, kW/m^2
q_{sm} = maximum surface flux, kW/m^2
b = extinction coefficient, m^{-1}

Average surface flux of the smoky zone, q_{cz}, is then calculated, based on the following assumptions.

- The smoky zone consists of clean-burning areas and areas in which the flame is obscured by smoke.
- Within the smoky zone, the fraction of the flame surface that is obscured by smoke is a function of the fuel properties and pool diameter.
- Smoky areas within the smoky zone have a surface flux of 20 kW/m^2 [Hagglund and Persson,1976].
- Clean-burning areas of the smoky zone have the same surface flux as the clean-burning zone.
- The average surface flux of the smoky zone is the area-weighted average of the surface fluxes for the smoky areas and the clean-burning areas within the smoky zone.

(This two-zone concept is based on the Health and Safety Executive POOLFIRE6 model, as described by Rew and Hulbert [1996].)

Step 7: The surface of the flame is divided into numerous differential areas. The following equation is then used to calculate the view factor from a differential target, at a specific location outside the flame, to each differential area on the surface of the flame.

$$F_{dA_t \to dA_f} = \frac{\cos(\beta_t) \cdot \cos(\beta_f)}{\pi \cdot r^2} \cdot dA_f \qquad \text{for } [\beta_t] \text{ and } [\beta_f] < 90°$$

where: $F_{dA_t \to dA_f}$ = view factor from a differential area on the target to a differential area on the surface of the flame, dimensionless

dA_f = differential area on the flame surface, m^2

dA_t = differential area on the target surface, m^2

r = distance between differential areas dA_t and dA_f, m

β_t = angle between normal to dA_t and the line from dA_t to dA_f, degrees

β_f = angle between normal to dA_f and the line from dA_t to dA_f, degrees

Step 8: The radiant heat flux incident upon the target is computed by multiplying the view factor for each differential area on the flame by the appropriate surface flux (q_{cz} or q_{sz}) and by the appropriate atmospheric transmittance, then summing these values over the surface of the flame.

$$q_{ai} = \sum_{A_f} q_{sf} \cdot F_{dA_t \to dA_f} \cdot \tau$$

where: q_{ai} = attenuated radiant heat flux incident upon the target due to radiant heat emitted by the flame, kW/m^2

A_f = area of the surface of the flame

q_{sf} = radiant heat flux emitted by the surface of the flame, kW/m^2 (q_{sf} equals either q_{cz} or q_{sz}, as appropriate)

τ = atmospheric transmittance, dimensionless

Atmospheric transmittance, τ, is a function of absolute humidity and r, the path length between differential areas on the flame and target [Wayne, 1991].

Step 9: Steps 7 and 8 are repeated for numerous target locations.

Validation

Several of the equations used in the Pool Fire Radiation Model are empirical relationships based on data from medium- to large-scale experiments, which ensures reasonably good agreement between model predictions and experimental data for variables such as flame length and tilt angle. Comparisons of experimental data and model predictions for incident heat flux at specific locations are more meaningful and of greater interest. Unfortunately, few reports on medium- or large-scale experiments contain the level of detail required to make such comparisons.

One source of detailed test data is a report by Welker and Cavin [1982]. It contains data from sixty-one pool fire tests involving commercial propane. Variables that were examined during these tests include pool size (2.7 to 152 m^2) and wind speed. Figure B-1 compares the predicted values of incident heat flux with experimental data from the sixty-one pool fire tests.

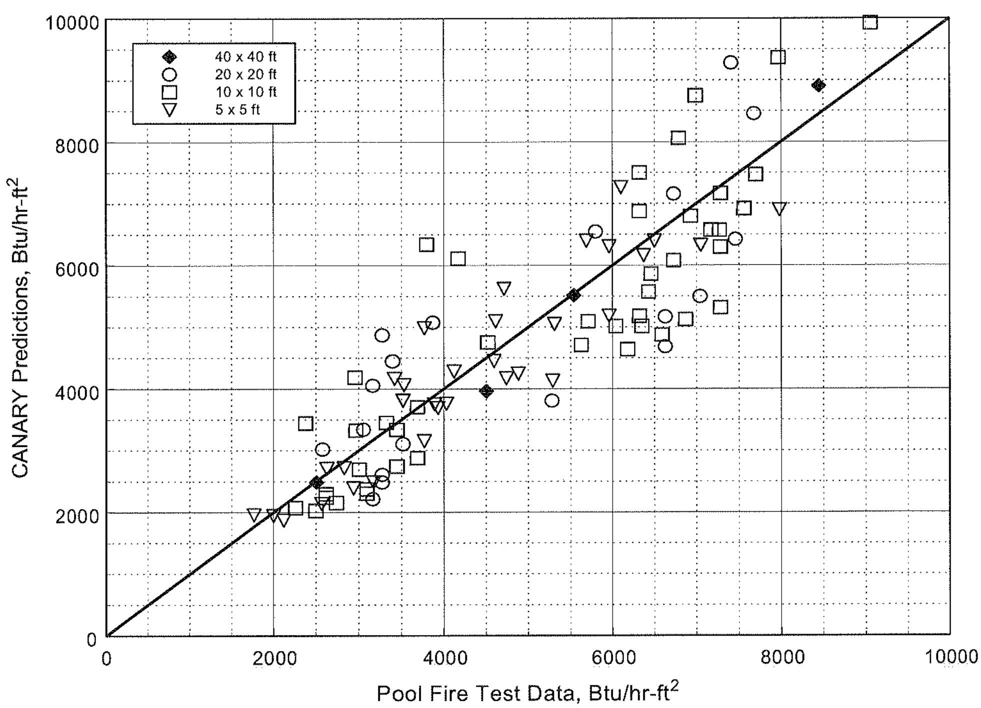

Figure B-1

In another series of tests, fire radiation measurements were taken for large liquefied natural gas (LNG) pool fires. The Montoir tests are the largest tests of LNG fires, involving pools up to 35 meters in diameter [Nédelka, Moorhouse, and Tucker, 1989]. Figure B-2 compares the radiation isopleths predicted by CANARY with the actual measurements taken in Test 2 of the Montoir series.

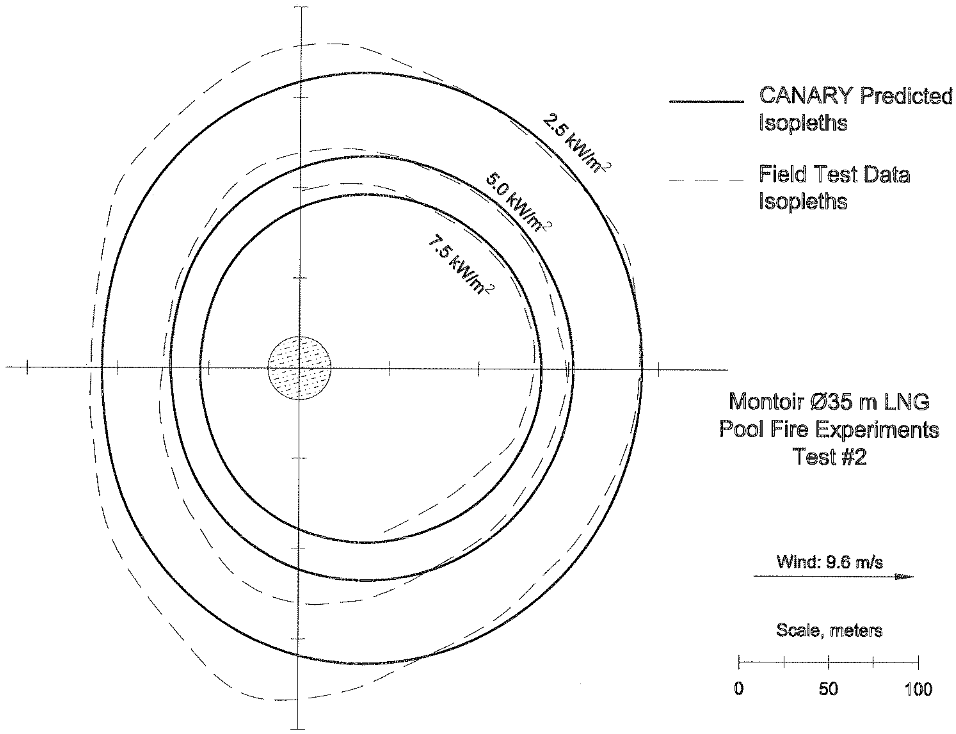

Figure B-2

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Torch Fire and Flare Radiation Model

Purpose

The purpose of this model is to predict the impact of fire radiation emitted by burning jets of vapor. Specifically, the model predicts the maximum radiant heat flux incident upon a target as a function of distance between the target and the point of release.

Required Data

(a) Composition of the released material
(b) Temperature and pressure of the material before release
(c) Mass flow rate of the material being released
(d) Diameter of the exit hole
(e) Wind speed
(f) Air temperature
(g) Relative humidity
(h) Elevation of the target (relative to grade)
(i) Elevation of the point of release (relative to grade)
(j) Angle of the release (relative to horizontal)

Methodology

Step 1: A correlation based on a Momentum Jet Model is used to determine the length of the flame. This correlation accounts for the effects of:

- composition of the released material,
- diameter of the exit hole,
- release rate,
- release velocity, and
- wind speed.

Step 2: To determine the behavior of the flame, the model uses a momentum-based approach that considers increasing plume buoyancy along the flame and the bending force of the wind. The following equations are used to determine the path of the centerline of the flame [Cook, et al., 1987].

$$\Phi_X = (\rho_{ja})^{0.5} \cdot \bar{u} \cdot \sin(\theta) \cdot \cos(\varphi) + (\rho_\infty)^{0.5} \cdot u_\infty \qquad \text{(downwind)}$$

$$\Phi_Y = (\rho_{ja})^{0.5} \cdot \bar{u} \cdot \sin(\theta) \cdot \sin(\varphi) \qquad \text{(crosswind)}$$

$$\Phi_Z = (\rho_{ja})^{0.5} \cdot \bar{u} \cdot \cos(\theta) + (\rho_\infty)^{0.5} \cdot u_b \cdot \frac{(i+1)}{n} \qquad \text{(vertical)}$$

where: Φ_{XYZ} = momentum flux in X, Y, Z direction
ρ_{ja} = density of the jet fluid at ambient conditions, kg/m^3
$\bar{u}$ = average axial velocity of the flame, m/s

θ = release angle in $X\text{–}Z$ plane (relative to horizontal), degrees
φ = release angle in $X\text{–}Y$ plane (relative to downwind), degrees
ρ_∞ = density of air, kg/m^3
u_∞ = wind speed, m/s
ρ_b = density of combustion products, kg/m^3
u_b = buoyancy velocity, m/s
n = number of points taken along the flame length

These correlations were developed to predict the path of a torch flame when released at various orientations. The model currently does not allow a release angle in a crosswind direction; the release angle is confined to the downwind/vertical plane (i.e., $\varphi = 0$).

Step 3: The angle of flame tilt is defined as the inclination of a straight line between the point of release and the end point of the flame centerline path (as determined in Step 2).

Step 4: The geometric shape of the flame is defined as a frustum of a cone (as suggested by several flare/fire researchers [e.g., Kalghatgi, 1983, Chamberlain, 1987]), but modified by adding a hemisphere to the large end of the frustum. The small end of the frustum is positioned at the point of release, and the centerline of the frustum is inclined at the angle determined in Step 3.

Step 5: The surface emissive power is determined from the molecular weight and heat of combustion of the burning material, the release rate and velocity, and the surface area of the flame.

Step 6: The surface of the flame is divided into numerous differential areas. The following equation is then used to calculate the view factor from a differential target, at a specific location outside the flame, to each differential area on the surface of the flame.

$$F_{dA_t \to dA_f} = \frac{\cos(\beta_t) \cdot \cos(\beta_f)}{\pi \cdot r^2} \cdot dA_f \qquad \text{for } [\beta_t] \text{ and } [\beta_f] < 90$$

where: $F_{dA_t \to dA_f}$ = view factor from a differential area on the target to a differential area on the surface of the flame, dimensionless
dA_f = differential area on the flame surface, m^2
dA_t = differential area on the target surface, m^2
r = distance between differential areas dA_t and dA_f, m
β_t = angle between normal to dA_t and the line from dA_t to dA_f, degrees
β_f = angle between normal to dA_f and the line from dA_t to dA_f, degrees

Step 7: The radiant heat flux incident upon the target is computed by multiplying the view factor for each differential area on the flame by the surface missive power and by the appropriate atmospheric transmittance, then summing these values over the surface of the flame.

$$q_{ai} = \sum_{A_f} q_{sf} \cdot F_{dA_t \to dA_f} \cdot \tau$$

where: q_{ai} = attenuated radiant heat flux incident upon the target due to radiant heat emitted by the flame, kW/m^2

A_f = area of the surface of the flame

q_{sf} = radiant heat flux emitted by the surface of the flame, kW/m^2

τ = atmospheric transmittance, dimensionless

Atmospheric transmittance, τ, is a function of absolute humidity and r, the path length between differential areas on the flame and target [Wayne, 1991].

Step 8: Steps 6 and 7 are repeated for numerous target locations.

Validation

Several of the equations used in the Torch Fire and Flare Radiation Model are empirical relationships based on data from medium- to large-scale experiments, which ensures reasonably good agreement between model predictions and experimental data for variables such as flame tilt angle. Comparisons of experimental data and model predictions for incident heat flux at specific locations are more meaningful and of greater interest. Unfortunately, few reports on medium- or large-scale experiments contain the level of detail required to make such comparisons.

One reasonable source of test data is a report by Chamberlain [1987]. It contains data from seven flare tests involving natural gas releases from industrial flares, with several data points being reported for each test. Variables that were examined during these tests include release diameter (0.203 and 1.07 m), release rate and velocity, and wind speed. Figure C-1 compares the predicted values of incident heat flux with experimental data from the seven flare tests.

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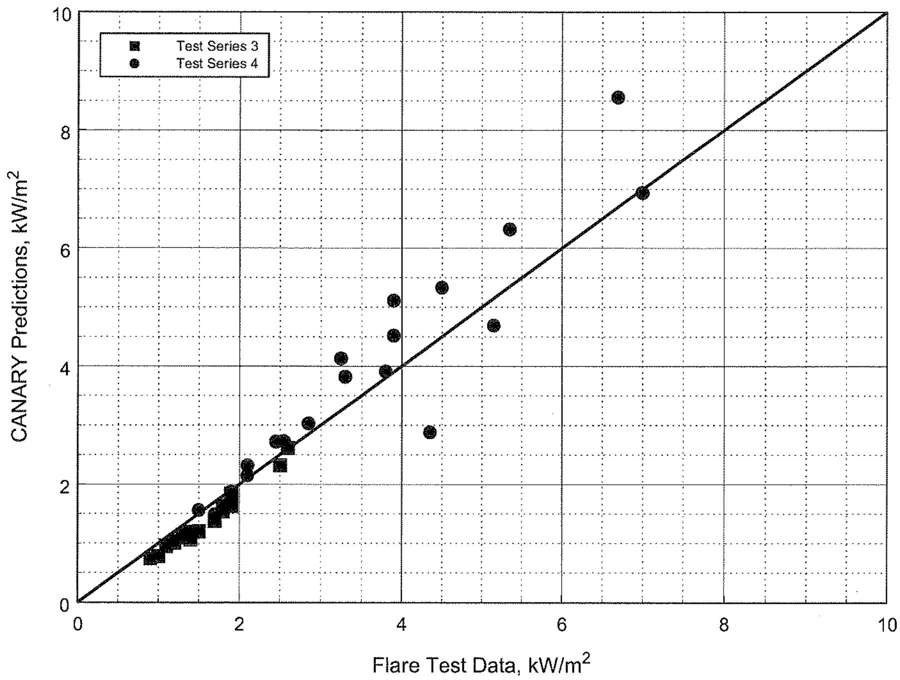
Test Series 3
Test Series 4
CANARY Predictions, kW/m2
Flare Test Data, kW/m2
0
2
4
6
8
10

Figure C-1

Fireball Model

Purpose

The purpose of the Fireball Model is to predict the impact of thermal radiation emitted by fireballs that result from catastrophic failures of pressure vessels containing superheated liquids. Specifically, the model predicts the average radiant heat flux incident upon a grade-level target as a function of the horizontal distance between the target and the center of the fireball.

Required Data

(a) Composition of flammable liquid within the pressure vessel
(b) Mass of flammable liquid within the pressure vessel
(c) Pressure within vessel just prior to rupture
(d) Temperature of the liquid within the vessel just prior to rupture
(e) Air temperature
(f) Relative humidity

Methodology

Step 1: Calculate the mass of fuel consumed in the fireball. The mass of fuel in the fireball is equal to the smaller of the mass of fuel in the vessel (as specified by the user), or three times the mass of fuel that flashes to vapor when it is released to the atmosphere [Hasegawa and Sato, 1977].

Step 2: Calculate the maximum diameter of the fireball using the empirical correlation from Roberts [1981/82].

$$D_{\max} = 5.8 \cdot M_f^{1/3}$$

where: $D_{\max}$ = maximum diameter of the fireball, m
M_f = mass of fuel in the fireball, kg

Step 3: Calculate fireball duration using the following empirical correlation [Martinsen and Marx, 1999].

$$t_d = 0.9 \cdot M_f^{1/4}$$

where: t_d = fireball duration, s
M_f = mass of fuel in the fireball, kg

Step 4: Calculate the size of the fireball and its location, as a function of time. The fireball is assumed to grow at a rate that is proportional to the cube root of time, reaching its maximum diameter, $D_{\max}$, at the time of liftoff, $t_d/3$. During its growth phase, the fireball remains tangent to grade. After liftoff, it rises at a constant rate [Shield, 1994].

Step 5: Estimate the surface flux of the fireball. The fraction of the total available heat energy that is emitted as radiation is calculated using the equation derived by Roberts [1981/82].

$$f = 0.0296 \cdot P^{0.32}$$

where: f = fraction of available heat energy released as radiation, dimensionless
P = pressure in vessel at time of rupture, kPa

The total amount of energy emitted as radiation is then calculated.

$$E_r = f \cdot M_f \cdot \Delta H_c$$

where: E_r = energy emitted as radiation, kJ
ΔH_c = heat of combustion, kJ/kg

The surface flux is estimated by dividing E_r by the average surface area of the fireball and the fireball duration, but it is not allowed to exceed 400 kW/m^2.

Step 6: Calculate the maximum view factor from a differential target (at specific grade level locations outside the fireball) to the fireball, using the simple equation for a spherical radiator [Howell, 1982].

$$F = \frac{R^2}{H^2}$$

where: F = view factor from differential area to the fireball, dimensionless
R = radius of the fireball, m
H = distance between target and the center of the fireball, m

R and H vary with time due to the growth and rise of the fireball. Therefore, the duration of the fireball is divided into time intervals and a view factor is calculated at the end of each interval.

Step 7: Compute the attenuated radiant heat flux at each target location, at the end of each time interval, by multiplying the appropriate view factor by the surface flux of the fireball and by the appropriate atmospheric transmittance. The transmittance of the atmosphere is a function of the absolute humidity and path length from the fireball to the target [Wayne, 1991]. For each target location, calculate the average attenuated heat flux over the duration of the fireball.

Step 8: Calculate the absorbed energy at each target location. For a given location, the energy absorbed during each time interval is computed by multiplying the length of the interval by the average attenuated radiant heat flux for that interval. The absorbed energies for all time intervals are then summed to determine the radiant energy absorbed over the duration of the fireball.

Step 9: Calculate the integrated dosage at each target location. This is computed in the same manner as absorbed energy is computed in Step 8, except that the average attenuated radiant heat flux for each time interval is taken to the 4/3rds power before it is multiplied by the time interval. This allows the dosage to be used in the probit equation for fatalities from thermal radiation [Eisenberg, Lynch, and Breeding, 1975].

$$Pr = -38.4785 + 2.56 \cdot \ln\left(q^{4/3} \cdot t\right)$$

where: Pr = probit
q = radiant heat flux, W/m^2
t = exposure time, s

Validation

Several of the equations used in the Fireball Model are empirical relationships based on data from small- to medium-scale experiments, which ensures reasonably good agreement between model predictions and experimental data for variables such as maximum fireball diameter. Comparisons of experimental data and model predictions for average incident heat flux, absorbed energy, or dosage are more meaningful and of greater interest. Unfortunately, very few reports on small- or medium-scale fireball experiments contain the level of detail required to make such comparisons, and no such data are available for large-scale experiments.

One of the most complete sources of test data for medium-scale fireball tests is a report by Johnson, Pritchard, and Wickens [1990]. It contains data on five BLEVE tests that involved butane and propane, in quantities up to 2,000 kg. Figure D-1 compares the predicted values of absorbed energy with experimental data from those five BLEVE tests.

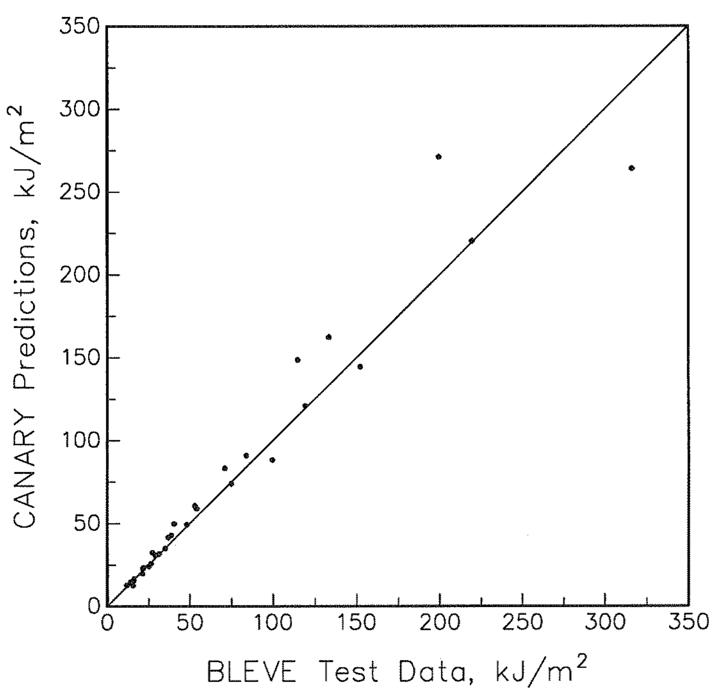

Figure D-1

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Fluid Release Model

Purpose

The purpose of the Fluid Release Model is to predict the rate of mass release from a breach of containment. Specifically, the model predicts the rate of flow and the physical state (liquid, two-phase, or gas) of the release of a fluid stream as it enters the atmosphere from a circular breach in a pipe or vessel wall. The model also computes the amount of vapor and aerosol produced and the rate at which liquid reaches the ground.

Required Data

(a) Composition of the fluid
(b) Temperature and pressure of the fluid just prior to the time of the breach
(c) Normal flow rate of fluid into the vessel or in the pipe
(d) Size of the pipe and/or vessel
(e) Length of pipe
(f) Area of the breach
(g) Angle of release relative to horizontal
(h) Elevation of release point above grade

Methodology

Step 1: Calculation of Initial Flow Conditions

The initial conditions (before the breach occurs) in the piping and/or vessel are determined from the input data, coupled with a calculation to determine the initial pressure profile in the piping. The pressure profile is computed by dividing the pipe into small incremental lengths and computing the flow conditions stepwise from the vessel to the breach point. As the flow conditions are computed, the time required for a sonic wave to traverse each section is also computed. The flow in any length increment can be all vapor, all liquid, or two-phase (this implies that the sonic velocity within each section may vary). As flow conditions are computed in each length increment, checks are made to determine if the fluid velocity has exceeded the sonic velocity or if the pressure in the flow increment has reached atmospheric. If either condition has been reached, an error code is generated and computations are stopped.

Step 2: Initial Unsteady State Flow Calculations

When a breach occurs in a system with piping, a disturbance in flow and pressure propagates from the breach point at the local sonic velocity of the fluid. During the time required for the disturbance to reach the upstream end of the piping, a period of highly unsteady flow occurs. The portion of the piping that has experienced the passage of the pressure disturbance is in accelerated flow, while the portion upstream of the disturbance is in the same flow regime as before the breach occurred.

To compute the flow rate from the breach during the initial unsteady flow period, a small time increment is selected and the distance that the pressure disturbance has moved in that time increment is computed using the sonic velocity profile found in the initial pressure profile calculation. The disturbed length is subdivided into small increments for use in an iterative pressure balance calculation. A pressure balance is achieved when a breach pressure is found that balances the flow from the breach and the flow in the disturbed section of piping. Another time increment is added, and the iterative procedure continues. The unsteady period continues until the pressure disturbance reaches the upstream end of the pipe.

Step 3: Long-Term Unsteady State Flow Calculations

The long-term unsteady state flow calculations are characterized by flow in the piping system that is changing more slowly than during the initial unsteady state calculations. The length of accelerated flow in the piping is constant, set by the user input pipe length. The vessel contents are being depleted, resulting in a potential lowering of pressure in the vessel. As with the other flow calculations, the time is incremented and the vessel conditions are computed. The new vessel conditions serve as input for the pressure drop calculations in the pipe. When a breach pressure is computed that balances the breach flow with the flow in the piping, a solution for that time is achieved. The solution continues until the ending time or other ending conditions are reached.

The frictional losses in the piping system are computed using the equation:

$$h = \left(\frac{4 \cdot f \cdot L \cdot U_{ls}^2}{2 \cdot g_c \cdot D_e} \right) \tag{1}$$

where: h = head (pressure) loss, ft of fluid
f = friction factor
L = length of system, ft
U = average flowing velocity, ft/sec
g_c = gravitational constant, 32.2 $lb_m \cdot ft/(lb_f \cdot sec^2)$
D_e = equivalent diameter of duct, ft

The friction factor is computed using the following equation:

$$\frac{1}{\sqrt{f}} = 1.74 - 2.0 \cdot \log_{10}\left[\frac{2 \cdot \varepsilon}{D_e} + \frac{18.7}{Re \cdot \sqrt{f}} \right] \tag{2}$$

where: ε = pipe roughness, ft
Re = Reynolds number, $D_e \cdot U \cdot \rho / \mu$, dimensionless
ρ = fluid density, lb/ft^3
μ = fluid viscosity, $lb/(ft \cdot sec)$

Equations (1) and (2) are used for liquid, vapor, and two-phase flow regimes. Since the piping is subdivided into small lengths, changes in velocity and physical properties across each segment are assumed to be negligible. At each step in the calculation, a check is made to determine if the fluid velocity has reached or exceeded the computed critical (sonic) velocity for the fluid. If the critical velocity has been exceeded, the velocity is constrained to the critical velocity and the maximum mass flow rate in the piping has been set.

If the fluid in the piping is in two-phase flow, the Lockhart and Martinelli [1949] modification to Equation (1) is used. The Lockhart and Martinelli equation for head loss is shown below:

$$h_{TP} = \Phi^2 \cdot \left(\frac{4 \cdot f \cdot L \cdot U_{ls}^2}{2 \cdot g_c \cdot D_e} \right) \tag{3}$$

where: h_{TP} = head loss for two-phase flow, ft of fluid
Φ = empirical parameter correlating single- and two-phase flow, dimensionless
U_{ls} = superficial liquid velocity (velocity of liquid if liquid filled the pipe), ft/sec

This equation is valid over short distances where the flowing velocity does not change appreciably.

Validation

Validation of fluid flow models is difficult since little data are available for comparison. Fletcher [1983] presented a set of data for flashing CFC-11 flowing through orifices and piping. Figures E-1 through E-4 compare calculations made using the Fluid Release Model with the data presented by Fletcher. Figure E-1 compares fluid fluxes for orifice type releases. These releases had length-to-diameter (L/D) ratios less than 0.88. Figure E-2 compares computed and experimental release fluxes for an L/D ratio of 120 at several levels of storage pressure. Figure E-3 compares similar releases for an L/D of 37.5. Figure E-4 shows predicted and experimental release fluxes at a given pressure for L/D ratios from 1 to 200.

Figures E-5 and E-6 compare computed and experimental gas discharge rates for the complete breach of two pipes. One pipe had an internal diameter of 6.2 inches (0.157 m); the other had a diameter of 12 inches (0.305 m). These pipes were initially pressurized to 1,000 psia with air and then explosively ruptured. The experimental values were reported in a research paper for Alberta Environment, authored by Wilson [1981].

Aerosols and Liquid Droplet Evaporation

Liquids stored at temperatures above their atmospheric pressure boiling point (superheated liquids) will give off vapor when released from storage. If the temperature of storage is sufficiently above the normal boiling point, the energy of the released vapor will break the liquid stream into small droplets. If these droplets are small enough, they will not settle, but remain in the vapor stream as aerosol droplets. The presence of aerosol droplets in the vapor stream changes its apparent density and provides an additional source of vapor. Droplets large enough to fall to the ground will lose mass due to evaporation during their fall.

The prediction of aerosol formation and amount of aerosol formed is based on the theoretical work performed for the Center for Chemical Process Safety (CCPS) by CREARE. CREARE's work has been extended and corrected by Quest. The extension to the model computes the non-aerosol drop evaporation. In Figure E-7, the four experimental data sets available for comparison (chlorine (Cl_2), methylamine (MMA), CFC-11, and cyclohexane) are compared to the values computed by the CANARY Aerosol Model.

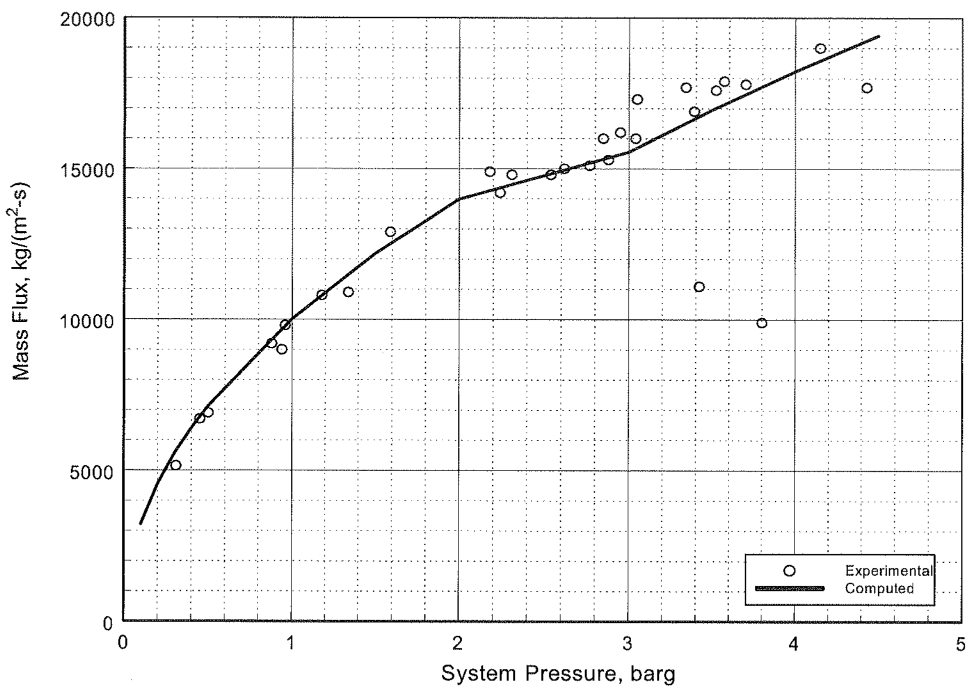

Figure E-1
Comparison of CFC-11 Orifice Releases as a Function of System Pressure

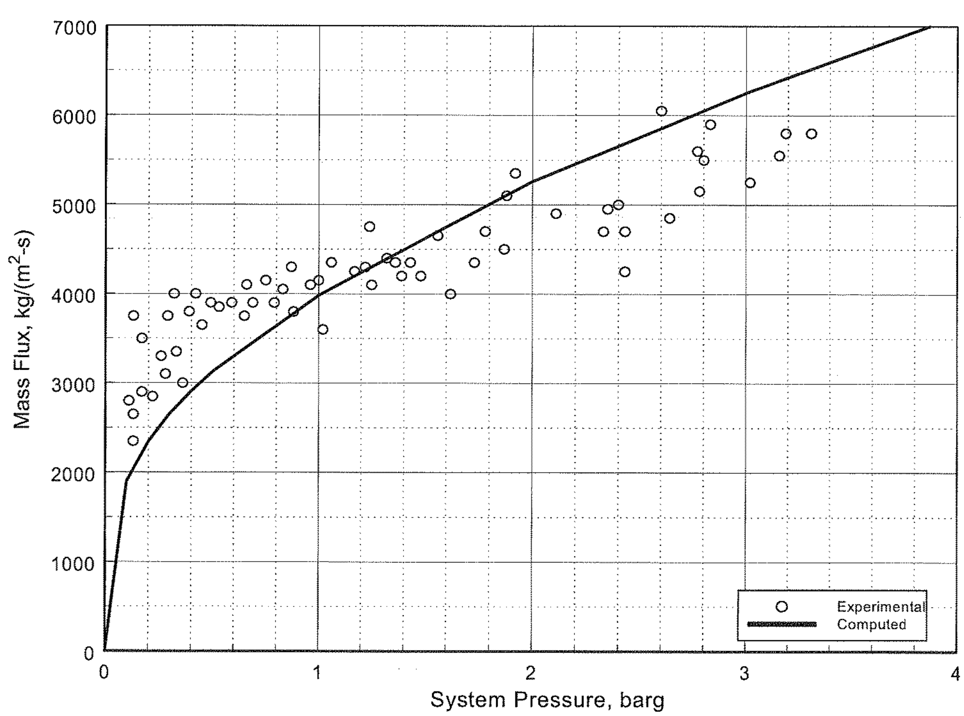

Figure E-2
CFC-11 Release Rate Comparison with L/D of 120

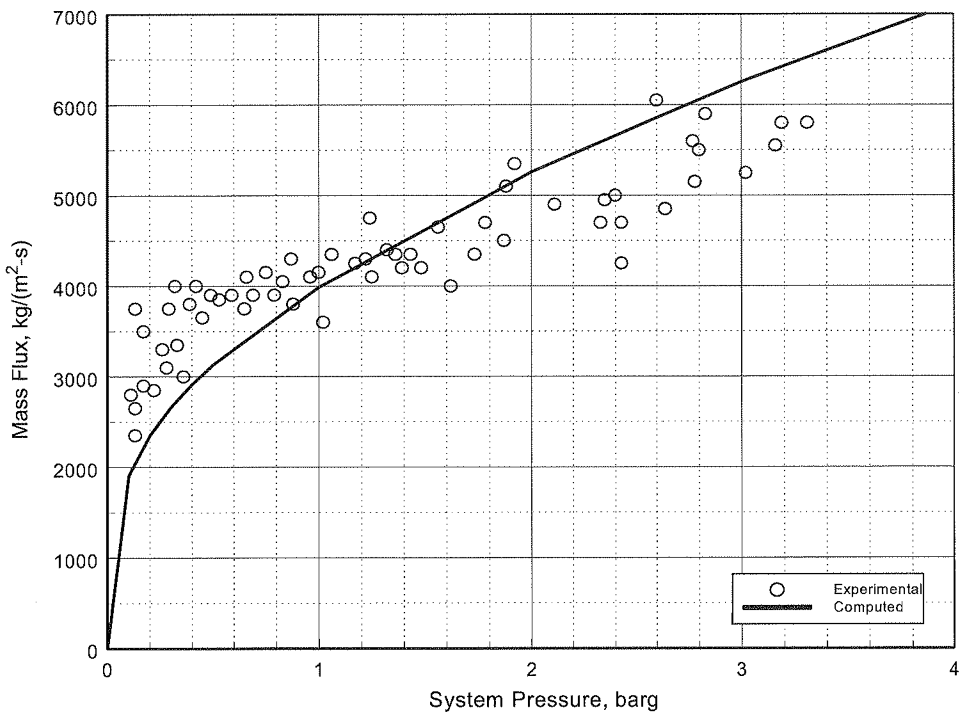

Figure E-3
CFC-11 Release Rate Comparison with L/D of 37.5

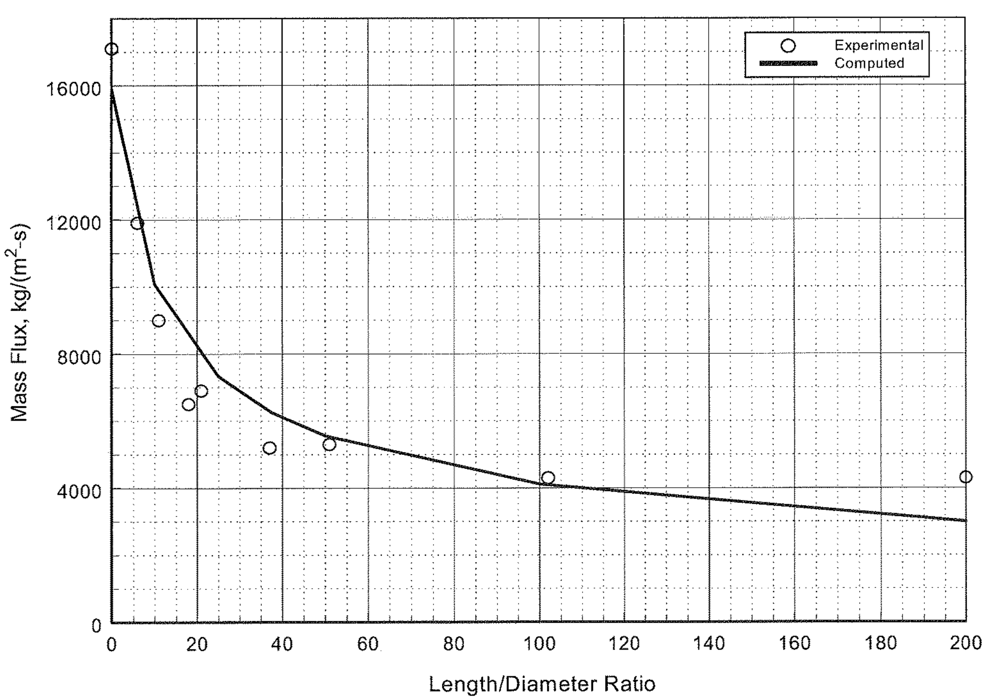

Figure E-4
CFC-11 Release Rate Comparison at Varying L/D Ratios

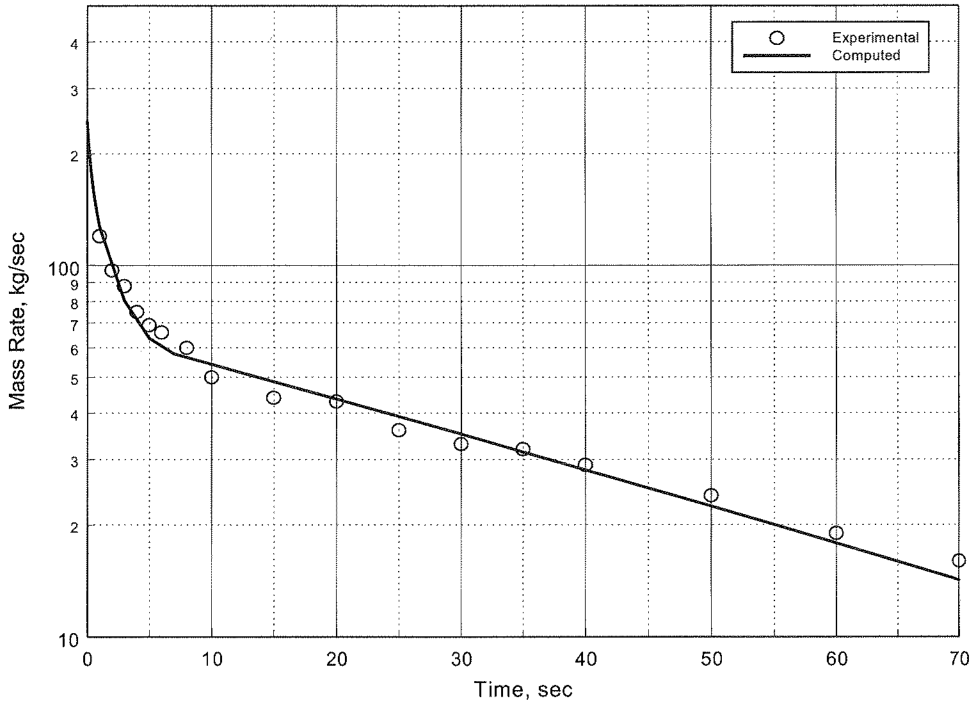

Figure E-5
Air Discharge Rates for 0.157 m Diameter Piping

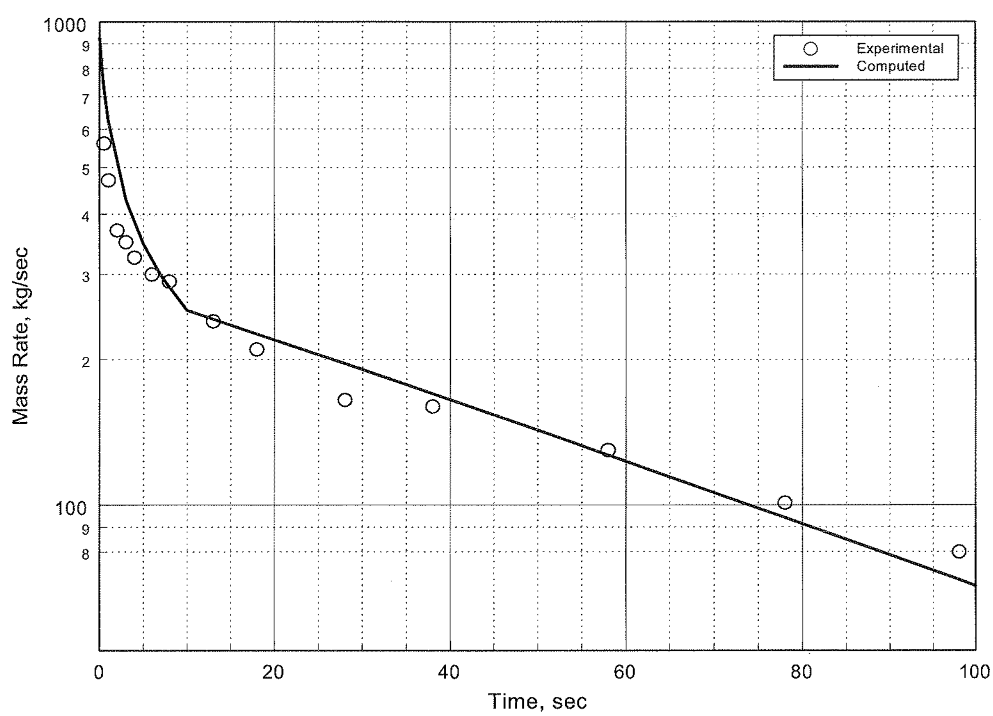

Figure E-6
Air Discharge Rates for 0.305 m Diameter Piping

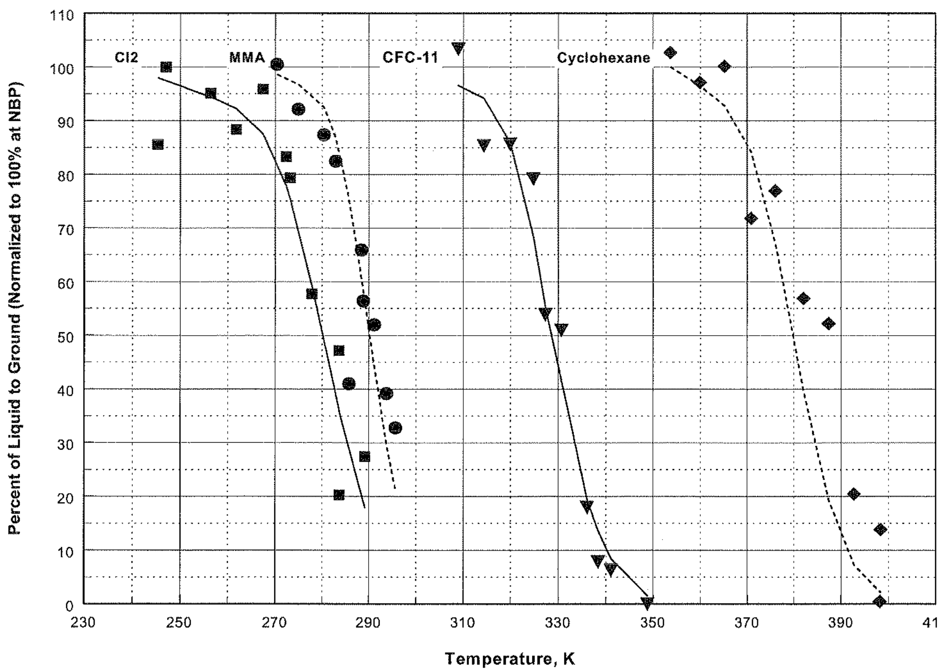

Figure E-7
Aerosol Formation as a Function of Storage Temperature

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Lockhart, R. W., and R. C. Martinelli, "Proposed Correlation of Data for Isothermal Two-Phase, Two-Component Flow in Pipes." Chemical Engineering Progress, Vol. 45, 1949: p. 39.

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Momentum Jet Dispersion Model

Purpose

The purpose of this model is to predict the dispersion of a jet release into ambient air. It is used to predict the downwind travel of a flammable or toxic gas or aerosol momentum jet release.

Required Data

(a) Composition and properties of the released material
(b) Temperature of released material
(c) Release rate of material
(d) Vertical release angle relative to wind direction
(e) Height of release
(f) Release area
(g) Ambient wind speed
(h) Ambient Pasquill-Gifford stability class
(i) Ambient temperature
(j) Relative humidity
(k) Surface roughness scale

Methodology

Step 1: An assumption is made that flow perpendicular to the main flow in the plume is negligible, that the velocity and concentration profiles in the jet are similar at all sections of the jet, that molecular transport in the jet is negligible, and that longitudinal turbulent transport is negligible when compared to longitudinal convective transport. The coordinate system is then defined in s and r, where s is the path length of the plume and r is the radial distance from the plume centerline. The angle between the plume axis and horizontal is referred to as θ. Relationships between the downwind coordinate, x, vertical coordinate, y, and plume axis are given simply by:

$$\frac{dx}{ds} = \cos(\theta) \tag{1}$$

and

$$\frac{dy}{ds} = \sin(\theta) \tag{2}$$

Step 2: Velocity, concentration, and density profiles are assumed to be cylindrically symmetric about the plume axis and are assumed to be Gaussian in shape. The three profiles are taken as:

$$u(s,r,\theta) = U_a \cdot \cos(\theta) + u^*(s) \cdot e^{\frac{-r^2}{b^2(s)}} \tag{3}$$

where: u = plume velocity, m/s
U_a = ambient wind speed, m/s
u^* = plume velocity relative to the wind in the downwind direction at the plume axis, m/s
$b(s)$ = characteristic width of the plume at distance s from the release, m

$$\rho(s,r,\theta) = \rho_a + \rho^*(s) \cdot e^{\frac{-r^2}{\lambda^2 \cdot b^2(s)}} \tag{4}$$

where: ρ = plume density, kg/m^3
ρ_a = density of ambient air, kg/m^3
$\rho^*(s)$ = density difference between plume axis and ambient air, kg/m^3
λ^2 = turbulent Schmidt number, 1.35

$$c(s,r,\theta) = c^*(s) \cdot e^{\frac{-r^2}{\lambda^2 \cdot b^2(s)}} \tag{5}$$

where: c = pollutant concentration in the plume, kg/m^3
$c^*(s)$ = pollutant concentration at plume centerline, kg/m^3

Step 3: The equation for air entrainment into the plume and the conservation equations can then be solved. The equation for air entrainment is:

$$\frac{d}{ds}\left(\int_0^{b\sqrt{2}} \rho \cdot u \cdot 2 \cdot \pi \cdot dr\right) \tag{6}$$
$$= 2 \cdot \pi \cdot b \cdot \rho_a \cdot \left\{\alpha_1 \cdot |u^*(s)| + \alpha_2 \cdot U_a \cdot |\sin(\theta)| \cos(\theta) + \alpha_3 \cdot u'\right\}$$

where: α_1 = entrainment coefficient for a free jet, 0.057
α_2 = entrainment coefficient for a line thermal, 0.5
α_3 = entrainment coefficient due to turbulence, 1.0
u' = turbulent entrainment velocity (root mean square of the wind velocity fluctuation is used for this number), m/s

Step 4: The equations of conservation of mass, momentum, and energy are given as:

$$\frac{d}{ds}\left(\int_0^{b\sqrt{2}} c \cdot u \cdot 2 \cdot \pi \cdot dr\right) = 0 \tag{7}$$

$$\frac{d}{ds}\left(\int_0^{b\sqrt{2}} \left(\rho \cdot u^2 \cdot \cos(\theta) \cdot 2 \cdot \pi \cdot dr\right)\right) \tag{8}$$
$$= 2 \cdot \pi \cdot b \cdot \rho_a \cdot \left\{\alpha_1 \cdot \left|u^*(s)\right| + \alpha_2 \cdot U_a \cdot \left|\sin(\theta)\right| \cdot \cos(\theta) + \alpha_3 \cdot u'\right\}$$
$$+ C_d \cdot \pi \cdot b \cdot \rho_a \cdot U_a^2 \left|\sin(\theta)\right|$$

$$\frac{d}{ds}\left(\int_0^{b\sqrt{2}} \rho \cdot u^2 \cdot \cos(\theta) \cdot 2 \cdot \pi \cdot dr\right) \tag{9}$$
$$= \int_0^{b\sqrt{2}} g \cdot (\rho_a - \rho)\, \pi \cdot r \cdot dr \pm C_d \cdot \pi \cdot b \cdot \rho_a \cdot U_a^2 \cdot \sin(\theta) \cdot \cos(\theta)$$

$$\frac{d}{ds}\left(\int_0^{b\sqrt{2}} \rho \cdot u \left(\frac{1}{\rho} - \frac{1}{\rho_{a0}}\right) \cdot 2 \cdot \pi \cdot r \cdot dr\right) \tag{10}$$
$$= \rho_a \cdot 2 \cdot \pi \cdot b \left(\frac{1}{\rho_a} - \frac{1}{\rho_{a0}}\right) \cdot \left\{\alpha_1 \cdot |u^*(s)| + \alpha_2 \cdot U_a \ \sin(\theta)\, | \cdot \cos(\theta) + \alpha_3 \cdot \acute{u}\right\}$$

The subscript 0 refers to conditions at the point of release. These equations are integrated along the path of the plume to yield the concentration profiles as a function of elevation and distance downwind of the release.

Step 5: After the steady-state equations are solved, an along-wind dispersion correction is applied to account for short-duration releases. This is accomplished using the method outlined by Palazzi, et al. [1982].

Step 6: If the plume reaches the ground, it is coupled to the Heavy Gas Dispersion Model (described in Section G) and the dispersion calculations continue.

Validation

The Momentum Jet Dispersion Model used in CANARY was validated by comparing results obtained from the model with experimental data from field tests. Data used for this comparison and the conditions used in the model were taken from an American Petroleum Institute (API) study [Hanna, Strimaitis, and Chang, 1991]. For this model, comparisons were made with the Desert Tortoise, Goldfish, and Prairie Grass series of dispersion tests. Results of these comparisons are shown in Figure F-1.

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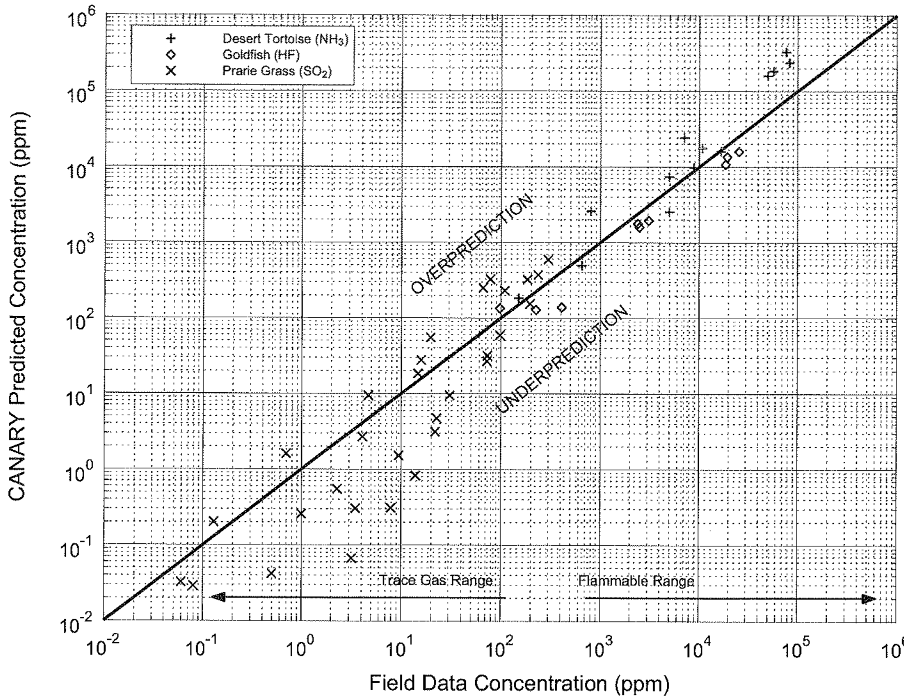

Figure F-1

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Heavy Gas Dispersion Model

Purpose

The purpose of this model is to predict the dispersion and gravity flow of a heavy gas released into the air from liquid pools or instantaneous gas releases. It is used to predict the downwind travel of a flammable or toxic vapor cloud.

Required Data

(a) Composition and properties of the released material
(b) Temperature of released material
(c) Vapor generation rate
(d) Vapor source area
(e) Vapor source duration
(f) Ambient wind speed
(g) Ambient Pasquill-Gifford atmospheric stability class
(h) Ambient temperature
(i) Relative humidity
(j) Surface roughness scale

Methodology

Step 1: For a steady-state plume, released from a stationary source, the Heavy Gas Dispersion Model solves the following equations:

$$\frac{d}{dx}\left(\rho \cdot U \cdot B \cdot h \cdot m\right) = \rho_s \cdot W_s \cdot B_s \tag{1}$$

$$\frac{d}{dx}\left(\rho \cdot U \cdot B \cdot h\right) = \rho_a \cdot \left(V_e \cdot h + W_e \cdot B\right) + \rho_s \cdot W_s \cdot B_s \tag{2}$$

$$\frac{d}{dx}\left(\rho \cdot U \cdot B \cdot h \cdot C_p \cdot T\right) = \rho_a \cdot \left(V_e \cdot h + W_e \cdot B\right) \cdot C_{pa} \cdot T_a + \rho_s \cdot W_s \cdot B_s \cdot C_{ps} \cdot T_s + f_t \tag{3}$$

$$\frac{d}{dx}\left(\rho \cdot U \cdot B \cdot h \cdot U\right) = -0.5 \cdot \alpha_g \cdot g \cdot \frac{d}{dx}\left[\left(\rho - \rho_a\right) \cdot B \cdot h^2\right] + \rho_a \cdot \left(V_e \cdot h + W_e \cdot B\right) \cdot U_a + f_u \tag{4}$$

$$\frac{d}{dx}\left(\rho \cdot U \cdot B \cdot h \cdot V_g\right) = g \cdot \left(\rho - \rho_a\right) \cdot h^2 + f_{vg} \tag{5}$$

$$U \cdot \frac{dZ_c}{dx} = -V_g \cdot \frac{Z_c}{B} \tag{6}$$

$$U \cdot \frac{dB}{dx} = \frac{\rho_a}{\rho} \cdot V_e + V_g \tag{7}$$

$$\rho \cdot T = \frac{\rho_a \cdot T_a \cdot M_s}{\left[M_s + \left(M_a - M_s\right) \cdot m\right]} \tag{8}$$

where:
x = downwind distance, m
ρ = density, kg/m^3
U = velocity in the direction of the wind, m/s
B = cloud width parameter, m
h = cloud height parameter, m
m = mass fraction of source gas
T = temperature, K
C_p = specific heat, J/(kg • K)
f_t = ground heat flux, J/(m•s)
f_u = downwind friction term, kg/s^2
f_v = crosswind friction term, kg/s^2
V_e = horizontal entrainment rate, m/s
V_g = horizontal crosswind gravity flow velocity, m/s
W_e = vertical entrainment rate, m/s
W_s = vertical source gas injection velocity, m/s
M = molecular weight, kg/kmole
s = refers to source properties
a = refers to ambient properties

The first six equations are crosswind-averaged conservation equations. Equation (7) is the width equation, and Equation (8) is the equation of state.

Step 2: All of the gas cloud properties are crosswind averaged. The three-dimensional concentration distribution is calculated from the average mass concentration by assuming the following concentration profile:

$$C(x,y,z) = C(x) \cdot C_1(y) \cdot C_2(z) \tag{9}$$

$$C(x) = \frac{M_a \cdot m(x)}{M_s + \left(M_a - M_s\right) \cdot m(x)} \tag{10}$$

$$C_1(y) = \frac{1}{4 \cdot b} \cdot \left\{ erf\left(\frac{y+b}{2 \cdot \beta}\right) - erf\left(\frac{y-b}{2 \cdot \beta}\right) \right\} \tag{11}$$

$$B^2 = b^2 + 3 \cdot \beta^2 \tag{12}$$

$$C_2(z) = \left(\frac{6}{\pi}\right)^{1/2} \cdot \frac{1}{h} \cdot \exp\left(\frac{-3 \cdot z^2}{2 \cdot h^2}\right) \tag{13}$$

where: $C(x,y,z)$ = concentration in plume at $x, y, z,$ kg/m^3
y = crosswind coordinate, m
z = vertical coordinate, m
b, B, β = half-width parameters, m

Step 3: As there are now two parameters used to define $C_1(y)$, the following equation is needed to calculate b:

$$U \cdot \left(\frac{db}{dx}\right) = V_g \cdot \frac{b}{B} \tag{14}$$

Step 4: The vertical entrainment rate is defined to be:

$$W_e = \frac{\sqrt{3} \cdot a \cdot k \cdot U_* \cdot \delta\left(\frac{h}{H}\right)}{\Phi_h\left(\frac{h}{L}\right)} \tag{15}$$

where: a = constant, 1.5
k = constant, 0.41
U_* = friction velocity, m/s
L = Monin-Obukhov length derived from the atmospheric stability class

Step 5: The profile function δ is used to account for the height of the mixing layer, H, and to restrict the growth of the cloud height to that of the mixing layer. H is a function of stability class and is defined as:

$$\delta\left(\frac{h}{H}\right) = 1 - \frac{h}{H} \tag{16}$$

The Monin-Obukhov function, Φ_h, is defined by:

$$\Phi_h\left(\frac{h}{L}\right) = \begin{cases} 1 + 5 \cdot \dfrac{h}{L} & L \geq 0 \text{ (stable)} \\ \left[1 - 16 \cdot \dfrac{h}{L}\right]^{-1/2} & L < 0 \text{ (unstable)} \end{cases} \tag{17}$$

Step 6: After the steady-state equations are solved, an along-wind dispersion correction is applied to account for short-duration releases. This is accomplished using the method outlined by Palazzi, et al. [1982].

Validation

The Heavy Gas Dispersion Model used in CANARY was validated by comparing results obtained from the model with experimental data from field tests. Data used for this comparison and the conditions used in the model were taken from an American Petroleum Institute (API) study [Hanna, Strimaitis, and Chang, 1991]. For this model, comparisons were made with the Burro, Maplin Sands, and Coyote series of dispersion tests. Results of these comparisons are shown in Figure G-1.

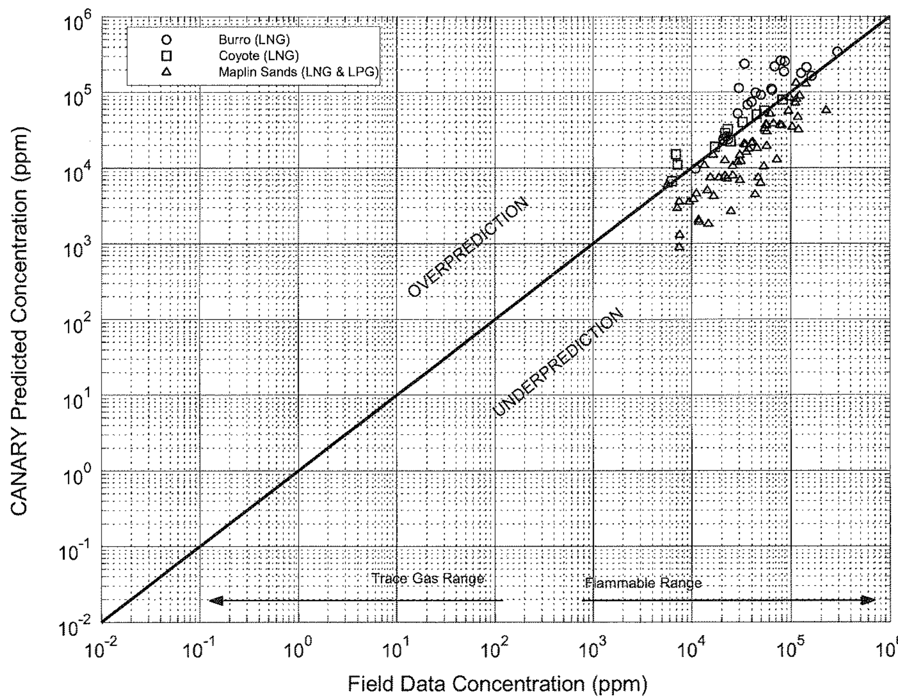

Figure G-1

References

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Vapor Cloud Explosion Model

Purpose

The purpose of this model is to predict the overpressure field that would be produced by the explosion of a partially confined and/or obstructed fuel-air cloud, based on the Baker-Strehlow methodology. Specifically, the model predicts the magnitude of the peak side-on overpressure and specific impulse as a function of distance from the source of the explosion.

Required Data

(a) Composition of the fuel (flammable fluid) involved in the explosion
(b) Total mass of fuel in the flammable cloud at the time of ignition or the volume of the partially-confined/obstructed area
(c) Fuel reactivity (high, medium, or low)
(d) Obstacle density (high, medium, or low)
(e) Flame expansion (1-D, 2-D, 2½-D, or 3-D)
(f) Reflection factor

Methodology

Step 1: The combustion energy of the cloud is estimated by multiplying its mass by the heat of combustion. If the volume of the flammable cloud is input, the mass is estimated by assuming that a stoichiometric mixture of gas and air exists within that volume.

Step 2: The combustion energy is multiplied by the reflection factor to account for blast reflection from the ground or surrounding objects.

Step 3: Flame speed is determined from the fuel reactivity, obstacle density, and flame expansion parameters, as presented in Baker, et al. [1994, 1998].

Fuel reactivity and obstacle density each have low, medium, and high choices. The flame expansion parameter allows choices of 1-D, 2-D, 2.5-D, and 3-D. The choices for these three parameters create a matrix of 36 possibilities, thus allowing locations that have differing levels of congestion or confinement to produce different overpressures. Each matrix possibility corresponds to a flame speed, and thus a peak (source) overpressure. The meanings of the three parameters and their options are:

Fuel Reactivity (High, Medium, or Low). The fuels considered to have high reactivity are acetylene, ethylene oxide, propylene oxide, and hydrogen. Low reactivity fuels are (pure) methane and carbon monoxide. All other fuels are medium reactivity. If fuels from different reactivity categories are mixed, the model recommends using the higher category unless the amount of higher reactivity fuel is less than 2% of the mixture.

Obstacle Density (High, Medium, or Low). High obstacle density is encountered when objects in the flame's path are closely spaced. This is defined as multiple layers of obstruction resulting in at least a 40% blockage ratio (i.e., 40% of the volume is occupied by obstacles). Low density areas are defined as having a blockage ratio of less than 10%. All other blockage ratios fall into the medium category.

Flame Expansion (1-D, 2-D, 2.5-D, or 3-D). The expansion of the flame front must be characterized with one of these four descriptors. 1-D expansion is likened to an explosion in a pipe or hallway. 2-D expansion can be described as what occurs between flat, parallel surfaces. An unconfined (hemispherical expansion) case is described as 3-D. The additional descriptor of 2.5-D is used for situations that begin as 2-D and quickly transition to 3-D.

Step 4: Based on the calculated flame speed, appropriate blast curves are selected from the figures in Baker, et al., 1994. For flame speeds not shown on the graph, appropriate curves are prepared by interpolation between existing curves.

Step 5: The Sachs scaled distance, $\overline{R}$, is calculated for several distances using the equation:

$$\overline{R} = \frac{R}{\left(\dfrac{E}{P_0}\right)^{1/3}}$$

where: R = distance from the center of the explosion
E = total energy calculated in step 2, above
P_0 = atmospheric pressure

Step 6: The peak side-on overpressure and specific impulse at each scaled distance are determined from the blast curves in Baker, et al., 1994.

References

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APPENDIX E

Noise Analysis

Navcon Engineering Report No. 71838a, Chevron El Segundo Refinery

Product Reliability and Optimization (PRO) Project

California Environmental Quality Act (CEQA) Noise Impact Assessment

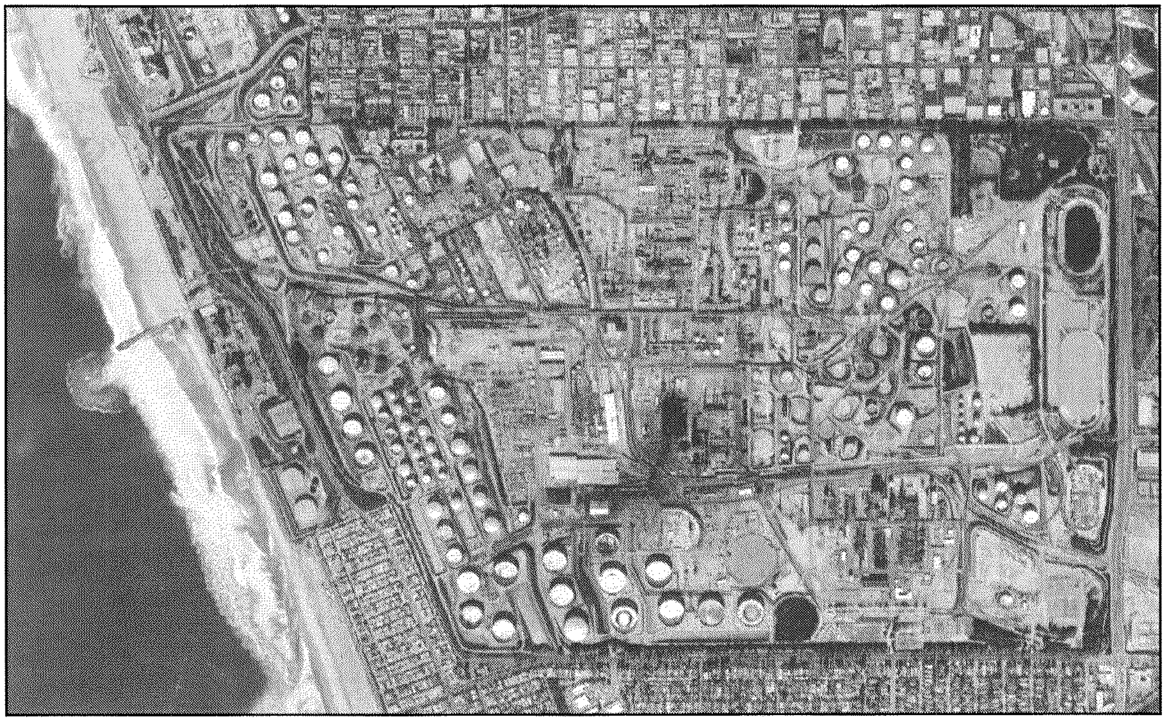

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Table of Contents

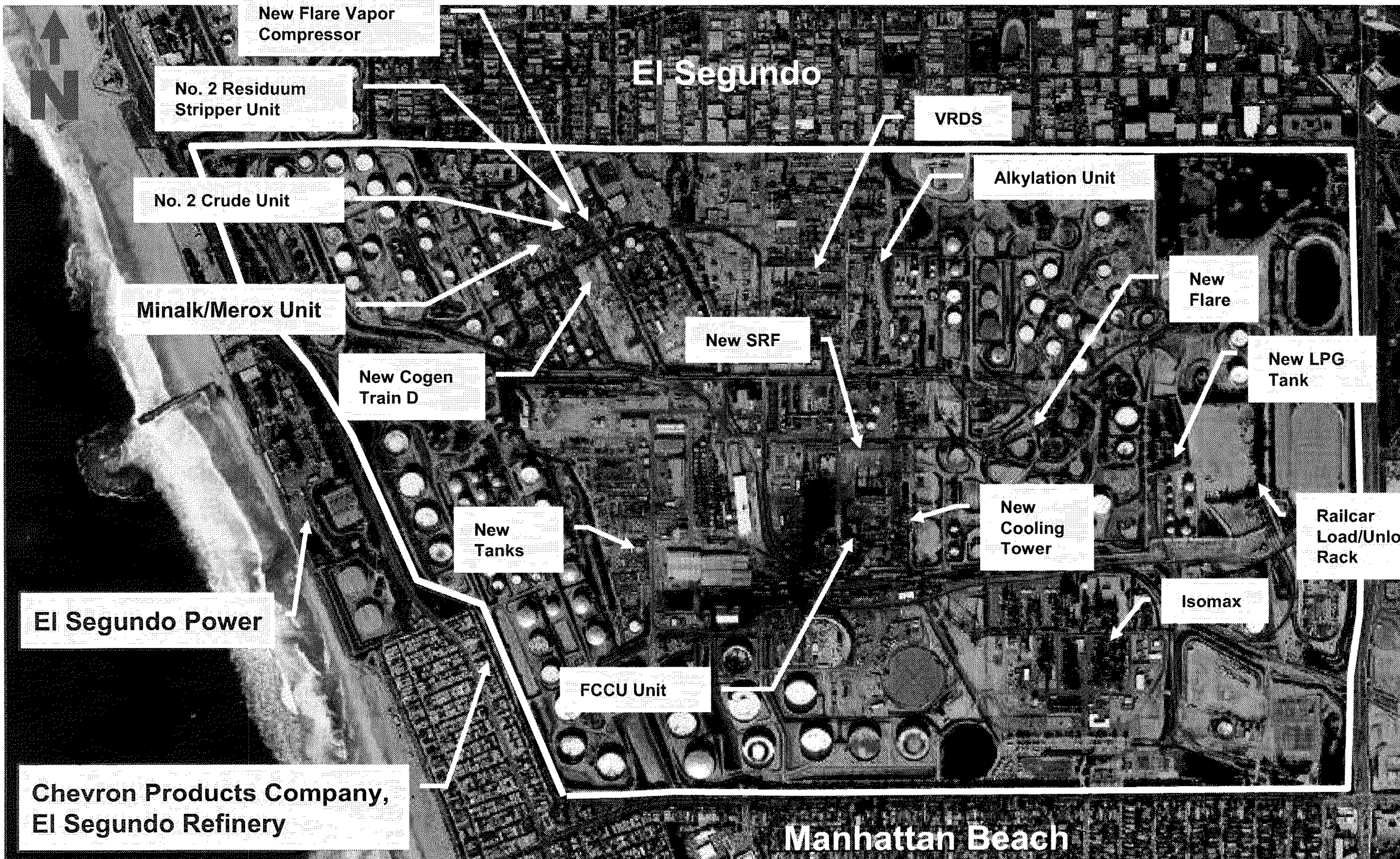
I. Administrative Information

- Project Location: Chevron Product Company, El Segundo Refinery
  324 West El Segundo Blvd., El Segundo, CA, 90245
- Project Name: Product Reliability and Optimization Project (PRO)
- Navcon Job No.: 71838, Chevron PRO Project Noise Study
- Navcon Engineers: Jim Steedman & Hans Forschner
- Service Contract: Chevron Contract 99001412, DRES 4676668

II. Chevron Product Reliability and Optimization Project (PRO) Description

- Chevron Products Company is proposing modifications and additions to its El Segundo Refinery. The purpose of these modifications and additions is to increase the reliability and capacity of specific existing Refinery processing equipment.
- The Chevron Refinery property is bounded by the City of El Segundo to the North and the City of Manhattan Beach to the South. Residential communities are located to the North (El Segundo) and to the South-West and South (Manhattan Beach). Commercial areas are located to the North-East & East (El Segundo). El Segundo Power is located to the South-West. Refer to ***Aerial Photo 1***.

Aerial Photo 1, Site Plan with Principal Project Component Locations



III. Introduction

- This report summarizes the results of the Chevron PRO Project, *California Environmental Quality Act* (CEQA) Noise Impact Assessment.
- The principal objective was to asses the potential noise impact from the PRO Project in terms of CEQA Guidelines (refer to ***Section IV***).
- The principal tasks included: (**1**) an environmental noise survey to document current noise levels at the perimeter of the refinery (refer to ***Section V***), (**2**) the development of a three dimensional analytical noise model and prediction of the PRO Project noise levels (refer to ***Section VI***), and (**3**) the assessment of the PRO Project noise impact in terms of the Draft Los Angeles CEQA Thresholds Guidelines (refer to ***Section VII***).
- The noise study was conducted by Hans Forschner and Jim Steedman of Navcon Engineering.

IV. Noise Impact Assessment Methodology

- The Chevron PRO noise assessment was made following standard methods and procedures accepted by the Air Quality Management District (AQMD). The noise impact is determined based upon net changes in the Community Noise Exposure Level (CNEL) due to the proposed project.
- The standard methods and procedures group noise-sensitive land uses and set ambient noise level limits according to the land use compatibility shown in ***Table 1***. The ambient noise levels are considered to be normally/conditionally acceptable, normally unacceptable, or clearly unacceptable based upon the CNEL.
- A project is considered to pose a significant impact on the community noise, if the operations cause the ambient noise level at the property line to either:
  - increase the CNEL by 5 dBA or more; or
  - increase the CNEL by 3 dBA and rise into either the normally unacceptable or clearly unacceptable category

Table 1: Land Use Compatibility Categories & Noise Levels

Land Use	Ambient Community Noise Exposure Level (dBA CNEL)		
	Normally/Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Single-family, duplex, mobile homes, multi-family homes	50 - 70	70 - 75	Above 70
Schools, libraries, churches, hospitals, nursing homes, motels, hotels	50 - 70	70 - 80	Above 80
Auditoriums, concert halls, amphitheatres	50 - 70	(1)	Above 65
Sports arenas, outdoor spectator sports	50 - 75	(1)	Above 70
Playgrounds, neighborhood parks	50 - 70	67 - 75	Above 72
Golf courses, riding stables, water recreation, cemeteries	50 - 75	70 - 80	Above 80
Office buildings, business and professional commercial	50 - 77	Above 75	(1)
Industrial, manufacturing, utilities, and agriculture	50 - 80	Above 75	(1)

(1) No values identified.

V. *Environmental Noise Survey*

- Navcon conducted an environmental noise survey on October 5 - 9, 2007. The principal objective was to document the current ambient noise level at the refinery property line for the CEQA noise assessment.
- Five noise monitoring stations were used during the survey. They were located along the South, West & North perimeters of the refinery as shown in ***Aerial Photo 2***.
- Noise Monitoring Terminals (NMT) #1, #2 & #3 are transportable systems based upon Larson Davis Model 824 & 831 sound level analyzers.
  - *NMT #1* was located on the South-West berm close to Chevron Gate 22 as shown in ***Aerial Photo 2 & Photo Set 1***.
  - *NMT #2* was located on the West property line by Crest Drive & 45^{th} Street, Manhattan Beach as shown in ***Aerial Photo 2 & Photo Set 2***.
  - *NMT #3* was located on the North property line close to the Administration Building as shown in ***Aerial Photo 2 and Photo Set 3***.

V. *Environmental Noise Survey (cont'd)*

- The refinery's Noise Monitoring & Early Warning System (NMEWS) microphones, NMEWS #1 & NMEWS #2, which have been in operation since 1990, were also used to document the current ambient noise environment (refer to ***Aerial Photo 2 and Photo Set 4***). The NMEWS monitors are based upon Bruel & Kjaer 4921 sound level meters interfaced to an Agilent Technologies VXI data acquisition system.
  - *NMEWS #1* is located on the South-Central side of the refinery, North of the Rosecrans berm.
  - *NMEWS #2* is located on the South-East side of the refinery, North of the Rosecrans berm by the electrical sub-station.

V. *Environmental Noise Survey (cont'd)*

- All five noise monitors used during the environmental noise survey meet the American National Standards Institute (ANSI) S1.4, 1983 specification for Type I (Precision) sound level meters. Each monitor is calibrated on an annual basis in accordance with the National Institute of Standards Technology (NIST). The system sensitivities were checked prior to and following the noise monitoring survey using a NIST traceable Bruel & Kjaer pistonphone, Model 4228.
- The noise monitors were time synchronized and configured to record one second energy equivalent levels (Leq), hourly averaged sound pressure levels (L50), and the statistical noise parameters (Ln).
- The ambient noise level was assessed in terms of the Community Noise Exposure Level (CNEL). The CNEL is the averaged daily noise level with a 5 dB weighting factor applied to the level measured between 7 PM and 10 PM and a 10 dB weighting factor applied to the level measured between 10 PM and 7 AM.
- The current ambient CNEL values are summarized in ***Table 2***.

Aerial Photo 2, Noise Monitoring Location Plan View

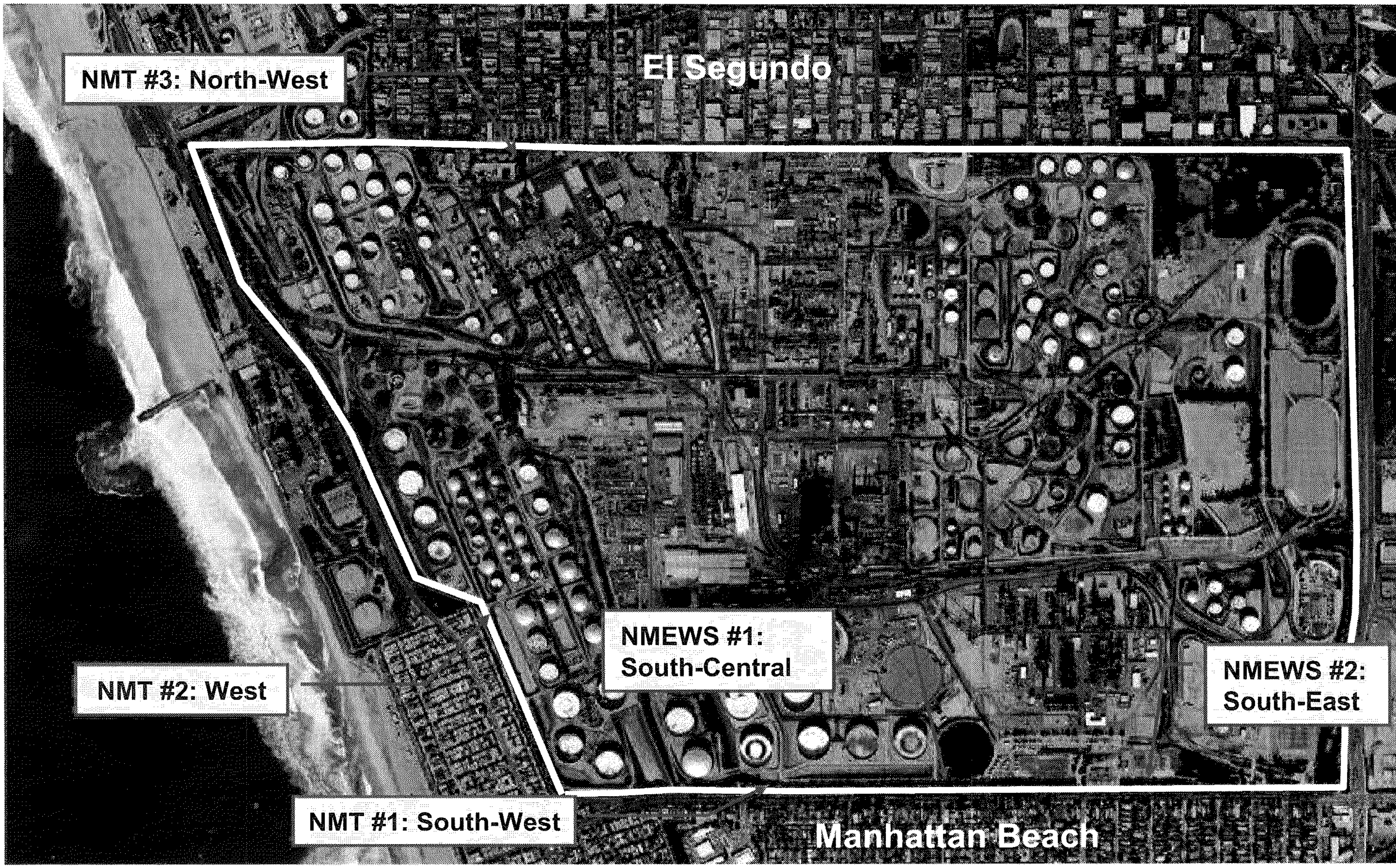
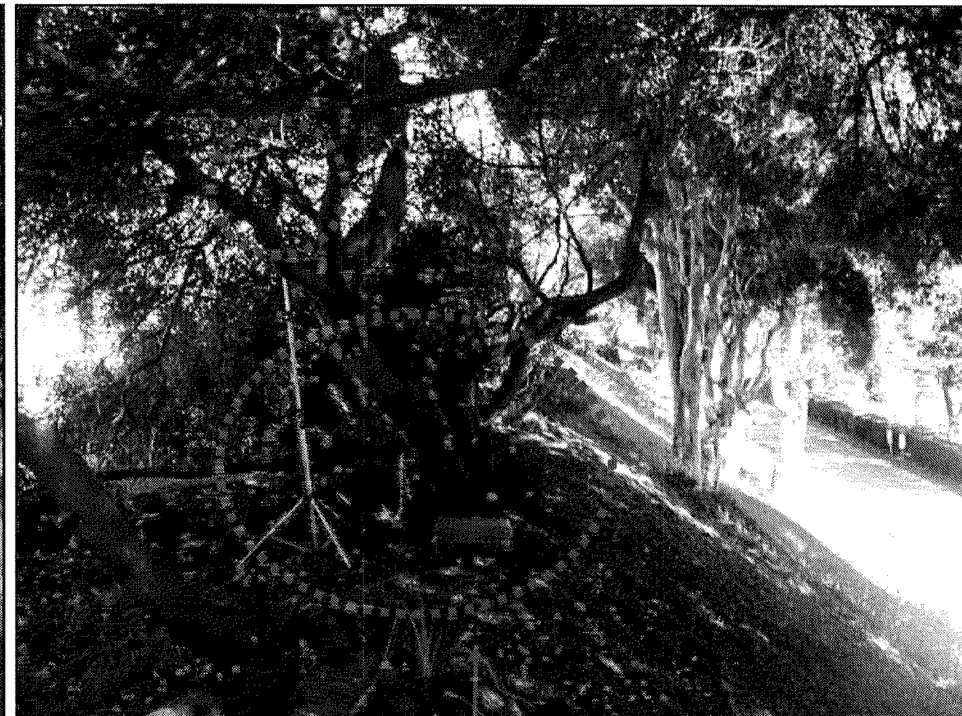


Photo Set 1, NMT #1 - South-West Property Line (Manhattan Beach)



NMT #1: Outdoor Microphone, Windscreen & Bird Spikes

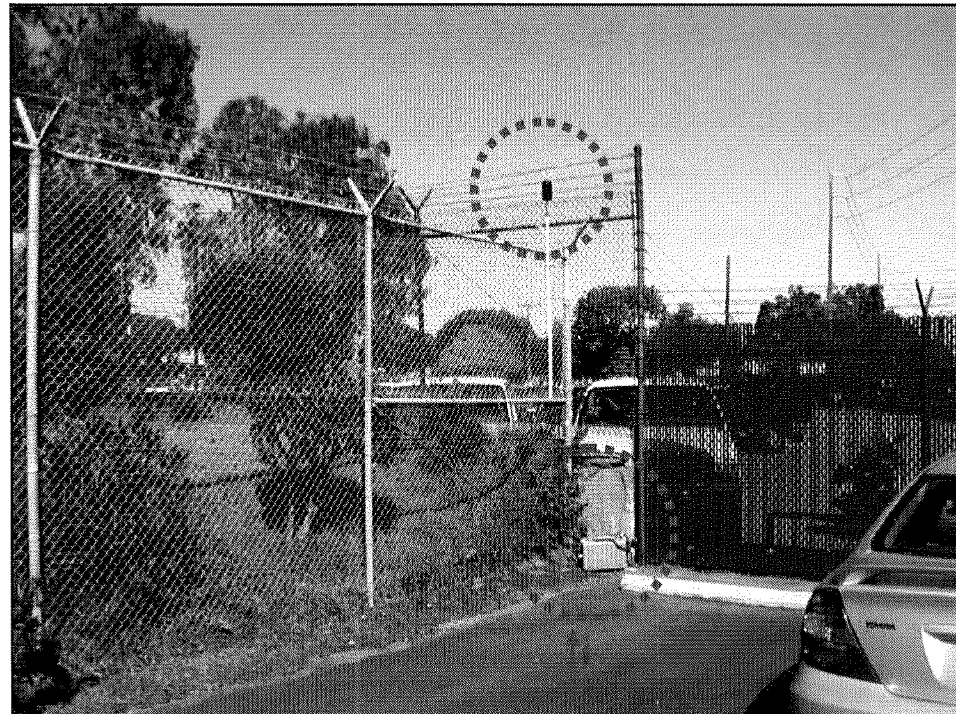
NMT #1: Environmental Enclosure with Sound Level Analyzer & Tripod

Photo Set 2, NMT #2 - West Property Line (Manhattan Beach)

NMT #2: Outdoor Microphone, Windscreen & Bird Spikes

NMT #2: Environmental Enclosure with Sound Level Analyzer & Tripod

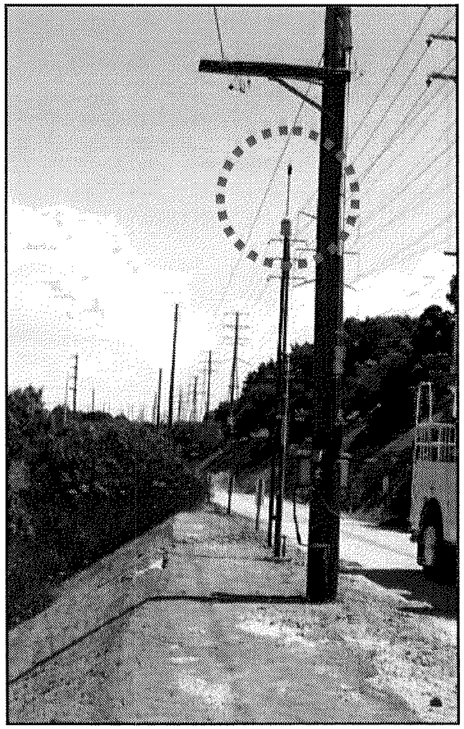
Photo Set 3, NMT #3 - North Property Line (El Segundo)



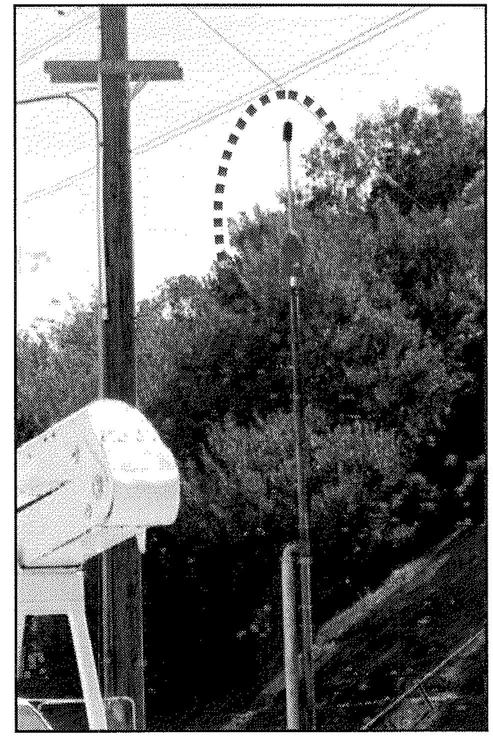
NMT #3: Outdoor Microphone, Windscreen & Bird Spikes

NMT #3: Environmental Enclosure with Sound Level Analyzer & Tripod

Photo 4, NMEWS #1 & NMEWS #2, South Property Line (Manhattan Beach)



NMEWS #1: South-Central
Property Line
Manhattan Beach



NMEWS #2: South-East
Property Line
Manhattan Beach

Table 2, CNEL – Current Ambient Noise Level

Date	NMT # 1 South-West Property Line	NMT # 2 West Property Line	NMT # 3 North-West Property Line	NMEWS # 1 South-Central Property Line	NMEWS # 2 South-East Property Line
5-Oct-07	63.7	61.9	68.7	68.0	63.8
6-Oct-07	64.2	61.7	68.8	69.1	63.9
7-Oct-07	65.3	65.5	69.7	69.1	64.3
8-Oct-07	63.5	60.4	68.9	69.2	63.8
9-Oct-07	63.4	66.7	69.1	68.2	63.8
Average	64.0	63.3	69.0	68.7	63.9
Max	65.3	66.7	69.7	69.2	64.3
Min	63.4	60.4	68.7	68.0	63.8
Stdev	0.8	2.7	0.4	0.6	0.2

The ambient property line background noise level CNEL ranges between 63 dBA and 70 dBA. The standard deviation ranges between 0.2 dB and 2.7 dB.

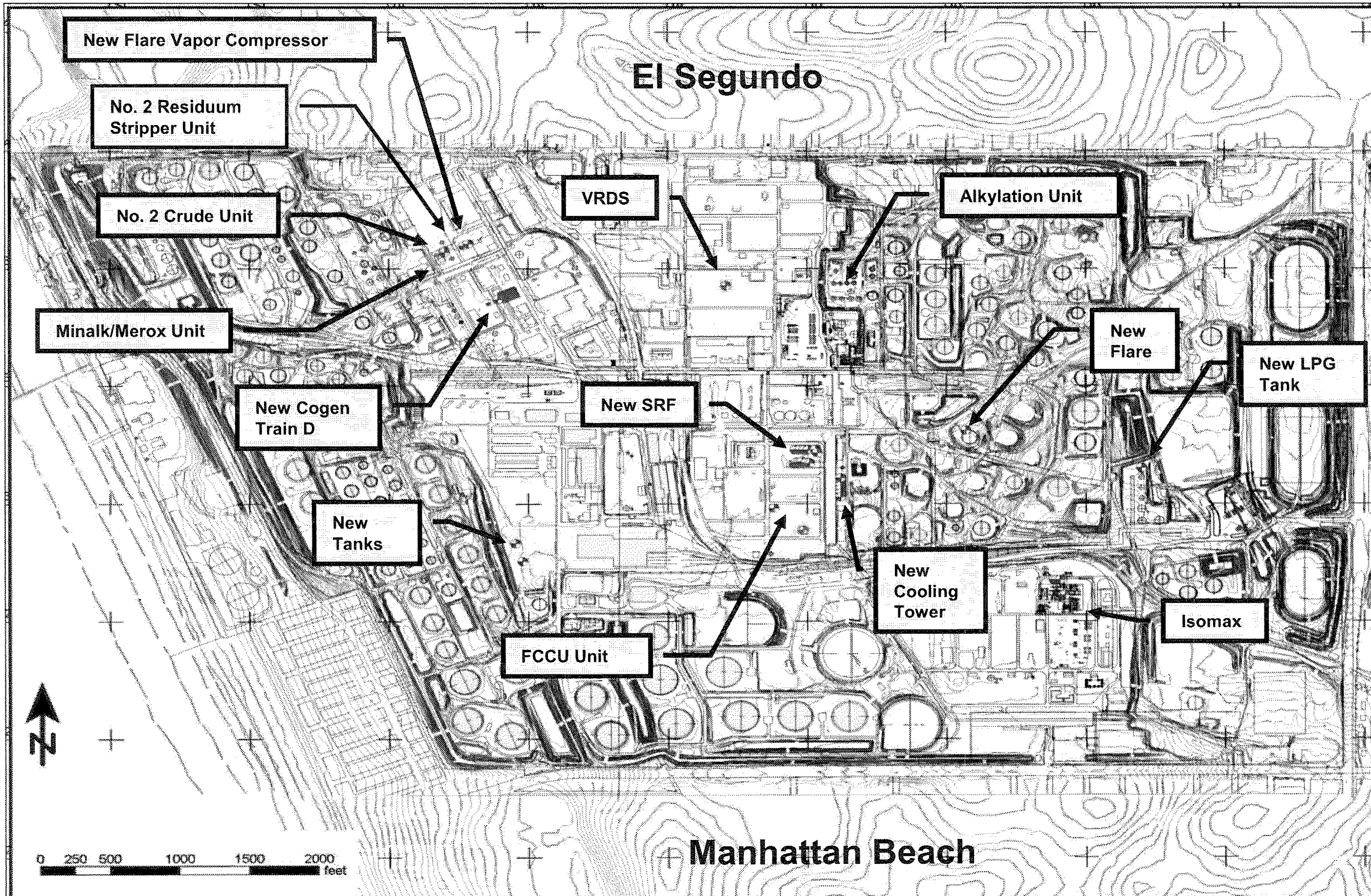
VI. Acoustical Model

- A three dimensional noise model of the PRO Project was created using the noise modeling software, SoundPLAN. The noise model geometry is presented in ***Graphics 1, 2 & 3***.
- The acoustical model parameters were as follows:
  - the ground was modeled with an absorption coefficient of 0.5.
  - the sides of the tanks, buildings, etc. were modeled as reflective surfaces and also as diffractive bodies (see the blue shaded areas).
  - the noise producing equipment were modeled as point, line & area sources (see the red shaded objects).
- The noise source sound power emission levels were estimated based upon the Chevron El Segundo Refinery Equipment Noise Specification which is 80 dBA to 85 dBA sound pressure level at 3 ft. from the face of the equipment. The spectral content was based on measurements recorded on similar equipment. The estimated sound power emission spectra are presented in ***Tables 3a – 3c***.

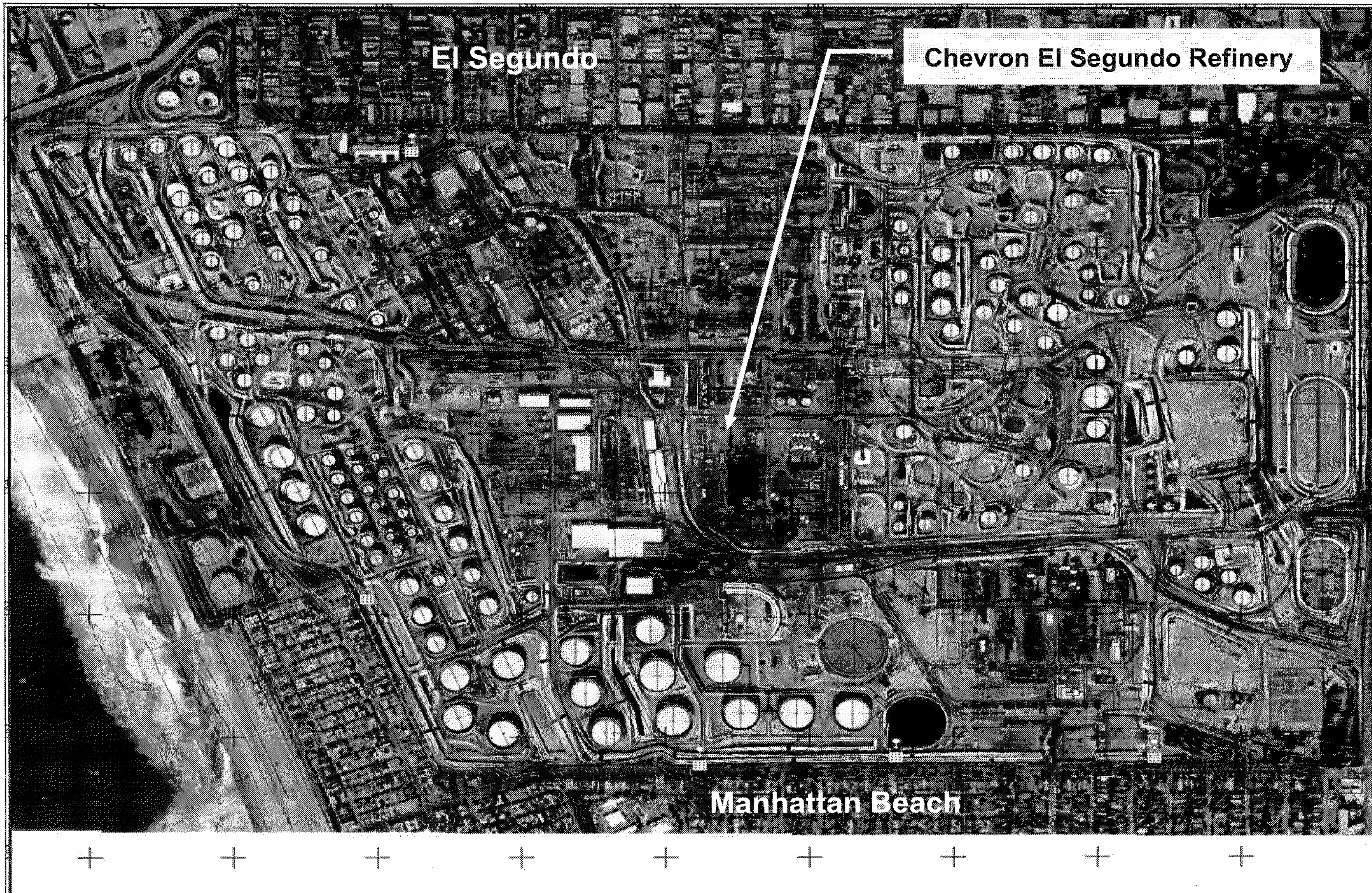
VI. Acoustical Model (cont'd)

- The PRO Project noise model predictions were made based upon the algorithms and procedures described in "*Environmental Noise from Industrial Plants. General Prediction Method, Danish Acoustical Laboratory, 1982. Report 32*".
- All significant noise sources to be installed as part of the PRO Project were considered to be operating simultaneously. Thus, the noise level predictions presented in this report are conservative and considered worst case. The vapory recovery flare was not included in the assessment since it will only be utilized during plant process upsets.
- The predicted CNEL contour map for the PRO Project (new sources only) is presented in ***Graphic 4***.

Graphic 1, Noise Model Geometry (2D View)



Graphic 2, Noise Model Geometry with Aerial Photo (2D View)



Graphic 3, Noise Model Geometry with Topographical Map (3D View)

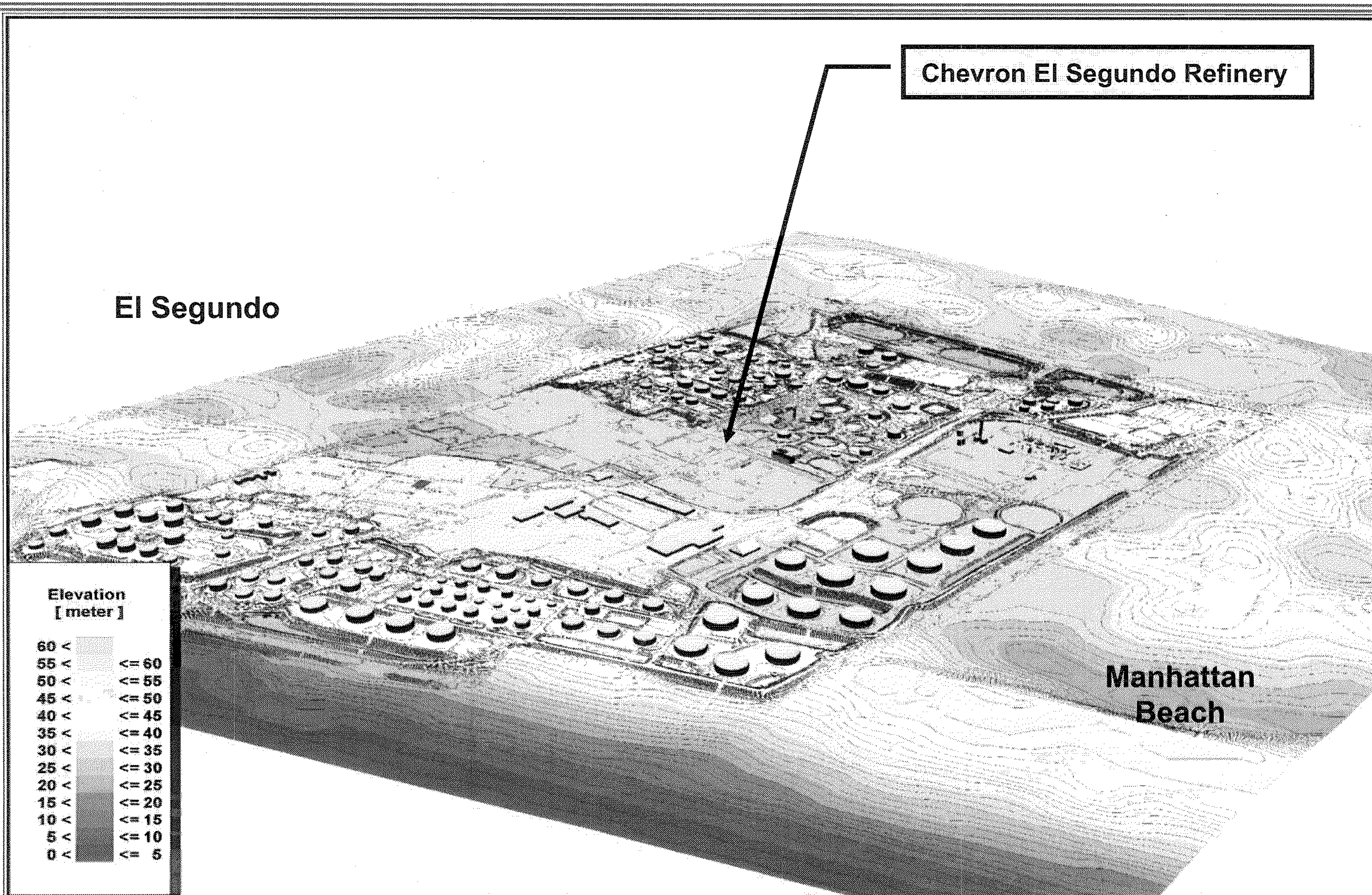


Table 3a, Sound Power Emission Levels

			Sound Power Level [dBA]								
No. #	Source	Unit / Plant	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	OA
1	P-397 Flare Knockout Liquid Pump	2nd Crude	60	72	79	85	88	89	86	77	93
2	P-398 Flare Knockout Liquid Pump	2nd Crude	60	72	79	85	88	89	86	77	93
3	Cogen D Train	Cogen Train D	94	98	102	108	96	92	91	109	113
4	Cogen D-Train Stack	Cogen Train D	81	89	97	103	89	71	77	81	104
5	K-3701 / 3702 Gas Compressor	Cogen Train D	86	99	103	107	109	112	111	104	116
6	New Cooling Tower West	FCCU	93	101	101	98	104	100	101	90	109
7	P-5720 Depropanizer OH Pumps	FCCU	62	74	81	87	90	91	88	79	95
8	K-4450 Reciprocating Compressor	Flare Gas Vapor	90	93	104	96	95	106	103	95	110
9	P-4400 Water Pump	Flare Gas Vapor	62	74	81	87	90	91	88	79	95
10	P-4401 Flare Base Pump	Flare Gas Vapor	62	74	81	87	90	91	88	79	95
11	K-7301 Combustion Air Blower	SRU Unit	82	99	103	94	94	89	83	77	105
12	K-7302 Compressor	SRU Unit	82	99	103	94	94	89	83	77	105
13	P-7305 BFW Booster Pump	SRU Unit	62	74	81	87	90	91	88	79	95
14	P-7303 Sulfur Degassing Pump	SRU Unit	60	72	79	85	88	89	86	77	93

OA = Overall Sound Pressure Level **FCCU** = Fluid Catalytic Cracking Unit **SRU** = Sulfur Recovery Unit

Table 3b, Sound Power Emission Levels

No. #	Source	Unit / Plant	Sound Power Level [dBA] 63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	OA
15	E-730 G/H Overhead Condenser	Isomax	81	92	99	101	98	99	93	85	106
16	K & P-501 CKN High Pressure Feed	Isomax	73	82	91	97	103	108	99	91	110
17	K-940 H2 Booster Compressor	Isomax	92	96	107	99	98	108	105	95	112
18	P-700 CKN Feed Booster Pump	Isomax	62	74	81	87	90	91	88	79	95
19	P-710 Vacuum Colum Pump	Isomax	62	74	81	87	90	91	88	79	95
20	P-712 Vaccum Column Pump	Isomax	62	74	81	87	90	91	88	79	95
21	P-713 Diesel Product Pump	Isomax	62	74	81	87	90	91	88	79	95
22	P-733 Isosplitter Pump	Isomax	62	74	81	87	90	91	88	79	95
23	P-733A Isosplitter Pump	Isomax	62	74	81	87	90	91	88	79	95
24	P-733B Isosplitter Pump	Isomax	62	74	81	87	90	91	88	79	95
25	Ejector Vaccum Column C-730	Isomax	67	85	89	90	92	94	92	86	99
26	P-6801 Feed Pumps	SWS	62	74	81	87	90	91	88	79	95
27	P 6815 Bottoms Pump	SWS	62	74	81	87	90	91	88	79	95
28	P-302 Blend Pump	Tank 302	62	74	81	87	90	91	88	79	95

OA = Overall Sound Pressure Level **SWS** = Sour Water Stripper

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Table 3c, Sound Power Emission Levels

No. #	Source	Unit / Plant	Sound Power Level [dBA]								
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	OA
29	P-303 Blend Pump	Tank 303	62	74	81	87	90	91	88	79	95
30	P-722 Pump	Tank 722	60	72	79	85	88	89	86	77	93
31	K-6902 Booster Blower	TGU	82	99	103	94	94	89	83	83	105
32	K-10 Main Air Blower	TGU	84	101	105	96	96	91	85	83	107
33	K-6901 Combustion Air Blower	TGU	82	99	103	94	94	89	83	83	105
34	P-6902 Condenser Circ Pump	TGU	60	72	79	85	88	89	86	77	93
35	P-6902 Desuperheater Circ Pump	TGU	60	72	79	85	88	89	86	77	93
36	P-6903 Rich Amine Pump	TGU	60	72	79	85	88	89	86	77	93
37	P-6904 Wash Water Pump	TGU	60	72	79	85	88	89	86	77	93
38	P-6905 Lean Amine Pump	TGU	60	72	79	85	88	89	86	77	93
39	P-6906 Regenerator Reflux Pump	TGU	60	72	79	85	88	89	86	77	93
40	P-6908 Caustic Pump	TGU	60	72	79	85	88	89	86	77	93
41	K-1581 Sulfiding Recycle Compress	VRDS	85	88	99	91	90	101	98	83	105

OA = Overall Sound Pressure Level **TGU** = Tail Gas Unit **VRDS** = Vacuum Residuum Desulphurization Unit

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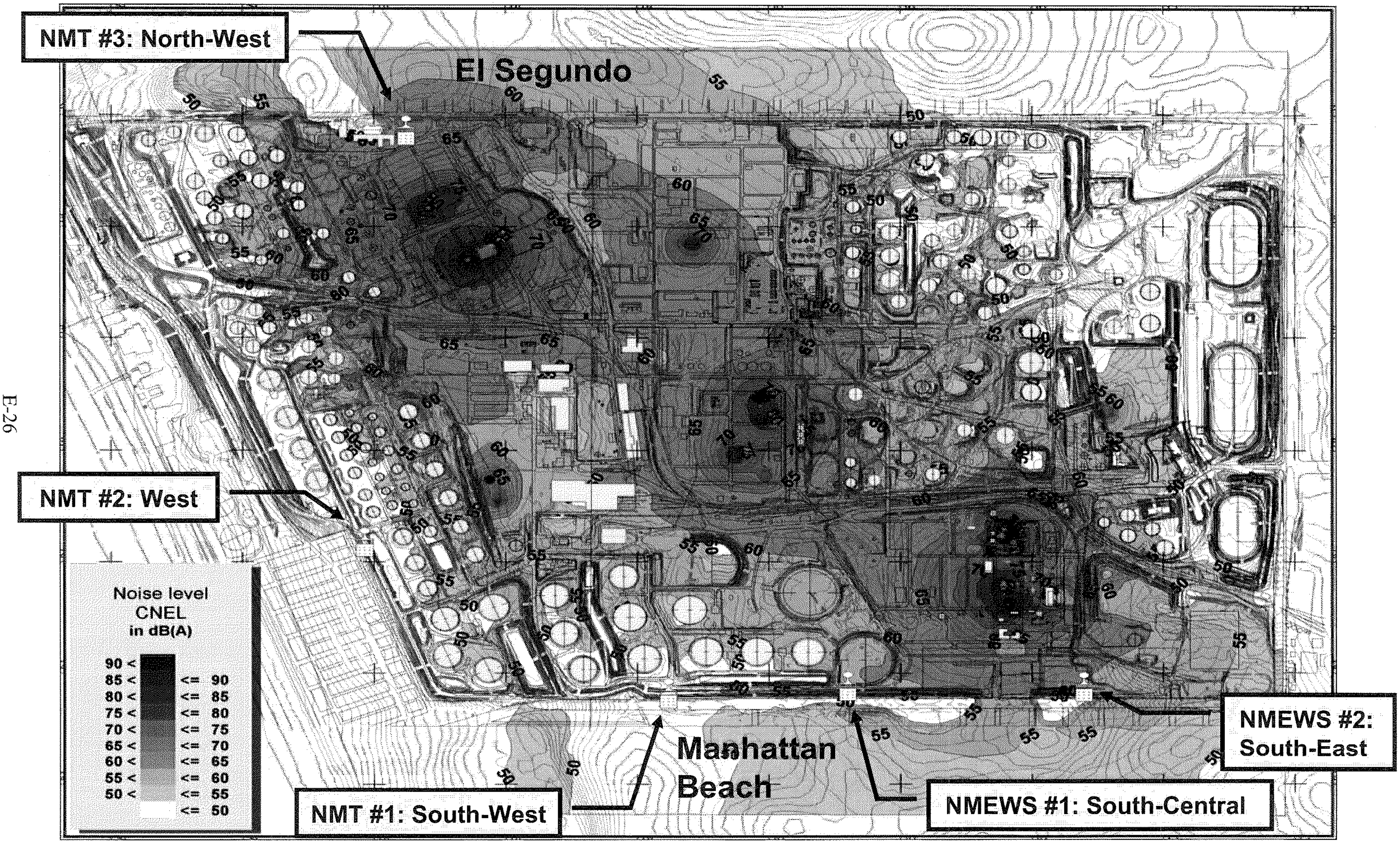
Graphic 4, CNEL Contour Map (Predicted PRO Project New Sources Only)



VII. Noise Impact Assessment

- The current ambient CNEL was measured along the refinery's North, West, and South property line.
- A noise model was developed for the PRO Project and CNEL predictions made for all new equipment considered to be acoustically significant.
- Referring to ***Table 4***, the net change in CNEL along the refinery property line was computed by logarithmically adding the predicted PRO Project noise to the current ambient.
- The PRO Project is predicted to increase the current minimum ambient CNEL by less than 1.3 dB. Based on the criteria accepted by AQMD, the PRO Project will not represent a significant noise impact to the residential communities of El Segundo and Manhattan Beach.

Table 4, CNEL Noise Impact Assessment

	NMT # 1 South-West Property Line	NMT # 2 West Property Line	NMT # 3 North-West Property Line	NMEWS # 1 South-Central Property Line	NMEWS # 2 South-East Property Line
Measured Current Minimum Ambient CNEL	63.4	60.4	68.7	68.0	63.8
Predicted Pro Project CNEL	47.6	47.2	62.5	58.9	59.4
Summation: Current Ambient CNEL + Predicted PRO Project CNEL	63.5	60.6	69.7	68.5	65.1
NET Change in CNEL	**0.1**	**0.2**	**0.9**	**0.5**	**1.3**
Significant Noise Impact	**No**	**No**	**No**	**No**	**No**

Note: The noise impact was determined by (1) logarithmically adding the predicted PRO Project noise to the current measured ambient CNEL, (2) computing the NET change in the ambient CNEL, and (3) applying the impact criteria described in ***Section IV***.

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APPENDIX F

Traffic Level of Service Analysis

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LEVEL OF SERVICE ANALYSIS

A.M. PEAK HOUR

Scenario: 2008 AM Peak Hour

Geometrics: Existing Geometrics

Ambient Traffic Growth: .5 % per year

Year 2007			Forecast Year 2008			Plus Proposed Project			
LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+V/C
Sepulveda(SR1) and El Segundo Bl.									
E	55.5	0.977	E	56.4	0.982	E	56.4	0.982	+0.000
Sepulveda(SR1) and Rosecrans Av.									
D	38.5	0.890	D	39.1	0.894	D	39.1	0.894	+0.000
Sepulveda(SR1) and Imperial Hwy									
C	20.3	0.753	C	20.6	0.756	C	20.6	0.756	+0.000
Aviation Bl. and El Segundo Bl.									
D	35.4	0.869	D	36.0	0.873	D	36.0	0.873	+0.000
Aviation Bl. and Rosecrans Av.									
D	26.7	0.811	D	27.2	0.815	D	27.2	0.815	+0.000
La Cienega Bl. and I-405 SB ramps									
B	10.2	0.652	B	10.5	0.655	B	10.5	0.655	+0.000
La Cienega Bl. and El Segundo Bl.									

B	10.2	0.652	B	10.5	0.655	B	10.5	0.655	+0.000
I-405 SB on-ramp and El Segundo Bl.									
D	35.7	0.871	D	36.3	0.875	D	36.3	0.875	+0.000
I-405 NB ramps and El Segundo Bl.									
C	22.2	0.772	C	22.5	0.775	C	22.5	0.775	+0.000
I-405 SB offramp and Rosecrans Av.									
B	8.5	0.635	B	8.8	0.638	B	8.8	0.638	+0.000

Notes:

v/c = volume to capacity ratio (capacity utilization ratio)

delay = average stopped delay in seconds per vehicle

LOS = Level of Service

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LEVEL OF SERVICE ANALYSIS

A.M. PEAK HOUR

Scenario: 2008 AM Peak Hour

Geometrics: Existing Geometrics

Ambient Traffic Growth: .5 % per year

	Year 2007			Forecast Year 2008			Plus Proposed Project			
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+V/C
I-405 NB ramps and Rosecrans Bl.	B	8.6	0.636	B	8.9	0.639	B	8.9	0.639	+0.000
I-405 SB ramps and Hindry Ave.	A	5.0	0.319	A	5.0	0.320	A	5.0	0.320	+0.000
California St. and Imperial Hwy.	A	5.0	0.449	A	5.0	0.451	A	5.0	0.451	+0.000
Main Street and Imperial Hwy.	B	11.9	0.669	B	12.2	0.672	B	12.2	0.672	+0.000
Continental and Grand Ave	A	5.0	0.318	A	5.0	0.319	A	5.0	0.319	+0.000
Continental and Mariposa Ave	A	5.0	0.409	A	5.0	0.411	A	5.0	0.411	+0.000

```
Nash St and Mariposa Ave

 A    5.0 0.330    A    5.0 0.332    A    5.0 0.332   +0.000

Douglas St/Douglas ST and Mariposa Ave

 A    5.0 0.282    A    5.0 0.283    A    5.0 0.283   +0.000

Douglas St and Atwood Way

 A    5.0 0.156    A    5.0 0.157    A    5.0 0.157   +0.000


Notes:

v/c   = volume to capacity ratio (capacity utilization ratio)

delay = average stopped delay in seconds per vehicle

LOS   = Level of Service
```

2008AM-LOS.txt

Sepulveda(SR1) and El Segundo Bl.

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

				Year 2007		Forecast Year 2008		W/Proposed Project		With ALL Projects	
Movement		Lanes	Capacity	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C
NB	LEFT	2.00	3120	300	0.096	302	0.097	302	0.097	302	0.097
	THRU	4.00	6400	3345	0.585	3362	0.588	3362	0.588	3362	0.588
	RIGHT	0.00	0	401	0.000	403	0.000	403	0.000	403	0.000
SB	LEFT	2.00	3120	229	0.073	230	0.074	230	0.074	230	0.074
	THRU	4.00	6400	1211	0.189	1217	0.190	1217	0.190	1217	0.190
	RIGHT	1.00	1600	224	0.140	225	0.141	225	0.141	225	0.141
EB	LEFT	1.00	1600	107	0.067	108	0.067	108	0.067	108	0.067
	THRU	2.00	3200	275	0.086	276	0.086	276	0.086	276	0.086
	RIGHT	1.00	1600	222	0.139	223	0.139	223	0.139	223	0.139
WB	LEFT	1.50	2360	142	0.060	143	0.060	143	0.060	143	0.060
	THRU	1.50	2400	484	0.202	486	0.203	486	0.203	486	0.203
	RIGHT	1.00	1600	267	0.167	268	0.168	268	0.168	268	0.168
Intersection Volume				7207		7243		7243		7243	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.977		0.982		0.982		0.982
Stopped Delay (sec/veh)					55.5		56.4		56.4		56.4
LEVEL OF SERVICE (LOS)					E		E		E		E

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Sepulveda(SR1) and Rosecrans Av.

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	128	0.041	129	0.041	129	0.041	129	0.041
	THRU	4.00	6400	3525	0.551	3543	0.554	3543	0.554	3543	0.554
	RIGHT	1.00	1600	448	0.280	450	0.281	450	0.281	450	0.281
SB	LEFT	2.00	3120	273	0.087	274	0.088	274	0.088	274	0.088
	THRU	3.00	4800	914	0.190	919	0.191	919	0.191	919	0.191
	RIGHT	1.00	1600	95	0.059	95	0.060	95	0.060	95	0.060
EB	LEFT	2.00	3120	228	0.073	229	0.073	229	0.073	229	0.073
	THRU	3.00	4800	503	0.105	506	0.105	506	0.105	506	0.105
	RIGHT	1.00	1600	161	0.101	162	0.101	162	0.101	162	0.101
WB	LEFT	2.00	3120	225	0.072	226	0.072	226	0.072	226	0.072
	THRU	2.00	3200	412	0.129	414	0.129	414	0.129	414	0.129
	RIGHT	1.00	1600	340	0.213	342	0.214	342	0.214	342	0.214
Intersection Volume				7252		7288		7288		7288	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.890		0.894		0.894		0.894
Stopped Delay (sec/veh)				38.5		39.1		39.1		39.1	
LEVEL OF SERVICE (LOS)					D		D		D		D

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Sepulveda(SR1) and Imperial Hwy

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	93	0.058	93	0.058	93	0.058	93	0.058
	THRU	3.00	4800	2005	0.418	2015	0.420	2015	0.420	2015	0.420
	RIGHT	1.00	1600	786	0.491	790	0.494	790	0.494	790	0.494
SB	LEFT	2.00	3120	413	0.132	415	0.133	415	0.133	415	0.133
	THRU	4.00	6400	2278	0.358	2289	0.359	2289	0.359	2289	0.359
	RIGHT	0.00	0	11	0.000	11	0.000	11	0.000	11	0.000
EB	LEFT	2.00	3120	270	0.087	271	0.087	271	0.087	271	0.087
	THRU	3.00	4800	326	0.068	328	0.068	328	0.068	328	0.068
	RIGHT	1.00	1600	181	0.113	182	0.114	182	0.114	182	0.114
WB	LEFT	2.00	3120	265	0.085	266	0.085	266	0.085	266	0.085
	THRU	3.00	4800	294	0.061	295	0.062	295	0.062	295	0.062
	RIGHT	1.00	1600	415	0.259	417	0.261	417	0.261	417	0.261
Intersection Volume				7337		7374		7374		7374	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.753		0.756		0.756		0.756
Stopped Delay (sec/veh)				20.3		20.6		20.6		20.6	
LEVEL OF SERVICE (LOS)					C		C		C		C

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Aviation Bl. and El Segundo Bl.

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	227	0.142	228	0.143	228	0.143	228	0.143
	THRU	2.00	3200	849	0.292	853	0.294	853	0.294	853	0.294
	RIGHT	0.00	0	86	0.000	86	0.000	86	0.000	86	0.000
SB	LEFT	1.00	1600	96	0.060	96	0.060	96	0.060	96	0.060
	THRU	2.00	3200	601	0.188	604	0.189	604	0.189	604	0.189
	RIGHT	1.00	1600	275	0.172	276	0.173	276	0.173	276	0.173
EB	LEFT	2.00	3120	188	0.060	189	0.061	189	0.061	189	0.061
	THRU	3.00	4800	499	0.104	501	0.104	501	0.104	501	0.104
	RIGHT	1.00	1600	73	0.046	73	0.046	73	0.046	73	0.046
WB	LEFT	2.00	3120	351	0.112	353	0.113	353	0.113	353	0.113
	THRU	3.00	4800	1768	0.407	1777	0.409	1777	0.409	1777	0.409
	RIGHT	0.00	0	184	0.000	185	0.000	185	0.000	185	0.000
Intersection Volume				5197		5223		5223		5223	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.869		0.873		0.873		0.873
Stopped Delay (sec/veh)					35.4		36.0		36.0		36.0
LEVEL OF SERVICE (LOS)					D		D		D		D

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Aviation Bl and Rosecrans Ave

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

				Year 2007		Forecast Year 2008		W/Proposed Project		With ALL Projects	
Movement		Lanes	Capacity	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C
NB	LEFT	2.00	3120	197	0.063	198	0.063	198	0.063	198	0.063
	THRU	3.00	4800	1194	0.249	1200	0.250	1200	0.250	1200	0.250
	RIGHT	1.00	1600	543	0.339	546	0.341	546	0.341	546	0.341
SB	LEFT	2.00	3120	67	0.021	67	0.022	67	0.022	67	0.022
	THRU	4.00	6400	654	0.102	657	0.103	657	0.103	657	0.103
	RIGHT	1.00	1600	400	0.250	402	0.251	402	0.251	402	0.251
EB	LEFT	1.00	1600	172	0.108	173	0.108	173	0.108	173	0.108
	THRU	3.00	4800	740	0.177	744	0.178	744	0.178	744	0.178
	RIGHT	0.00	0	110	0.000	111	0.000	111	0.000	111	0.000
WB	LEFT	2.00	3120	653	0.209	656	0.210	656	0.210	656	0.210
	THRU	3.00	4800	1324	0.383	1331	0.385	1331	0.385	1331	0.385
	RIGHT	0.00	0	516	0.000	519	0.000	519	0.000	519	0.000
Intersection Volume				6570		6603		6603		6603	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.811		0.815		0.815		0.815
Stopped Delay (sec/veh)				26.7		27.2		27.2		27.2	
LEVEL OF SERVICE (LOS)					D		D		D		D

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

La Cienega Bl. and I-405 SB ramps

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	1.50	2400	306	0.127	308	0.128	308	0.128	308	0.128
	RIGHT	1.50	2360	149	0.063	150	0.063	150	0.063	150	0.063
SB	LEFT	1.00	1600	234	0.146	235	0.147	235	0.147	235	0.147
	THRU	3.00	4800	125	0.026	126	0.026	126	0.026	126	0.026
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	1.50	2360	774	0.328	778	0.330	778	0.330	778	0.330
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.50	800	47	0.059	47	0.059	47	0.059	47	0.059
Intersection Volume				1635		1643		1643		1643	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.652		0.655		0.655		0.655
Stopped Delay (sec/veh)					10.2		10.5		10.5		10.5
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

La Cienega Bl. and El Segundo Bl.

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	2.00	3120	292	0.094	293	0.094	293	0.094	293	0.094
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	2.00	3120	627	0.201	630	0.202	630	0.202	630	0.202
EB	LEFT	1.00	1600	86	0.054	86	0.054	86	0.054	86	0.054
	THRU	2.00	3200	430	0.134	432	0.135	432	0.135	432	0.135
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1804	0.454	1813	0.457	1813	0.457	1813	0.457
	RIGHT	0.00	0	377	0.000	379	0.000	379	0.000	379	0.000
Intersection Volume				3616		3634		3634		3634	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.652		0.655		0.655		0.655
Stopped Delay (sec/veh)					10.2		10.5		10.5		10.5
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB on-ramp and El Segundo Bl.

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.50	2360	546	0.231	549	0.233	549	0.233	549	0.233
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.50	800	120	0.150	121	0.151	121	0.151	121	0.151
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	366	0.114	368	0.115	368	0.115	368	0.115
	RIGHT	1.00	1600	268	0.168	269	0.168	269	0.168	269	0.168
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	2832	0.590	2846	0.593	2846	0.593	2846	0.593
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				4132		4153		4153		4153	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.871		0.875		0.875		0.875
Stopped Delay (sec/veh)				35.7		36.3		36.3		36.3	
LEVEL OF SERVICE (LOS)					D		D		D		D

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 NB ramps and El Segundo Bl.

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	1199	0.384	1205	0.386	1205	0.386	1205	0.386
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	72	0.045	72	0.045	72	0.045	72	0.045
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	512	0.107	515	0.107	515	0.107	515	0.107
	RIGHT	1.00	(Free)	121		122		122		122	
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.50	4000	1349	0.337	1356	0.339	1356	0.339	1356	0.339
	RIGHT	1.50	2360	544	0.231	547	0.232	547	0.232	547	0.232
Intersection Volume				3797		3816		3816		3816	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.772		0.775		0.775		0.775
Stopped Delay (sec/veh)					22.2		22.5		22.5		22.5
LEVEL OF SERVICE (LOS)					C		C		C		C

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB offramp and Rosecrans Av.

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	2.00	3120	706	0.226	710	0.227	710	0.227	710	0.227
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	4.00	6400	1440	0.225	1447	0.226	1447	0.226	1447	0.226
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1724	0.359	1733	0.361	1733	0.361	1733	0.361
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				3870		3889		3889		3889	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.635		0.638		0.638		0.638
Stopped Delay (sec/veh)					8.5		8.8		8.8		8.8
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 NB ramps and Rosecrans Bl.

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement	Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB LEFT	2.00	3120	741	0.237	745	0.239	745	0.239	745	0.239
THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
RIGHT	1.00	1600	71	0.044	71	0.045	71	0.045	71	0.045
SB LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
THRU	4.00	6400	718	0.224	722	0.225	722	0.225	722	0.225
RIGHT	0.00	0	715	0.000	719	0.000	719	0.000	719	0.000
WB LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
THRU	3.00	4800	1013	0.349	1018	0.351	1018	0.351	1018	0.351
RIGHT	0.00	0	662	0.000	665	0.000	665	0.000	665	0.000
Intersection Volume			3920		3940		3940		3940	
Signal Phasing Loss Factor				0.05		0.05		0.05		0.05
Intersection V/C Ratio				0.636		0.639		0.639		0.639
Stopped Delay (sec/veh)				8.6		8.9		8.9		8.9
LEVEL OF SERVICE (LOS)				B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB ramps and Hindry Ave.

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	1.00	1600	1	0.001	1	0.001	1	0.001	1	0.001
	THRU	2.00	3200	53	0.027	53	0.027	53	0.027	53	0.027
	RIGHT	0.00	0	32	0.000	32	0.000	32	0.000	32	0.000
SB	LEFT	2.00	3120	460	0.147	462	0.148	462	0.148	462	0.148
	THRU	1.00	1600	81	0.057	81	0.057	81	0.057	81	0.057
	RIGHT	0.00	0	10	0.000	10	0.000	10	0.000	10	0.000
EB	LEFT	1.00	1600	8	0.005	8	0.005	8	0.005	8	0.005
	THRU	1.00	1600	25	0.017	25	0.017	25	0.017	25	0.017
	RIGHT	0.00	0	2	0.000	2	0.000	2	0.000	2	0.000
WB	LEFT	0.50	800	48	0.060	48	0.060	48	0.060	48	0.060
	THRU	0.50	800	72	0.090	72	0.090	72	0.090	72	0.090
	RIGHT	2.00	3120	719	0.230	723	0.232	723	0.232	723	0.232
Intersection Volume				1511		1519		1519		1519	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.319		0.320		0.320		0.320
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

California St. and Imperial Hwy.

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	8	0.005	8	0.005	8	0.005	8	0.005
	THRU	1.00	1600	2	0.001	2	0.001	2	0.001	2	0.001
	RIGHT	1.00	1600	169	0.106	170	0.106	170	0.106	170	0.106
SB	LEFT	1.00	1600	31	0.019	31	0.019	31	0.019	31	0.019
	THRU	1.00	1600	0	0.007	0	0.007	0	0.007	0	0.007
	RIGHT	0.00	0	11	0.000	11	0.000	11	0.000	11	0.000
EB	LEFT	1.00	1600	7	0.004	7	0.004	7	0.004	7	0.004
	THRU	3.00	4800	1415	0.297	1422	0.299	1422	0.299	1422	0.299
	RIGHT	0.00	0	12	0.000	12	0.000	12	0.000	12	0.000
WB	LEFT	1.00	1600	130	0.081	131	0.082	131	0.082	131	0.082
	THRU	3.00	4800	1658	0.360	1666	0.361	1666	0.361	1666	0.361
	RIGHT	0.00	0	68	0.000	68	0.000	68	0.000	68	0.000
Intersection Volume				3511		3529		3529		3529	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.449		0.451		0.451		0.451
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Main Street and Imperial Hwy.

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	1.50	2360	345	0.146	347	0.147	347	0.147	347	0.147
	THRU	0.50	800	2	0.002	2	0.003	2	0.003	2	0.003
	RIGHT	1.00	1600	647	0.404	650	0.406	650	0.406	650	0.406
SB	LEFT	0.00	0	1	0.000	1	0.000	1	0.000	1	0.000
	THRU	1.00	1600	0	0.003	0	0.003	0	0.003	0	0.003
	RIGHT	0.00	0	4	0.000	4	0.000	4	0.000	4	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	989	0.206	994	0.207	994	0.207	994	0.207
	RIGHT	1.00	(Free)	172		173		173		173	
WB	LEFT	1.00	1600	422	0.264	424	0.265	424	0.265	424	0.265
	THRU	3.00	4800	1231	0.257	1237	0.258	1237	0.258	1237	0.258
	RIGHT	0.00	0	1	0.000	1	0.000	1	0.000	1	0.000
Intersection Volume				3814		3833		3833		3833	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.669		0.672		0.672		0.672
Stopped Delay (sec/veh)					11.9		12.2		12.2		12.2
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Continental and Grand Ave

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	0.00	0	213	0.000	214	0.000	214	0.000	214	0.000
	THRU	3.00	4800	272	0.126	273	0.126	273	0.126	273	0.126
	RIGHT	0.00	0	119	0.000	120	0.000	120	0.000	120	0.000
SB	LEFT	1.00	1600	41	0.026	41	0.026	41	0.026	41	0.026
	THRU	3.00	4800	168	0.057	169	0.057	169	0.057	169	0.057
	RIGHT	0.00	0	106	0.000	107	0.000	107	0.000	107	0.000
EB	LEFT	1.00	1600	108	0.068	109	0.068	109	0.068	109	0.068
	THRU	3.00	4800	207	0.062	208	0.063	208	0.063	208	0.063
	RIGHT	0.00	0	92	0.000	92	0.000	92	0.000	92	0.000
WB	LEFT	1.00	1600	87	0.054	87	0.055	87	0.055	87	0.055
	THRU	3.00	4800	197	0.046	198	0.046	198	0.046	198	0.046
	RIGHT	0.00	0	23	0.000	23	0.000	23	0.000	23	0.000
Intersection Volume				1633		1641		1641		1641	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.318		0.319		0.319		0.319
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Continental and Mariposa Ave

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	56	0.035	56	0.035	56	0.035	56	0.035
	THRU	1.00	1600	69	0.043	69	0.043	69	0.043	69	0.043
	RIGHT	2.00	3120	108	0.035	109	0.035	109	0.035	109	0.035
SB	LEFT	1.00	1600	7	0.004	7	0.004	7	0.004	7	0.004
	THRU	1.00	1600	85	0.064	85	0.065	85	0.065	85	0.065
	RIGHT	0.00	0	18	0.000	18	0.000	18	0.000	18	0.000
EB	LEFT	1.00	1600	29	0.018	29	0.018	29	0.018	29	0.018
	THRU	3.00	4800	345	0.126	347	0.127	347	0.127	347	0.127
	RIGHT	0.00	0	261	0.000	262	0.000	262	0.000	262	0.000
WB	LEFT	1.00	1600	213	0.133	214	0.134	214	0.134	214	0.134
	THRU	2.00	3200	238	0.092	239	0.092	239	0.092	239	0.092
	RIGHT	0.00	0	55	0.000	55	0.000	55	0.000	55	0.000
Intersection Volume				1484		1491		1491		1491	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.409		0.411		0.411		0.411
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Nash St and Mariposa Ave

File: C:2008am.ivc

A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	71	0.000	71	0.000	71	0.000	71	0.000
	THRU	4.00	6400	768	0.181	772	0.182	772	0.182	772	0.182
	RIGHT	0.00	0	322	0.000	324	0.000	324	0.000	324	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	204	0.064	205	0.064	205	0.064	205	0.064
	RIGHT	1.00	1600	122	0.076	123	0.077	123	0.077	123	0.077
WB	LEFT	1.00	1600	56	0.035	56	0.035	56	0.035	56	0.035
	THRU	2.00	3200	260	0.081	261	0.082	261	0.082	261	0.082
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				1803		1812		1812		1812	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.330		0.332		0.332		0.332
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Douglas St/Douglas ST and Mariposa Ave

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	1.50	2360	266	0.113	267	0.113	267	0.113	267	0.113
	THRU	4.50	7200	371	0.052	373	0.052	373	0.052	373	0.052
	RIGHT	1.00	1600	8	0.005	8	0.005	8	0.005	8	0.005
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	1.50	2360	269	0.114	270	0.115	270	0.115	270	0.115
	THRU	0.50	800	11	0.014	11	0.014	11	0.014	11	0.014
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	12	0.006	12	0.006	12	0.006	12	0.006
	RIGHT	0.00	0	6	0.000	6	0.000	6	0.000	6	0.000
Intersection Volume				943		948		948		948	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.282		0.283		0.283		0.283
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Douglas St and Atwood Way

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A.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	324	0.104	326	0.104	326	0.104	326	0.104
	THRU	4.00	6400	265	0.041	266	0.042	266	0.042	266	0.042
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	2.00	3120	7	0.002	7	0.002	7	0.002	7	0.002
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				596		599		599		599	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.156		0.157		0.157		0.157
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

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TRIPS GENERATED BY PROJECTS

PROJECT (or Project Group)	A.M.PEAK HOUR enter	A.M.PEAK HOUR exit	P.M.PEAK HOUR enter	P.M.PEAK HOUR exit
1 Chevron construction	0	0	0	0

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LEVEL OF SERVICE ANALYSIS

A.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

Intersection	Year 2007 LOS	Year 2007 DELAY	Year 2007 V/C	Forecast Year 2008 LOS	Forecast Year 2008 DELAY	Forecast Year 2008 V/C		Plus Proposed Project LOS	Plus Proposed Project DELAY	Plus Proposed Project V/C	+ V/C
Sepulveda(SR1) and El Segundo Bl.	E	55.5	0.977	E	56.4	0.982	....	E	56.4	0.982	+0.000
Sepulveda(SR1) and Rosecrans Av.	D	38.5	0.890	D	39.1	0.894	....	D	39.1	0.894	+0.000
Sepulveda(SR1) and Imperial Hwy	C	20.3	0.753	C	20.6	0.756	....	C	20.6	0.756	+0.000
Aviation Bl. and El Segundo Bl.	D	35.4	0.869	D	36.0	0.873	....	D	36.0	0.873	+0.000
Aviation Bl and Rosecrans Ave	D	26.7	0.811	D	27.2	0.815	....	D	27.2	0.815	+0.000
La Cienega Bl. and I-405 SB ramps	B	10.2	0.652	B	10.5	0.655	....	B	10.5	0.655	+0.000
La Cienega Bl. and El Segundo Bl.	B	10.2	0.652	B	10.5	0.655	....	B	10.5	0.655	+0.000
I-405 SB on-ramp and El Segundo Bl.	D	35.7	0.871	D	36.3	0.875	....	D	36.3	0.875	+0.000
I-405 NB ramps and El Segundo Bl.	C	22.2	0.772	C	22.5	0.775	....	C	22.5	0.775	+0.000
I-405 SB offramp and Rosecrans Av.	B	8.5	0.635	B	8.8	0.638	....	B	8.8	0.638	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

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LEVEL OF SERVICE ANALYSIS

A.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008				Plus Proposed Project			
	LOS	DELAY	V/C	LOS	DELAY	V/C		LOS	DELAY	V/C	+ V/C
I-405 NB ramps and Rosecrans Bl.	B	8.6	0.636	B	8.9	0.639	....	B	8.9	0.639	+0.000
I-405 SB ramps and Hindry Ave.	A	5.0	0.319	A	5.0	0.320	....	A	5.0	0.320	+0.000
California St. and Imperial Hwy.	A	5.0	0.449	A	5.0	0.451	....	A	5.0	0.451	+0.000
Main Street and Imperial Hwy.	B	11.9	0.669	B	12.2	0.672	....	B	12.2	0.672	+0.000
Continental and Grand Ave	A	5.0	0.318	A	5.0	0.319	....	A	5.0	0.319	+0.000
Continental and Mariposa Ave	A	5.0	0.409	A	5.0	0.411	....	A	5.0	0.411	+0.000
Nash St and Mariposa Ave	A	5.0	0.330	A	5.0	0.332	....	A	5.0	0.332	+0.000
Douglas St/Douglas ST and Mariposa Ave	A	5.0	0.282	A	5.0	0.283	....	A	5.0	0.283	+0.000
Douglas St and Atwood Way	A	5.0	0.156	A	5.0	0.157	....	A	5.0	0.157	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

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LEVEL OF SERVICE ANALYSIS

A.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008			Plus Proposed Project			
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+V/C
Sepulveda(SR1) and El Segundo Bl.	E	55.5	0.977	E	56.4	0.982	E	56.4	0.982	+0.000
Sepulveda(SR1) and Rosecrans Av.	D	38.5	0.890	D	39.1	0.894	D	39.1	0.894	+0.000
Sepulveda(SR1) and Imperial Hwy	C	20.3	0.753	C	20.6	0.756	C	20.6	0.756	+0.000
Aviation Bl. and El Segundo Bl.	D	35.4	0.869	D	36.0	0.873	D	36.0	0.873	+0.000
Aviation Bl and Rosecrans Ave	D	26.7	0.811	D	27.2	0.815	D	27.2	0.815	+0.000
La Cienega Bl. and I-405 SB ramps	B	10.2	0.652	B	10.5	0.655	B	10.5	0.655	+0.000
La Cienega Bl. and El Segundo Bl.	B	10.2	0.652	B	10.5	0.655	B	10.5	0.655	+0.000
I-405 SB on-ramp and El Segundo Bl.	D	35.7	0.871	D	36.3	0.875	D	36.3	0.875	+0.000
I-405 NB ramps and El Segundo Bl.	C	22.2	0.772	C	22.5	0.775	C	22.5	0.775	+0.000
I-405 SB offramp and Rosecrans Av.	B	8.5	0.635	B	8.8	0.638	B	8.8	0.638	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

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LEVEL OF SERVICE ANALYSIS

A.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008			Plus Proposed Project			
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+V/C
I-405 NB ramps and Rosecrans Bl.	B	8.6	0.636	B	8.9	0.639	B	8.9	0.639	+0.000
I-405 SB ramps and Hindry Ave.	A	5.0	0.319	A	5.0	0.320	A	5.0	0.320	+0.000
California St. and Imperial Hwy.	A	5.0	0.449	A	5.0	0.451	A	5.0	0.451	+0.000
Main Street and Imperial Hwy.	B	11.9	0.669	B	12.2	0.672	B	12.2	0.672	+0.000
Continental and Grand Ave	A	5.0	0.318	A	5.0	0.319	A	5.0	0.319	+0.000
Continental and Mariposa Ave	A	5.0	0.409	A	5.0	0.411	A	5.0	0.411	+0.000
Nash St and Mariposa Ave	A	5.0	0.330	A	5.0	0.332	A	5.0	0.332	+0.000
Douglas St/Douglas ST and Mariposa Ave	A	5.0	0.282	A	5.0	0.283	A	5.0	0.283	+0.000
Douglas St and Atwood Way	A	5.0	0.156	A	5.0	0.157	A	5.0	0.157	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

LEVEL OF SERVICE ANALYSIS

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P.M. PEAK HOUR

Scenario: 2008 Winter construction
Ambient Traffic Growth: 0.5 % per year

Intersection	Year 2007 LOS	Year 2007 DELAY	Year 2007 V/C	Forecast Year 2008 LOS	Forecast Year 2008 DELAY	Forecast Year 2008 V/C	Plus Proposed Construction LOS	Plus Proposed Construction DELAY	Plus Proposed Construction V/C	Construction impact + V/C
Sepulveda(SR1) and El Segundo Bl	F	94.6	1.099	F	96.4	1.104	F	100.1	1.115	+0.011
Sepulveda(SR1) and Rosecrans Ave	F	82.7	1.065	F	84.4	1.070	F	89.9	1.086	+0.016
Sepulveda(SR1) and Imperial Hwy	C	16.4	0.714	C	16.8	0.718	C	17.2	0.722	+0.004
Aviation Bl and El Segundo Bl	E	52.7	0.963	E	53.6	0.968	F	66.0	1.017	+0.049
Aviation Bl and Rosecrans Ave	D	25.6	0.804	D	26.1	0.807	D	28.6	0.824	+0.017
La Cienega Bl and I-405 SB ramps	B	5.6	0.606	B	5.9	0.609	B	5.9	0.609	+0.000
La Cienega Bl and El Segundo Bl	B	12.4	0.674	B	12.7	0.677	C	17.2	0.722	+0.045
I-405 SB on-ramp and El Segundo Bl	B	8.2	0.632	B	8.4	0.634	B	12.9	0.679	+0.045
I-405 NB ramps and El Segundo Bl	A	5.0	0.533	A	5.0	0.535	A	5.0	0.541	+0.006
I-405 SB offramp and Rosecrans Ave	B	7.5	0.625	B	7.8	0.628	B	7.8	0.628	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

LEVEL OF SERVICE ANALYSIS

C:2008PM_W.ivc

P.M. PEAK HOUR

Scenario: 2008 Winter construction
Ambient Traffic Growth: 0.5 % per year

Year 2007			Forecast Year 2008			Plus Proposed Construction			Construction impact
LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+ V/C
I-405 NB ramps and Rosecrans Ave									
B	6.5	0.615	B	6.8	0.618	B	8.7	0.637	+0.019
I-405 SB ramps and Hindry Ave									
A	5.0	0.538	A	5.0	0.541	A	5.0	0.561	+0.020
California St and Imperial Hwy									
A	5.0	0.484	A	5.0	0.486	A	5.0	0.544	+0.058
Main Street and Imperial Hwy									
B	8.6	0.636	B	8.9	0.639	B	13.8	0.688	+0.049
Continental and Grand Ave									
A	5.0	0.276	A	5.0	0.277	A	5.0	0.330	+0.053
Continental and Mariposa Ave									
A	5.0	0.413	A	5.0	0.415	A	5.0	0.415	+0.000
Nash St and Mariposa Ave									
A	5.0	0.342	A	5.0	0.344	A	5.0	0.375	+0.031
Douglas St/Douglas ST and Mariposa Ave									
A	5.0	0.480	A	5.0	0.482	A	5.0	0.524	+0.042
Douglas St and Atwood Way									
A	5.0	0.300	A	5.0	0.301	A	5.0	0.333	+0.032

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

Sepulveda(SR1) and El Segundo Bl

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P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	11	0	0	0	0	0	0	0	0	0	0	0	11
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	38	0	0	0	0	0	0	0	0	0	38
ET	0	0	34	0	0	0	0	0	0	0	0	0	34
ER	0	0	13	0	0	0	0	0	0	0	0	0	13
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	11	0	0	0	0	0	0	0	11
Sum	11	0	85	0	11	0	0	0	0	0	0	0	108

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	265	0.085	266	0.085	266	0.085	266	0.085
	THRU	4.00	6400	1868	0.325	1877	0.327	1889	0.329	1889	0.329
	RIGHT	0.00	0	213	0.000	214	0.000	214	0.000	214	0.000
SB	LEFT	2.00	3120	236	0.076	237	0.076	237	0.076	237	0.076
	THRU	4.00	6400	3155	0.493	3171	0.495	3171	0.495	3171	0.495
	RIGHT	1.00	1600	90	0.056	90	0.057	90	0.057	90	0.057
EB	LEFT	1.00	1600	206	0.129	207	0.129	207	0.129	245	0.153
	THRU	2.00	3200	597	0.187	600	0.187	600	0.187	634	0.198
	RIGHT	1.00	1600	432	0.270	434	0.271	434	0.271	447	0.279
WB	LEFT	1.50	2360	671	0.284	674	0.286	674	0.286	674	0.286
	THRU	1.50	2400	294	0.123	295	0.123	295	0.123	295	0.123
	RIGHT	1.00	1600	288	0.180	289	0.181	289	0.181	301	0.188
Intersection Volume				8315		8357		8368		8464	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					1.099		1.104		1.104		1.115
Stopped Delay (sec/veh)					94.6		96.4		96.4		100.1
LEVEL OF SERVICE (LOS)					F		F		F		F

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Sepulveda(SR1) and Rosecrans Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	4	0	0	0	0	0	0	0	0	0	4
ST	0	0	9	7	0	0	0	0	0	0	0	0	15
SR	0	0	0	128	0	0	0	0	0	0	0	0	128
EL	11	0	0	0	0	0	0	0	0	0	0	0	11
ET	60	0	0	0	0	0	0	0	0	0	0	0	60
ER	4	0	0	0	0	0	0	0	0	0	0	0	4
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	75	0	13	135	0	0	0	0	0	0	0	0	223

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	329	0.105	331	0.106	331	0.106	331	0.106
	THRU	4.00	6400	1567	0.245	1575	0.246	1575	0.246	1575	0.246
	RIGHT	1.00	1600	652	0.407	655	0.410	655	0.410	655	0.410
SB	LEFT	2.00	3120	648	0.208	651	0.209	651	0.209	655	0.210
	THRU	3.00	4800	2939	0.612	2954	0.615	2954	0.615	2969	0.619
	RIGHT	1.00	1600	232	0.145	233	0.146	233	0.146	361	0.226
EB	LEFT	2.00	3120	182	0.058	183	0.059	194	0.062	194	0.062
	THRU	3.00	4800	635	0.132	638	0.133	698	0.145	698	0.145
	RIGHT	1.00	1600	263	0.164	264	0.165	268	0.168	268	0.168
WB	LEFT	2.00	3120	514	0.165	517	0.166	517	0.166	517	0.166
	THRU	2.00	3200	558	0.174	561	0.175	561	0.175	561	0.175
	RIGHT	1.00	1600	501	0.313	504	0.315	504	0.315	504	0.315
Intersection Volume				9020		9065		9140		9288	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					1.065		1.070		1.082		1.086
Stopped Delay (sec/veh)					82.7		84.4		88.8		89.9
LEVEL OF SERVICE (LOS)					F		F		F		F

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Sepulveda(SR1) and Imperial Hwy

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	4	0	4	0	11	0	0	0	0	0	0	0	19
NR	8	0	34	0	0	0	0	0	0	0	0	0	42
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	2	0	0	0	0	0	0	0	0	0	0	2
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	11	2	38	0	11	0	0	0	0	0	0	0	63

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	181	0.113	182	0.114	182	0.114	182	0.114
	THRU	3.00	4800	2021	0.421	2031	0.423	2035	0.424	2050	0.427
	RIGHT	1.00	1600	1094	0.684	1099	0.687	1107	0.692	1141	0.713
SB	LEFT	2.00	3120	343	0.110	345	0.110	345	0.110	345	0.110
	THRU	4.00	6400	2392	0.379	2404	0.381	2404	0.381	2404	0.381
	RIGHT	0.00	0	34	0.000	34	0.000	34	0.000	34	0.000
EB	LEFT	2.00	3120	188	0.060	189	0.061	189	0.061	191	0.061
	THRU	3.00	4800	292	0.061	293	0.061	293	0.061	293	0.061
	RIGHT	1.00	1600	154	0.096	155	0.097	155	0.097	155	0.097
WB	LEFT	2.00	3120	206	0.066	207	0.066	207	0.066	207	0.066
	THRU	3.00	4800	351	0.073	353	0.073	353	0.073	353	0.073
	RIGHT	1.00	1600	419	0.262	421	0.263	421	0.263	421	0.263
Intersection Volume				7675		7713		7725		7776	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.714		0.718		0.718		0.722
Stopped Delay (sec/veh)				16.4		16.8		16.8		17.2	
LEVEL OF SERVICE (LOS)				C		C		C		C	

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Aviation Bl and El Segundo Bl

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	34	0	203	0	0	0	0	0	0	0	237
ER	0	0	0	0	11	0	0	0	0	0	0	0	11
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	34	0	214	0	0	0	0	0	0	0	248

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	150	0.094	151	0.094	151	0.094	151	0.094
	THRU	2.00	3200	901	0.329	906	0.330	906	0.330	906	0.330
	RIGHT	0.00	0	151	0.000	152	0.000	152	0.000	152	0.000
SB	LEFT	1.00	1600	242	0.151	243	0.152	243	0.152	243	0.152
	THRU	2.00	3200	804	0.251	808	0.253	808	0.253	808	0.253
	RIGHT	1.00	1600	78	0.049	78	0.049	78	0.049	78	0.049
EB	LEFT	2.00	3120	221	0.071	222	0.071	222	0.071	222	0.071
	THRU	3.00	4800	1145	0.239	1151	0.240	1151	0.240	1387	0.289
	RIGHT	1.00	1600	247	0.154	248	0.155	248	0.155	259	0.162
WB	LEFT	2.00	3120	608	0.195	611	0.196	611	0.196	611	0.196
	THRU	3.00	4800	609	0.158	612	0.159	612	0.159	612	0.159
	RIGHT	0.00	0	149	0.000	150	0.000	150	0.000	150	0.000
Intersection Volume				5305		5332		5332		5579	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.963		0.968		0.968		1.017
Stopped Delay (sec/veh)					52.7		53.6		53.6		66.0
LEVEL OF SERVICE (LOS)					E		E		E		F

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Aviation Bl and Rosecrans Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	56	0	0	122	0	0	0	0	0	0	0	0	178
ER	4	0	0	7	0	0	0	0	0	0	0	0	11
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	60	0	0	128	0	0	0	0	0	0	0	0	188

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	276	0.088	277	0.089	277	0.089	277	0.089
	THRU	3.00	4800	661	0.138	664	0.138	664	0.138	664	0.138
	RIGHT	1.00	1600	548	0.343	551	0.344	551	0.344	551	0.344
SB	LEFT	2.00	3120	350	0.112	352	0.113	352	0.113	352	0.113
	THRU	4.00	6400	1367	0.214	1374	0.215	1374	0.215	1374	0.215
	RIGHT	1.00	1600	521	0.326	524	0.327	524	0.327	524	0.327
EB	LEFT	1.00	1600	276	0.172	277	0.173	277	0.173	277	0.173
	THRU	3.00	4800	661	0.252	664	0.253	721	0.266	842	0.292
	RIGHT	0.00	0	548	0.000	551	0.000	554	0.000	561	0.000
WB	LEFT	2.00	3120	553	0.177	556	0.178	556	0.178	556	0.178
	THRU	3.00	4800	1217	0.279	1223	0.281	1223	0.281	1223	0.281
	RIGHT	0.00	0	123	0.000	124	0.000	124	0.000	124	0.000
Intersection Volume				7101		7137		7197		7325	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.804		0.807		0.807		0.824
Stopped Delay (sec/veh)				25.6		26.1		26.1		28.6	
LEVEL OF SERVICE (LOS)				D		D		D		D	

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

La Cienega Bl and I-405 SB ramps

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	1.50	2400	217	0.090	218	0.091	218	0.091	218	0.091
	RIGHT	1.50	2360	118	0.050	119	0.050	119	0.050	119	0.050
SB	LEFT	1.00	1600	293	0.183	294	0.184	294	0.184	294	0.184
	THRU	3.00	4800	542	0.113	545	0.113	545	0.113	545	0.113
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	1.50	2360	666	0.282	669	0.284	669	0.284	669	0.284
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.50	800	120	0.150	121	0.151	121	0.151	121	0.151
Intersection Volume				1956		1966		1966		1966	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.606		0.609		0.609		0.609
Stopped Delay (sec/veh)					5.6		5.9		5.9		5.9
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

La Cienega Bl and El Segundo Bl

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	9	0	135	0	0	0	0	0	0	0	144
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	9	0	135	0	0	0	0	0	0	0	144

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	2.00	3120	675	0.216	678	0.217	678	0.217	678	0.217
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	2.00	3120	432	0.138	434	0.139	434	0.139	434	0.139
EB	LEFT	1.00	1600	163	0.102	164	0.102	164	0.102	164	0.102
	THRU	2.00	3200	1305	0.408	1312	0.410	1312	0.410	1455	0.455
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	607	0.164	610	0.164	610	0.164	610	0.164
	RIGHT	0.00	0	178	0.000	179	0.000	179	0.000	179	0.000
Intersection Volume				3360		3377		3377		3520	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.674		0.677		0.677		0.722
Stopped Delay (sec/veh)					12.4		12.7		12.7		17.2
LEVEL OF SERVICE (LOS)					B		B		B		C

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB on-ramp and El Segundo Bl

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	9	0	135	0	0	0	0	0	0	0	144
ER	0	0	26	0	68	0	0	0	0	0	0	0	93
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	34	0	203	0	0	0	0	0	0	0	237

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	1.50	2360	281	0.119	282	0.120	282	0.120	282	0.120
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.50	800	231	0.289	232	0.290	232	0.290	232	0.290
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	937	0.293	942	0.294	942	0.294	1085	0.339
	RIGHT	1.00	1600	833	0.521	837	0.523	837	0.523	930	0.581
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1092	0.228	1097	0.229	1097	0.229	1097	0.229
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				3374		3391		3391		3627	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.632		0.634		0.634		0.679
Stopped Delay (sec/veh)					8.2		8.4		8.4		12.9
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 NB ramps and El Segundo Bl

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	4	0	23	0	0	0	0	0	0	0	27
ER	0	0	4	0	113	0	0	0	0	0	0	0	117
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	9	0	135	0	0	0	0	0	0	0	144

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	329	0.105	331	0.106	331	0.106	331	0.106
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	313	0.196	315	0.197	315	0.197	315	0.197
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1378	0.287	1385	0.289	1385	0.289	1412	0.294
	RIGHT	1.00	(Free)	177		178		178		295	
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.50	4000	485	0.121	487	0.122	487	0.122	487	0.122
	RIGHT	1.50	2360	240	0.102	241	0.102	241	0.102	241	0.102
Intersection Volume				2922		2937		2937		3080	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.533		0.535		0.535		0.541
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB offramp and Rosecrans Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	38	0	0	81	0	0	0	0	0	0	0	0	119
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	38	0	0	81	0	0	0	0	0	0	0	0	119

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	2.00	3120	730	0.234	734	0.235	734	0.235	734	0.235
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	4.00	6400	2401	0.375	2413	0.377	2451	0.383	2532	0.396
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1638	0.341	1646	0.343	1646	0.343	1646	0.343
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				4769		4793		4830		4911	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.625		0.628		0.628		0.628
Stopped Delay (sec/veh)					7.5		7.8		7.8		7.8
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 NB ramps and Rosecrans Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	8	0	0	14	0	0	0	0	0	0	0	0	21
ER	30	0	0	68	0	0	0	0	0	0	0	0	98
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	38	0	0	81	0	0	0	0	0	0	0	0	119

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	593	0.190	596	0.191	596	0.191	596	0.191
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	192	0.120	193	0.121	193	0.121	193	0.121
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	4.00	6400	1561	0.375	1569	0.377	1576	0.383	1590	0.396
	RIGHT	0.00	0	841	0.000	845	0.000	875	0.000	943	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1031	0.322	1036	0.323	1036	0.323	1036	0.323
	RIGHT	0.00	0	514	0.000	517	0.000	517	0.000	517	0.000
Intersection Volume				4732		4756		4793		4874	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.615		0.618		0.624		0.637
Stopped Delay (sec/veh)					6.5		6.8		7.4		8.7
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB ramps and Hindry Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	23	0	0	41	0	0	0	0	0	0	0	0	63
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	23	0	0	41	0	0	0	0	0	0	0	0	63

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	219	0.099	220	0.099	220	0.099	220	0.099
	RIGHT	0.00	0	97	0.000	97	0.000	97	0.000	97	0.000
SB	LEFT	2.00	3120	730	0.234	734	0.235	756	0.242	797	0.255
	THRU	1.00	1600	163	0.195	164	0.196	164	0.196	164	0.196
	RIGHT	0.00	0	149	0.000	150	0.000	150	0.000	150	0.000
EB	LEFT	1.00	1600	145	0.091	146	0.091	146	0.091	146	0.091
	THRU	1.00	1600	80	0.052	80	0.053	80	0.053	80	0.053
	RIGHT	0.00	0	4	0.000	4	0.000	4	0.000	4	0.000
WB	LEFT	0.50	800	40	0.050	40	0.050	40	0.050	40	0.050
	THRU	0.50	800	52	0.065	52	0.065	52	0.065	52	0.065
	RIGHT	2.00	3120	189	0.061	190	0.061	190	0.061	190	0.061
Intersection Volume				1868		1877		1900		1940	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.538		0.541		0.548		0.561
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

California St and Imperial Hwy

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	45	0	0	0	0	0	235	0	0	0	0	280
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	45	0	0	0	0	0	235	0	0	0	0	280

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	10	0.006	10	0.006	10	0.006	10	0.006
	THRU	1.00	1600	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	119	0.074	120	0.075	120	0.075	120	0.075
SB	LEFT	1.00	1600	98	0.061	98	0.062	98	0.062	98	0.062
	THRU	1.00	1600	7	0.010	7	0.010	7	0.010	7	0.010
	RIGHT	0.00	0	9	0.000	9	0.000	9	0.000	9	0.000
EB	LEFT	1.00	1600	8	0.005	8	0.005	8	0.005	8	0.005
	THRU	3.00	4800	1123	0.236	1129	0.237	1129	0.237	1409	0.295
	RIGHT	0.00	0	9	0.000	9	0.000	9	0.000	9	0.000
WB	LEFT	1.00	1600	219	0.137	220	0.138	220	0.138	220	0.138
	THRU	3.00	4800	1535	0.334	1543	0.335	1543	0.335	1543	0.335
	RIGHT	0.00	0	67	0.000	67	0.000	67	0.000	67	0.000
Intersection Volume				3204		3220		3220		3500	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.484		0.486		0.486		0.544
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Main Street and Imperial Hwy

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	45	0	0	0	0	0	0	0	0	0	0	45
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	235	0	0	0	0	235
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	45	0	0	0	0	0	235	0	0	0	0	280

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.50	2360	153	0.065	154	0.065	154	0.065	154	0.065
	THRU	0.50	800	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	421	0.263	423	0.264	423	0.264	468	0.293
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	1.00	1600	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	940	0.196	945	0.197	945	0.197	1180	0.246
	RIGHT	1.00	(Free)	274		275		275		275	
WB	LEFT	1.00	1600	521	0.326	524	0.327	524	0.327	524	0.327
	THRU	3.00	4800	776	0.162	780	0.163	780	0.163	780	0.163
	RIGHT	0.00	0	4	0.000	4	0.000	4	0.000	4	0.000
Intersection Volume				3089		3104		3104		3384	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.636		0.639		0.639		0.688
Stopped Delay (sec/veh)					8.6		8.9		8.9		13.8
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Continental and Grand Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	100	0	0	0	0	0	0	100
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	0	0	0	0	0	0	100

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	74	0.000	74	0.000	74	0.000	74	0.000
	THRU	3.00	4800	218	0.067	219	0.067	219	0.067	219	0.067
	RIGHT	0.00	0	29	0.000	29	0.000	29	0.000	29	0.000
SB	LEFT	1.00	1600	22	0.014	22	0.014	22	0.014	22	0.014
	THRU	3.00	4800	349	0.090	351	0.090	351	0.090	351	0.090
	RIGHT	0.00	0	83	0.000	83	0.000	83	0.000	83	0.000
EB	LEFT	1.00	1600	102	0.064	103	0.064	103	0.064	203	0.127
	THRU	3.00	4800	229	0.105	230	0.105	230	0.105	230	0.105
	RIGHT	0.00	0	274	0.000	275	0.000	275	0.000	275	0.000
WB	LEFT	1.00	1600	50	0.031	50	0.031	50	0.031	50	0.031
	THRU	3.00	4800	260	0.063	261	0.063	261	0.063	261	0.063
	RIGHT	0.00	0	41	0.000	41	0.000	41	0.000	41	0.000
Intersection Volume				1731		1740		1740		1840	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.276		0.277		0.277		0.330
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Continental and Mariposa Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	100	0	0	0	0	0	0	100
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	0	0	0	0	0	0	100

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	213	0.133	214	0.134	214	0.134	214	0.134
	THRU	1.00	1600	161	0.101	162	0.101	162	0.101	162	0.101
	RIGHT	2.00	3120	218	0.070	219	0.070	219	0.070	319	0.102
SB	LEFT	1.00	1600	18	0.011	18	0.011	18	0.011	18	0.011
	THRU	1.00	1600	96	0.075	96	0.075	96	0.075	96	0.075
	RIGHT	0.00	0	24	0.000	24	0.000	24	0.000	24	0.000
EB	LEFT	1.00	1600	21	0.013	21	0.013	21	0.013	21	0.013
	THRU	3.00	4800	307	0.082	309	0.082	309	0.082	309	0.082
	RIGHT	0.00	0	87	0.000	87	0.000	87	0.000	87	0.000
WB	LEFT	1.00	1600	117	0.073	118	0.073	118	0.073	118	0.073
	THRU	2.00	3200	374	0.125	376	0.126	376	0.126	376	0.126
	RIGHT	0.00	0	27	0.000	27	0.000	27	0.000	27	0.000
Intersection Volume				1663		1671		1671		1771	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.413		0.415		0.415		0.415
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Nash St and Mariposa Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	100	0	0	0	0	0	0	100
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	0	0	0	0	0	0	100

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	86	0.000	86	0.000	86	0.000	86	0.000
	THRU	4.00	6400	397	0.095	399	0.095	399	0.095	399	0.095
	RIGHT	0.00	0	124	0.000	125	0.000	125	0.000	125	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	442	0.138	444	0.139	444	0.139	544	0.170
	RIGHT	1.00	1600	214	0.134	215	0.134	215	0.134	215	0.134
WB	LEFT	1.00	1600	95	0.059	95	0.060	95	0.060	95	0.060
	THRU	2.00	3200	189	0.059	190	0.059	190	0.059	190	0.059
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				1547		1555		1555		1655	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.342		0.344		0.344		0.375
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Douglas St/Douglas ST and Mariposa Ave

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	100	0	0	0	0	0	0	100
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	0	0	0	0	0	0	100

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.50	2360	268	0.114	269	0.114	269	0.114	269	0.114
	THRU	4.50	7200	468	0.065	470	0.065	470	0.065	470	0.065
	RIGHT	1.00	1600	8	0.005	8	0.005	8	0.005	8	0.005
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	1.50	2360	709	0.300	713	0.302	713	0.302	813	0.344
	THRU	0.50	800	11	0.014	11	0.014	11	0.014	11	0.014
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	25	0.016	25	0.016	25	0.016	25	0.016
	RIGHT	0.00	0	26	0.000	26	0.000	26	0.000	26	0.000
Intersection Volume				1515		1523		1523		1623	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.480		0.482		0.482		0.524
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Douglas St and Atwood Way

File: C:2008PM_W.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	100	0	0	0	0	0	0	100
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	0	0	0	0	0	0	100

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	753	0.241	757	0.243	757	0.243	857	0.275
	THRU	4.00	6400	548	0.086	551	0.086	551	0.086	551	0.086
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	2.00	3120	26	0.008	26	0.008	26	0.008	26	0.008
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				1327		1334		1334		1434	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.300		0.301		0.301		0.333
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

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TRIPS GENERATED BY PROJECTS

PROJECT (or Project Group)	A.M.PEAK HOUR enter	A.M.PEAK HOUR exit	P.M.PEAK HOUR enter	P.M.PEAK HOUR exit
1 Chevron Gate 22	0	0	0	75
2 Chevron Lots 5-6-7	0	0	0	45
3 Chevron Gates 7&8	0	0	0	85
4 Chevron Gate 10	0	0	0	135
5 Douglas building parking	0	0	0	225
6 Grand Avenue Courtyard parking	0	0	0	100
7 Pacific Tower parking	0	0	0	0
8 Dockweiler beach parking	0	0	0	235

C:2008PM_W.ivc

LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008			Plus Related Projects			Plus Proposed Project		
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+ V/C
Sepulveda(SR1) and El Segundo Bl	F	94.6	1.099	F	96.4	1.104	F	100.1	1.115	F	100.1	1.115	+0.000
Sepulveda(SR1) and Rosecrans Ave	F	82.7	1.065	F	84.4	1.070	F	85.6	1.073	F	89.9	1.086	+0.013
Sepulveda(SR1) and Imperial Hwy	C	16.4	0.714	C	16.8	0.718	C	17.2	0.722	C	17.2	0.722	+0.001
Aviation Bl and El Segundo Bl	E	52.7	0.963	E	53.6	0.968	F	66.0	1.017	F	66.0	1.017	+0.000
Aviation Bl and Rosecrans Ave	D	25.6	0.804	D	26.1	0.807	D	28.6	0.824	D	28.6	0.824	+0.000
La Cienega Bl and I-405 SB ramps	B	5.6	0.606	B	5.9	0.609	B	5.9	0.609	B	5.9	0.609	+0.000
La Cienega Bl and El Segundo Bl	B	12.4	0.674	B	12.7	0.677	C	17.2	0.722	C	17.2	0.722	+0.000
I-405 SB on-ramp and El Segundo Bl	B	8.2	0.632	B	8.4	0.634	B	12.9	0.679	B	12.9	0.679	+0.000
I-405 NB ramps and El Segundo Bl	A	5.0	0.533	A	5.0	0.535	A	5.0	0.541	A	5.0	0.541	+0.000
I-405 SB offramp and Rosecrans Ave	B	7.5	0.625	B	7.8	0.628	B	7.8	0.628	B	7.8	0.628	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

C:2008PM_W.ivc

LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008			Plus Related Projects			Plus Proposed Project			
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+ V/C
I-405 NB ramps and Rosecrans Ave	B	6.5	0.615	B	6.8	0.618	B	8.1	0.631	B	8.7	0.637	+0.006
I-405 SB ramps and Hindry Ave	A	5.0	0.538	A	5.0	0.541	A	5.0	0.554	A	5.0	0.561	+0.007
California St and Imperial Hwy	A	5.0	0.484	A	5.0	0.486	A	5.0	0.544	A	5.0	0.544	+0.000
Main Street and Imperial Hwy	B	8.6	0.636	B	8.9	0.639	B	13.8	0.688	B	13.8	0.688	+0.000
Continental and Grand Ave	A	5.0	0.276	A	5.0	0.277	A	5.0	0.330	A	5.0	0.330	+0.000
Continental and Mariposa Ave	A	5.0	0.413	A	5.0	0.415	A	5.0	0.415	A	5.0	0.415	+0.000
Nash St and Mariposa Ave	A	5.0	0.342	A	5.0	0.344	A	5.0	0.375	A	5.0	0.375	+0.000
Douglas St/Douglas ST and Mariposa Ave	A	5.0	0.480	A	5.0	0.482	A	5.0	0.524	A	5.0	0.524	+0.000
Douglas St and Atwood Way	A	5.0	0.300	A	5.0	0.301	A	5.0	0.333	A	5.0	0.333	+0.000
Sepulveda Blvd and Hughes Way/Gate 10	A	5.0	0.549	A	5.0	0.552	A	5.0	0.554	A	5.0	0.554	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

C:2008PM_W.ivc

LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

Intersection	Year 2007			Forecast Year 2008			Plus Proposed Project				Plus Related Projects		
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+V/C	LOS	DELAY	V/C
Sepulveda(SR1) and El Segundo Bl	F	94.6	1.099	F	96.4	1.104	F	96.4	1.104	+0.000	F	100.1	1.115
Sepulveda(SR1) and Rosecrans Ave	F	82.7	1.065	F	84.4	1.070	F	88.8	1.082	+0.013	F	89.9	1.086
Sepulveda(SR1) and Imperial Hwy	C	16.4	0.714	C	16.8	0.718	C	16.8	0.718	+0.001	C	17.2	0.722
Aviation Bl and El Segundo Bl	E	52.7	0.963	E	53.6	0.968	E	53.6	0.968	+0.000	F	66.0	1.017
Aviation Bl and Rosecrans Ave	D	25.6	0.804	D	26.1	0.807	D	26.1	0.807	+0.000	D	28.6	0.824
La Cienega Bl and I-405 SB ramps	B	5.6	0.606	B	5.9	0.609	B	5.9	0.609	+0.000	B	5.9	0.609
La Cienega Bl and El Segundo Bl	B	12.4	0.674	B	12.7	0.677	B	12.7	0.677	+0.000	C	17.2	0.722
I-405 SB on-ramp and El Segundo Bl	B	8.2	0.632	B	8.4	0.634	B	8.4	0.634	+0.000	B	12.9	0.679
I-405 NB ramps and El Segundo Bl	A	5.0	0.533	A	5.0	0.535	A	5.0	0.535	+0.000	A	5.0	0.541
I-405 SB offramp and Rosecrans Ave	B	7.5	0.625	B	7.8	0.628	B	7.8	0.628	+0.000	B	7.8	0.628

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

C:2008PM_W.ivc

LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

Intersection	Year 2007			Forecast Year 2008			Plus Proposed Project				Plus Related Projects		
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+V/C	LOS	DELAY	V/C
I-405 NB ramps and Rosecrans Ave	B	6.5	0.615	B	6.8	0.618	B	7.4	0.624	+0.006	B	8.7	0.637
I-405 SB ramps and Hindry Ave	A	5.0	0.538	A	5.0	0.541	A	5.0	0.548	+0.007	A	5.0	0.561
California St and Imperial Hwy	A	5.0	0.484	A	5.0	0.486	A	5.0	0.486	+0.000	A	5.0	0.544
Main Street and Imperial Hwy	B	8.6	0.636	B	8.9	0.639	B	8.9	0.639	+0.000	B	13.8	0.688
Continental and Grand Ave	A	5.0	0.276	A	5.0	0.277	A	5.0	0.277	+0.000	A	5.0	0.330
Continental and Mariposa Ave	A	5.0	0.413	A	5.0	0.415	A	5.0	0.415	+0.000	A	5.0	0.415
Nash St and Mariposa Ave	A	5.0	0.342	A	5.0	0.344	A	5.0	0.344	+0.000	A	5.0	0.375
Douglas St/Douglas ST and Mariposa Ave	A	5.0	0.480	A	5.0	0.482	A	5.0	0.482	+0.000	A	5.0	0.524
Douglas St and Atwood Way	A	5.0	0.300	A	5.0	0.301	A	5.0	0.301	+0.000	A	5.0	0.333

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

LEVEL OF SERVICE ANALYSIS

C:2008PM_S.ivc

P.M. PEAK HOUR

Scenario: 2008 Summer construction
Ambient Traffic Growth: 0.5 % per year

Intersection	Year 2007 LOS	Year 2007 DELAY	Year 2007 V/C	Forecast Year 2008 LOS	Forecast Year 2008 DELAY	Forecast Year 2008 V/C	Plus Proposed Construction LOS	Plus Proposed Construction DELAY	Plus Proposed Construction V/C	Construction impact + V/C
Sepulveda(SR1) and El Segundo Bl	F	94.6	1.099	F	96.4	1.104	F	100.1	1.115	+0.011
Sepulveda(SR1) and Rosecrans Ave	F	82.7	1.065	F	84.4	1.070	F	89.9	1.086	+0.016
Sepulveda(SR1) and Imperial Hwy	C	16.4	0.714	C	16.8	0.718	C	17.2	0.722	+0.004
Aviation Bl and El Segundo Bl	E	52.7	0.963	E	53.6	0.968	F	66.0	1.017	+0.049
Aviation Bl and Rosecrans Ave	D	25.6	0.804	D	26.1	0.807	D	28.6	0.824	+0.017
La Cienega Bl and I-405 SB ramps	B	5.6	0.606	B	5.9	0.609	B	5.9	0.609	+0.000
La Cienega Bl and El Segundo Bl	B	12.4	0.674	B	12.7	0.677	C	17.2	0.722	+0.045
I-405 SB on-ramp and El Segundo Bl	B	8.2	0.632	B	8.4	0.634	B	12.9	0.679	+0.045
I-405 NB ramps and El Segundo Bl	A	5.0	0.533	A	5.0	0.535	A	5.0	0.541	+0.006
I-405 SB offramp and Rosecrans Ave	B	7.5	0.625	B	7.8	0.628	B	7.8	0.628	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

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LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Scenario: 2008 Summer construction
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008			Plus Proposed Construction			Construction impact
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+ V/C
I-405 NB ramps and Rosecrans Ave	B	6.5	0.615	B	6.8	0.618	B	8.7	0.637	+0.006
I-405 SB ramps and Hindry Ave	A	5.0	0.538	A	5.0	0.541	A	5.0	0.561	+0.007
California St and Imperial Hwy	A	5.0	0.484	A	5.0	0.486	A	5.0	0.496	+0.010
Main Street and Imperial Hwy	B	8.6	0.636	B	8.9	0.639	B	8.9	0.639	+0.000
Continental and Grand Ave	A	5.0	0.276	A	5.0	0.277	A	5.0	0.352	+0.075
Continental and Mariposa Ave	A	5.0	0.413	A	5.0	0.415	A	5.0	0.415	+0.000
Nash St and Mariposa Ave	A	5.0	0.342	A	5.0	0.344	A	5.0	0.386	+0.042
Douglas St/Douglas ST and Mariposa Ave	A	5.0	0.480	A	5.0	0.482	A	5.0	0.539	+0.057
Douglas St and Atwood Way	A	5.0	0.300	A	5.0	0.301	A	5.0	0.344	+0.043

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

Sepulveda(SR1) and El Segundo Bl

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	11	0	0	0	0	0	0	0	0	0	0	0	11
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	38	0	0	0	0	0	0	0	0	0	38
ET	0	0	34	0	0	0	0	0	0	0	0	0	34
ER	0	0	13	0	0	0	0	0	0	0	0	0	13
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	11	0	0	0	0	0	0	0	11
Sum	11	0	85	0	11	0	0	0	0	0	0	0	108

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	2.00	3120	265	0.085	266	0.085	266	0.085	266	0.085
	THRU	4.00	6400	1868	0.325	1877	0.327	1889	0.329	1889	0.329
	RIGHT	0.00	0	213	0.000	214	0.000	214	0.000	214	0.000
SB	LEFT	2.00	3120	236	0.076	237	0.076	237	0.076	237	0.076
	THRU	4.00	6400	3155	0.493	3171	0.495	3171	0.495	3171	0.495
	RIGHT	1.00	1600	90	0.056	90	0.057	90	0.057	90	0.057
EB	LEFT	1.00	1600	206	0.129	207	0.129	207	0.129	245	0.153
	THRU	2.00	3200	597	0.187	600	0.187	600	0.187	634	0.198
	RIGHT	1.00	1600	432	0.270	434	0.271	434	0.271	447	0.279
WB	LEFT	1.50	2360	671	0.284	674	0.286	674	0.286	674	0.286
	THRU	1.50	2400	294	0.123	295	0.123	295	0.123	295	0.123
	RIGHT	1.00	1600	288	0.180	289	0.181	289	0.181	301	0.188
Intersection Volume				8315		8357		8368		8464	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					1.099		1.104		1.104		1.115
Stopped Delay (sec/veh)					94.6		96.4		96.4		100.1
LEVEL OF SERVICE (LOS)					F		F		F		F

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Sepulveda(SR1) and Rosecrans Ave

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	4	0	0	0	0	0	0	0	0	0	4
ST	0	0	9	7	0	0	0	0	0	0	0	0	15
SR	0	0	0	128	0	0	0	0	0	0	0	0	128
EL	11	0	0	0	0	0	0	0	0	0	0	0	11
ET	60	0	0	0	0	0	0	0	0	0	0	0	60
ER	4	0	0	0	0	0	0	0	0	0	0	0	4
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	75	0	13	135	0	0	0	0	0	0	0	0	223

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	329	0.105	331	0.106	331	0.106	331	0.106
	THRU	4.00	6400	1567	0.245	1575	0.246	1575	0.246	1575	0.246
	RIGHT	1.00	1600	652	0.407	655	0.410	655	0.410	655	0.410
SB	LEFT	2.00	3120	648	0.208	651	0.209	651	0.209	655	0.210
	THRU	3.00	4800	2939	0.612	2954	0.615	2954	0.615	2969	0.619
	RIGHT	1.00	1600	232	0.145	233	0.146	233	0.146	361	0.226
EB	LEFT	2.00	3120	182	0.058	183	0.059	194	0.062	194	0.062
	THRU	3.00	4800	635	0.132	638	0.133	698	0.145	698	0.145
	RIGHT	1.00	1600	263	0.164	264	0.165	268	0.168	268	0.168
WB	LEFT	2.00	3120	514	0.165	517	0.166	517	0.166	517	0.166
	THRU	2.00	3200	558	0.174	561	0.175	561	0.175	561	0.175
	RIGHT	1.00	1600	501	0.313	504	0.315	504	0.315	504	0.315
Intersection Volume				9020		9065		9140		9288	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					1.065		1.070		1.082		1.086
Stopped Delay (sec/veh)					82.7		84.4		88.8		89.9
LEVEL OF SERVICE (LOS)					F		F		F		F

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Sepulveda(SR1) and Imperial Hwy

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	4	0	4	0	11	0	0	0	0	0	0	0	19
NR	8	0	34	0	0	0	0	0	0	0	0	0	42
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	2	0	0	0	0	0	0	0	0	0	0	2
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	11	2	38	0	11	0	0	0	0	0	0	0	63

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	181	0.113	182	0.114	182	0.114	182	0.114
	THRU	3.00	4800	2021	0.421	2031	0.423	2035	0.424	2050	0.427
	RIGHT	1.00	1600	1094	0.684	1099	0.687	1107	0.692	1141	0.713
SB	LEFT	2.00	3120	343	0.110	345	0.110	345	0.110	345	0.110
	THRU	4.00	6400	2392	0.379	2404	0.381	2404	0.381	2404	0.381
	RIGHT	0.00	0	34	0.000	34	0.000	34	0.000	34	0.000
EB	LEFT	2.00	3120	188	0.060	189	0.061	189	0.061	191	0.061
	THRU	3.00	4800	292	0.061	293	0.061	293	0.061	293	0.061
	RIGHT	1.00	1600	154	0.096	155	0.097	155	0.097	155	0.097
WB	LEFT	2.00	3120	206	0.066	207	0.066	207	0.066	207	0.066
	THRU	3.00	4800	351	0.073	353	0.073	353	0.073	353	0.073
	RIGHT	1.00	1600	419	0.262	421	0.263	421	0.263	421	0.263
Intersection Volume				7675		7713		7725		7776	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.714		0.718		0.718		0.722
Stopped Delay (sec/veh)				16.4		16.8		16.8		17.2	
LEVEL OF SERVICE (LOS)				C		C		C		C	

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Aviation Bl and El Segundo Bl

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	34	0	203	0	0	0	0	0	0	0	237
ER	0	0	0	0	11	0	0	0	0	0	0	0	11
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	34	0	214	0	0	0	0	0	0	0	248

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	150	0.094	151	0.094	151	0.094	151	0.094
	THRU	2.00	3200	901	0.329	906	0.330	906	0.330	906	0.330
	RIGHT	0.00	0	151	0.000	152	0.000	152	0.000	152	0.000
SB	LEFT	1.00	1600	242	0.151	243	0.152	243	0.152	243	0.152
	THRU	2.00	3200	804	0.251	808	0.253	808	0.253	808	0.253
	RIGHT	1.00	1600	78	0.049	78	0.049	78	0.049	78	0.049
EB	LEFT	2.00	3120	221	0.071	222	0.071	222	0.071	222	0.071
	THRU	3.00	4800	1145	0.239	1151	0.240	1151	0.240	1387	0.289
	RIGHT	1.00	1600	247	0.154	248	0.155	248	0.155	259	0.162
WB	LEFT	2.00	3120	608	0.195	611	0.196	611	0.196	611	0.196
	THRU	3.00	4800	609	0.158	612	0.159	612	0.159	612	0.159
	RIGHT	0.00	0	149	0.000	150	0.000	150	0.000	150	0.000
Intersection Volume				5305		5332		5332		5579	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.963		0.968		0.968		1.017
Stopped Delay (sec/veh)					52.7		53.6		53.6		66.0
LEVEL OF SERVICE (LOS)					E		E		E		F

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Aviation Bl and Rosecrans Ave

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	56	0	0	122	0	0	0	0	0	0	0	0	178
ER	4	0	0	7	0	0	0	0	0	0	0	0	11
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	60	0	0	128	0	0	0	0	0	0	0	0	188

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	276	0.088	277	0.089	277	0.089	277	0.089
	THRU	3.00	4800	661	0.138	664	0.138	664	0.138	664	0.138
	RIGHT	1.00	1600	548	0.343	551	0.344	551	0.344	551	0.344
SB	LEFT	2.00	3120	350	0.112	352	0.113	352	0.113	352	0.113
	THRU	4.00	6400	1367	0.214	1374	0.215	1374	0.215	1374	0.215
	RIGHT	1.00	1600	521	0.326	524	0.327	524	0.327	524	0.327
EB	LEFT	1.00	1600	276	0.172	277	0.173	277	0.173	277	0.173
	THRU	3.00	4800	661	0.252	664	0.253	721	0.266	842	0.292
	RIGHT	0.00	0	548	0.000	551	0.000	554	0.000	561	0.000
WB	LEFT	2.00	3120	553	0.177	556	0.178	556	0.178	556	0.178
	THRU	3.00	4800	1217	0.279	1223	0.281	1223	0.281	1223	0.281
	RIGHT	0.00	0	123	0.000	124	0.000	124	0.000	124	0.000
Intersection Volume				7101		7137		7197		7325	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.804		0.807		0.807		0.824
Stopped Delay (sec/veh)				25.6		26.1		26.1		28.6	
LEVEL OF SERVICE (LOS)				D		D		D		D	

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

La Cienega Bl and I-405 SB ramps

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0	0

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	1.50	2400	217	0.090	218	0.091	218	0.091	218	0.091
	RIGHT	1.50	2360	118	0.050	119	0.050	119	0.050	119	0.050
SB	LEFT	1.00	1600	293	0.183	294	0.184	294	0.184	294	0.184
	THRU	3.00	4800	542	0.113	545	0.113	545	0.113	545	0.113
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	1.50	2360	666	0.282	669	0.284	669	0.284	669	0.284
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.50	800	120	0.150	121	0.151	121	0.151	121	0.151
Intersection Volume				1956		1966		1966		1966	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.606		0.609		0.609		0.609
Stopped Delay (sec/veh)					5.6		5.9		5.9		5.9
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

La Cienega Bl and El Segundo Bl

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	9	0	135	0	0	0	0	0	0	0	144
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	9	0	135	0	0	0	0	0	0	0	144

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	2.00	3120	675	0.216	678	0.217	678	0.217	678	0.217
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	2.00	3120	432	0.138	434	0.139	434	0.139	434	0.139
EB	LEFT	1.00	1600	163	0.102	164	0.102	164	0.102	164	0.102
	THRU	2.00	3200	1305	0.408	1312	0.410	1312	0.410	1455	0.455
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	607	0.164	610	0.164	610	0.164	610	0.164
	RIGHT	0.00	0	178	0.000	179	0.000	179	0.000	179	0.000
Intersection Volume				3360		3377		3377		3520	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.674		0.677		0.677		0.722
Stopped Delay (sec/veh)					12.4		12.7		12.7		17.2
LEVEL OF SERVICE (LOS)					B		B		B		C

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB on-ramp and El Segundo Bl

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	9	0	135	0	0	0	0	0	0	0	144
ER	0	0	26	0	68	0	0	0	0	0	0	0	93
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	34	0	203	0	0	0	0	0	0	0	237

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.50	2360	281	0.119	282	0.120	282	0.120	282	0.120
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.50	800	231	0.289	232	0.290	232	0.290	232	0.290
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	937	0.293	942	0.294	942	0.294	1085	0.339
	RIGHT	1.00	1600	833	0.521	837	0.523	837	0.523	930	0.581
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1092	0.228	1097	0.229	1097	0.229	1097	0.229
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				3374		3391		3391		3627	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.632		0.634		0.634		0.679
Stopped Delay (sec/veh)					8.2		8.4		8.4		12.9
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 NB ramps and El Segundo Bl

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	4	0	23	0	0	0	0	0	0	0	27
ER	0	0	4	0	113	0	0	0	0	0	0	0	117
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	9	0	135	0	0	0	0	0	0	0	144

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	329	0.105	331	0.106	331	0.106	331	0.106
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	313	0.196	315	0.197	315	0.197	315	0.197
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1378	0.287	1385	0.289	1385	0.289	1412	0.294
	RIGHT	1.00	(Free)	177		178		178		295	
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.50	4000	485	0.121	487	0.122	487	0.122	487	0.122
	RIGHT	1.50	2360	240	0.102	241	0.102	241	0.102	241	0.102
Intersection Volume				2922		2937		2937		3080	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.533		0.535		0.535		0.541
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB offramp and Rosecrans Ave

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	38	0	0	81	0	0	0	0	0	0	0	0	119
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	38	0	0	81	0	0	0	0	0	0	0	0	119

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	2.00	3120	730	0.234	734	0.235	734	0.235	734	0.235
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	4.00	6400	2401	0.375	2413	0.377	2451	0.383	2532	0.396
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1638	0.341	1646	0.343	1646	0.343	1646	0.343
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				4769		4793		4830		4911	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.625		0.628		0.628		0.628
Stopped Delay (sec/veh)					7.5		7.8		7.8		7.8
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 NB ramps and Rosecrans Ave

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	8	0	0	14	0	0	0	0	0	0	0	0	21
ER	30	0	0	68	0	0	0	0	0	0	0	0	98
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	38	0	0	81	0	0	0	0	0	0	0	0	119

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	593	0.190	596	0.191	596	0.191	596	0.191
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	192	0.120	193	0.121	193	0.121	193	0.121
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	4.00	6400	1561	0.375	1569	0.377	1576	0.383	1590	0.396
	RIGHT	0.00	0	841	0.000	845	0.000	875	0.000	943	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	1031	0.322	1036	0.323	1036	0.323	1036	0.323
	RIGHT	0.00	0	514	0.000	517	0.000	517	0.000	517	0.000
Intersection Volume				4732		4756		4793		4874	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.615		0.618		0.624		0.637
Stopped Delay (sec/veh)					6.5		6.8		7.4		8.7
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

I-405 SB ramps and Hindry Ave

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	23	0	0	41	0	0	0	0	0	0	0	0	63
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	23	0	0	41	0	0	0	0	0	0	0	0	63

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	219	0.099	220	0.099	220	0.099	220	0.099
	RIGHT	0.00	0	97	0.000	97	0.000	97	0.000	97	0.000
SB	LEFT	2.00	3120	730	0.234	734	0.235	756	0.242	797	0.255
	THRU	1.00	1600	163	0.195	164	0.196	164	0.196	164	0.196
	RIGHT	0.00	0	149	0.000	150	0.000	150	0.000	150	0.000
EB	LEFT	1.00	1600	145	0.091	146	0.091	146	0.091	146	0.091
	THRU	1.00	1600	80	0.052	80	0.053	80	0.053	80	0.053
	RIGHT	0.00	0	4	0.000	4	0.000	4	0.000	4	0.000
WB	LEFT	0.50	800	40	0.050	40	0.050	40	0.050	40	0.050
	THRU	0.50	800	52	0.065	52	0.065	52	0.065	52	0.065
	RIGHT	2.00	3120	189	0.061	190	0.061	190	0.061	190	0.061
Intersection Volume				1868		1877		1900		1940	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.538		0.541		0.548		0.561
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

California St and Imperial Hwy

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	45	0	0	0	0	0	0	0	0	0	0	45
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	45	0	0	0	0	0	0	0	0	0	0	45

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.00	1600	10	0.006	10	0.006	10	0.006	10	0.006
	THRU	1.00	1600	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	119	0.074	120	0.075	120	0.075	120	0.075
SB	LEFT	1.00	1600	98	0.061	98	0.062	98	0.062	98	0.062
	THRU	1.00	1600	7	0.010	7	0.010	7	0.010	7	0.010
	RIGHT	0.00	0	9	0.000	9	0.000	9	0.000	9	0.000
EB	LEFT	1.00	1600	8	0.005	8	0.005	8	0.005	8	0.005
	THRU	3.00	4800	1123	0.236	1129	0.237	1129	0.237	1174	0.246
	RIGHT	0.00	0	9	0.000	9	0.000	9	0.000	9	0.000
WB	LEFT	1.00	1600	219	0.137	220	0.138	220	0.138	220	0.138
	THRU	3.00	4800	1535	0.334	1543	0.335	1543	0.335	1543	0.335
	RIGHT	0.00	0	67	0.000	67	0.000	67	0.000	67	0.000
Intersection Volume				3204		3220		3220		3265	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.484		0.486		0.486		0.496
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Main Street and Imperial Hwy

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	45	0	0	0	0	0	0	0	0	0	0	45
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	45	0	0	0	0	0	0	0	0	0	0	45

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	1.50	2360	153	0.065	154	0.065	154	0.065	154	0.065
	THRU	0.50	800	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	1.00	1600	421	0.263	423	0.264	423	0.264	468	0.293
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	1.00	1600	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	3.00	4800	940	0.196	945	0.197	945	0.197	945	0.197
	RIGHT	1.00	(Free)	274		275		275		275	
WB	LEFT	1.00	1600	521	0.326	524	0.327	524	0.327	524	0.327
	THRU	3.00	4800	776	0.162	780	0.163	780	0.163	780	0.163
	RIGHT	0.00	0	4	0.000	4	0.000	4	0.000	4	0.000
Intersection Volume				3089		3104		3104		3149	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.636		0.639		0.639		0.639
Stopped Delay (sec/veh)					8.6		8.9		8.9		8.9
LEVEL OF SERVICE (LOS)					B		B		B		B

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Continental and Grand Ave

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	100	35	0	0	0	0	0	135
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	35	0	0	0	0	0	135

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	74	0.000	74	0.000	74	0.000	74	0.000
	THRU	3.00	4800	218	0.067	219	0.067	219	0.067	219	0.067
	RIGHT	0.00	0	29	0.000	29	0.000	29	0.000	29	0.000
SB	LEFT	1.00	1600	22	0.014	22	0.014	22	0.014	22	0.014
	THRU	3.00	4800	349	0.090	351	0.090	351	0.090	351	0.090
	RIGHT	0.00	0	83	0.000	83	0.000	83	0.000	83	0.000
EB	LEFT	1.00	1600	102	0.064	103	0.064	103	0.064	238	0.148
	THRU	3.00	4800	229	0.105	230	0.105	230	0.105	230	0.105
	RIGHT	0.00	0	274	0.000	275	0.000	275	0.000	275	0.000
WB	LEFT	1.00	1600	50	0.031	50	0.031	50	0.031	50	0.031
	THRU	3.00	4800	260	0.063	261	0.063	261	0.063	261	0.063
	RIGHT	0.00	0	41	0.000	41	0.000	41	0.000	41	0.000
Intersection Volume				1731		1740		1740		1875	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.276		0.277		0.277		0.352
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Continental and Mariposa Ave

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	100	35	0	0	0	0	0	135
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	35	0	0	0	0	0	135

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

				Year 2007		Forecast Year 2008		W/Proposed Project		With ALL Projects	
Movement		Lanes	Capacity	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C
NB	LEFT	1.00	1600	213	0.133	214	0.134	214	0.134	214	0.134
	THRU	1.00	1600	161	0.101	162	0.101	162	0.101	162	0.101
	RIGHT	2.00	3120	218	0.070	219	0.070	219	0.070	354	0.113
SB	LEFT	1.00	1600	18	0.011	18	0.011	18	0.011	18	0.011
	THRU	1.00	1600	96	0.075	96	0.075	96	0.075	96	0.075
	RIGHT	0.00	0	24	0.000	24	0.000	24	0.000	24	0.000
EB	LEFT	1.00	1600	21	0.013	21	0.013	21	0.013	21	0.013
	THRU	3.00	4800	307	0.082	309	0.082	309	0.082	309	0.082
	RIGHT	0.00	0	87	0.000	87	0.000	87	0.000	87	0.000
WB	LEFT	1.00	1600	117	0.073	118	0.073	118	0.073	118	0.073
	THRU	2.00	3200	374	0.125	376	0.126	376	0.126	376	0.126
	RIGHT	0.00	0	27	0.000	27	0.000	27	0.000	27	0.000
Intersection Volume				1663		1671		1671		1806	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.413		0.415		0.415		0.415
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Nash St and Mariposa Ave

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	100	35	0	0	0	0	0	135
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	35	0	0	0	0	0	135

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	86	0.000	86	0.000	86	0.000	86	0.000
	THRU	4.00	6400	397	0.095	399	0.095	399	0.095	399	0.095
	RIGHT	0.00	0	124	0.000	125	0.000	125	0.000	125	0.000
EB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	442	0.138	444	0.139	444	0.139	579	0.181
	RIGHT	1.00	1600	214	0.134	215	0.134	215	0.134	215	0.134
WB	LEFT	1.00	1600	95	0.059	95	0.060	95	0.060	95	0.060
	THRU	2.00	3200	189	0.059	190	0.059	190	0.059	190	0.059
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				1547		1555		1555		1690	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.342		0.344		0.344		0.386
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Douglas St/Douglas ST and Mariposa Ave

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P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	100	35	0	0	0	0	0	135
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	35	0	0	0	0	0	135

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	V/C	Forecast Year 2008 Volume	V/C	W/Proposed Project Volume	V/C	With ALL Projects Volume	V/C
NB	LEFT	1.50	2360	268	0.114	269	0.114	269	0.114	269	0.114
	THRU	4.50	7200	468	0.065	470	0.065	470	0.065	470	0.065
	RIGHT	1.00	1600	8	0.005	8	0.005	8	0.005	8	0.005
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	1.50	2360	709	0.300	713	0.302	713	0.302	848	0.359
	THRU	0.50	800	11	0.014	11	0.014	11	0.014	11	0.014
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	2.00	3200	25	0.016	25	0.016	25	0.016	25	0.016
	RIGHT	0.00	0	26	0.000	26	0.000	26	0.000	26	0.000
Intersection Volume				1515		1523		1523		1658	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.480		0.482		0.482		0.539
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

Douglas St and Atwood Way

File: C:2008PM_S.ivc

P.M. PEAK HOUR

TRIPS AT INTERSECTION FROM EACH PROJECT

Projects or Project Groups (1 = Proposed Project)

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
NL	0	0	0	0	0	100	35	0	0	0	0	0	135
NT	0	0	0	0	0	0	0	0	0	0	0	0	0
NR	0	0	0	0	0	0	0	0	0	0	0	0	0
SL	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0	0	0	0	0	0	0
EL	0	0	0	0	0	0	0	0	0	0	0	0	0
ET	0	0	0	0	0	0	0	0	0	0	0	0	0
ER	0	0	0	0	0	0	0	0	0	0	0	0	0
WL	0	0	0	0	0	0	0	0	0	0	0	0	0
WT	0	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	100	35	0	0	0	0	0	135

INTERSECTION LEVEL OF SERVICE (LOS)

* Geometrics: Existing Geometrics
* Ambient Traffic Growth: 0.5 % per year

Movement		Lanes	Capacity	Year 2007 Volume	Year 2007 V/C	Forecast Year 2008 Volume	Forecast Year 2008 V/C	W/Proposed Project Volume	W/Proposed Project V/C	With ALL Projects Volume	With ALL Projects V/C
NB	LEFT	2.00	3120	753	0.241	757	0.243	757	0.243	892	0.286
	THRU	4.00	6400	548	0.086	551	0.086	551	0.086	551	0.086
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
SB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
EB	LEFT	2.00	3120	26	0.008	26	0.008	26	0.008	26	0.008
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
WB	LEFT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	THRU	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
	RIGHT	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000
Intersection Volume				1327		1334		1334		1469	
Signal Phasing Loss Factor					0.05		0.05		0.05		0.05
Intersection V/C Ratio					0.300		0.301		0.301		0.344
Stopped Delay (sec/veh)					5.0		5.0		5.0		5.0
LEVEL OF SERVICE (LOS)					A		A		A		A

Note: If turns must be made from a through lane, turning volumes are included in the v/c ratio of the through lane. A curb lane 20 feet or wider is treated as having an unmarked right turn pocket.

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TRIPS GENERATED BY PROJECTS

PROJECT (or Project Group)	A.M.PEAK HOUR enter	exit	P.M.PEAK HOUR enter	exit
1 Chevron Gate 22	0	0	0	75
2 Chevron Lots 5-6-7	0	0	0	45
3 Chevron Gates 7&8	0	0	0	85
4 Chevron Gate 10	0	0	0	135
5 Douglas building parking	0	0	0	225
6 Grand Avenue Courtyard parking	0	0	0	100
7 Pacific Tower parking	0	0	0	35
8 Dockweiler beach parking	0	0	0	0

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LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

Intersection	Year 2007 LOS	Year 2007 DELAY	Year 2007 V/C	Forecast Year 2008 LOS	Forecast Year 2008 DELAY	Forecast Year 2008 V/C	Plus Related Projects LOS	Plus Related Projects DELAY	Plus Related Projects V/C	Plus Proposed Project LOS	Plus Proposed Project DELAY	Plus Proposed Project V/C	+ V/C
Sepulveda(SR1) and El Segundo Bl	F	94.6	1.099	F	96.4	1.104	F	100.1	1.115	F	100.1	1.115	+0.000
Sepulveda(SR1) and Rosecrans Ave	F	82.7	1.065	F	84.4	1.070	F	85.6	1.073	F	89.9	1.086	+0.013
Sepulveda(SR1) and Imperial Hwy	C	16.4	0.714	C	16.8	0.718	C	17.2	0.722	C	17.2	0.722	+0.001
Aviation Bl and El Segundo Bl	E	52.7	0.963	E	53.6	0.968	F	66.0	1.017	F	66.0	1.017	+0.000
Aviation Bl and Rosecrans Ave	D	25.6	0.804	D	26.1	0.807	D	28.6	0.824	D	28.6	0.824	+0.000
La Cienega Bl and I-405 SB ramps	B	5.6	0.606	B	5.9	0.609	B	5.9	0.609	B	5.9	0.609	+0.000
La Cienega Bl and El Segundo Bl	B	12.4	0.674	B	12.7	0.677	C	17.2	0.722	C	17.2	0.722	+0.000
I-405 SB on-ramp and El Segundo Bl	B	8.2	0.632	B	8.4	0.634	B	12.9	0.679	B	12.9	0.679	+0.000
I-405 NB ramps and El Segundo Bl	A	5.0	0.533	A	5.0	0.535	A	5.0	0.541	A	5.0	0.541	+0.000
I-405 SB offramp and Rosecrans Ave	B	7.5	0.625	B	7.8	0.628	B	7.8	0.628	B	7.8	0.628	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

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LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008			Plus Related Projects			Plus Proposed Project			
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+ V/C
I-405 NB ramps and Rosecrans Ave	B	6.5	0.615	B	6.8	0.618	B	8.1	0.631	B	8.7	0.637	+0.006
I-405 SB ramps and Hindry Ave	A	5.0	0.538	A	5.0	0.541	A	5.0	0.554	A	5.0	0.561	+0.007
California St and Imperial Hwy	A	5.0	0.484	A	5.0	0.486	A	5.0	0.496	A	5.0	0.496	+0.000
Main Street and Imperial Hwy	B	8.6	0.636	B	8.9	0.639	B	8.9	0.639	B	8.9	0.639	+0.000
Continental and Grand Ave	A	5.0	0.276	A	5.0	0.277	A	5.0	0.352	A	5.0	0.352	+0.000
Continental and Mariposa Ave	A	5.0	0.413	A	5.0	0.415	A	5.0	0.415	A	5.0	0.415	+0.000
Nash St and Mariposa Ave	A	5.0	0.342	A	5.0	0.344	A	5.0	0.386	A	5.0	0.386	+0.000
Douglas St/Douglas ST and Mariposa Ave	A	5.0	0.480	A	5.0	0.482	A	5.0	0.539	A	5.0	0.539	+0.000
Douglas St and Atwood Way	A	5.0	0.300	A	5.0	0.301	A	5.0	0.344	A	5.0	0.344	+0.000
Sepulveda Blvd and Hughes Way/Gate 10	A	5.0	0.549	A	5.0	0.552	A	5.0	0.554	A	5.0	0.554	+0.000

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

C:2008PM_S.ivc

LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008			Plus Proposed Project				Plus Related Projects		
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+V/C	LOS	DELAY	V/C
Sepulveda(SR1) and El Segundo Bl	F	94.6	1.099	F	96.4	1.104	F	96.4	1.104	+0.000	F	100.1	1.115
Sepulveda(SR1) and Rosecrans Ave	F	82.7	1.065	F	84.4	1.070	F	88.8	1.082	+0.013	F	89.9	1.086
Sepulveda(SR1) and Imperial Hwy	C	16.4	0.714	C	16.8	0.718	C	16.8	0.718	+0.001	C	17.2	0.722
Aviation Bl and El Segundo Bl	E	52.7	0.963	E	53.6	0.968	E	53.6	0.968	+0.000	F	66.0	1.017
Aviation Bl and Rosecrans Ave	D	25.6	0.804	D	26.1	0.807	D	26.1	0.807	+0.000	D	28.6	0.824
La Cienega Bl and I-405 SB ramps	B	5.6	0.606	B	5.9	0.609	B	5.9	0.609	+0.000	B	5.9	0.609
La Cienega Bl and El Segundo Bl	B	12.4	0.674	B	12.7	0.677	B	12.7	0.677	+0.000	C	17.2	0.722
I-405 SB on-ramp and El Segundo Bl	B	8.2	0.632	B	8.4	0.634	B	8.4	0.634	+0.000	B	12.9	0.679
I-405 NB ramps and El Segundo Bl	A	5.0	0.533	A	5.0	0.535	A	5.0	0.535	+0.000	A	5.0	0.541
I-405 SB offramp and Rosecrans Ave	B	7.5	0.625	B	7.8	0.628	B	7.8	0.628	+0.000	B	7.8	0.628

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

C:2008PM_S.ivc

LEVEL OF SERVICE ANALYSIS

P.M. PEAK HOUR

Geometrics: Existing Geometrics
Ambient Traffic Growth: 0.5 % per year

	Year 2007			Forecast Year 2008			Plus Proposed Project				Plus Related Projects		
	LOS	DELAY	V/C	LOS	DELAY	V/C	LOS	DELAY	V/C	+V/C	LOS	DELAY	V/C
I-405 NB ramps and Rosecrans Ave	B	6.5	0.615	B	6.8	0.618	B	7.4	0.624	+0.006	B	8.7	0.637
I-405 SB ramps and Hindry Ave	A	5.0	0.538	A	5.0	0.541	A	5.0	0.548	+0.007	A	5.0	0.561
California St and Imperial Hwy	A	5.0	0.484	A	5.0	0.486	A	5.0	0.486	+0.000	A	5.0	0.496
Main Street and Imperial Hwy	B	8.6	0.636	B	8.9	0.639	B	8.9	0.639	+0.000	B	8.9	0.639
Continental and Grand Ave	A	5.0	0.276	A	5.0	0.277	A	5.0	0.277	+0.000	A	5.0	0.352
Continental and Mariposa Ave	A	5.0	0.413	A	5.0	0.415	A	5.0	0.415	+0.000	A	5.0	0.415
Nash St and Mariposa Ave	A	5.0	0.342	A	5.0	0.344	A	5.0	0.344	+0.000	A	5.0	0.386
Douglas St/Douglas ST and Mariposa Ave	A	5.0	0.480	A	5.0	0.482	A	5.0	0.482	+0.000	A	5.0	0.539
Douglas St and Atwood Way	A	5.0	0.300	A	5.0	0.301	A	5.0	0.301	+0.000	A	5.0	0.344

Notes:
v/c = volume to capacity ratio (capacity utilization ratio)
delay = average stopped delay in seconds per vehicle
LOS = Level of Service

APPENDIX G

RESPONSE TO COMMENTS RECEIVED ON THE DRAFT ENVIRONMENTAL IMPACT REPORT

APPENDIX G

FINAL ENVIRONMENTAL IMPACT REPORT

CHEVRON PRODUCTS COMPANY PRODUCT RELIABILITY AND OPTIMIZATION PROJECT

COMMENTS AND RESPONSES TO COMMENTS

INTRODUCTION

This Appendix, together with other portions of the Draft Environmental Impact Report (Draft EIR), constitute the Final EIR for the proposed Chevron Products Company Product Reliability and Optimization Project.

The Draft EIR was circulated for a 45-day public review and comment period on March 7, 2008 and ending April 22, 2008. The Draft EIR is available at the South Coast Air Quality Management District (SCAQMD), 21865 Copley Drive, Diamond Bar, California 91765-4182 or by phone at (909) 396-2039. The Draft EIR can also be downloaded by contacting the SCAQMD's CEQA web pages at http://www.aqmd.gov/ceqa/nonaqmd.html.

The Draft EIR contained a detailed project description, the environmental setting for each environmental resource where the NOP/IS determined there was a potential significant adverse impact, an analysis of the potentially significant environmental impacts including cumulative impacts, project alternatives, mitigation measures, and other areas of discussion as required by CEQA. The discussion of the project-related and cumulative environmental impacts included a detailed analysis of air quality, energy, hazards and hazardous materials, hydrology/water quality, noise, solid/hazardous waste and transportation/traffic.

The SCAQMD received four comment letters on the Draft EIR during the public comment period. The comment letters and responses to the comments raised in those letters are provided in this appendix. The comments are bracketed and numbered. The related responses are identified with the corresponding number and are included following each comment letter.

STATE OF CALIFORNIA Arnold Schwarzenegger, *Governor*

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
e-mail: ds_nahc@pacbell.net

March 26, 2008

Mr. Michael Krause, Air Quality Specialist
SOUTH COAST AIR QUALITY MANAGGEMENT DISTRICT
21865 Copley Drive
Diamond Bar, CA 91765

Re: SCH#2007081057; CEQA Notice of Completion; draft Environmental Impact Report (DEIR) for the Chevron Products Company El Segundo Refinery Product Reliability and Optimization Project; El Segundo; Los Angeles County, California

Dear Mr. Krause:

The Native American Heritage Commission is the state agency designated to protect California's Native American Cultural Resources. The California Environmental Quality Act (CEQA) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the California Code of Regulations §15064.5(b)(c (CEQA guidelines). Section 15382 of the 2007 CEQA Guidelines defines a 1-1
significant impact on the environment as "a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ... objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE)', and if so, to mitigate that effect. To adequately assess the project-related impacts on historical resources, the Commission recommends the following action:

√ Contact the appropriate California Historic Resources Information Center (CHRIS) for possible 'recorded sites' in locations where the development will or might occur.. Contact information for the Information Center nearest you is available from the State Office of Historic Preservation (916/653-7278)/ http://www.ohp.parks.ca.gov. The record search will determine: 1-2

- If a part or the entire APE has been previously surveyed for cultural resources.
- If any known cultural resources have already been recorded in or adjacent to the APE.
- If the probability is low, moderate, or high that cultural resources are located in the APE.
- If a survey is required to determine whether previously unrecorded cultural resources are present.

√ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.

- The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made 1-3
available for pubic disclosure.
- The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.

√ Contact the Native American Heritage Commission (NAHC) for:

  - A Sacred Lands File (SLF) search of the project area and information on tribal contacts in the project vicinity that may have additional cultural resource information. Please provide this office with the following citation format to assist with the Sacred Lands File search request: USGS 7.5-minute quadrangle citation with name, township, range and section; .

- The NAHC advises the use of Native American Monitors to ensure proper identification and care given cultural 1-4
resources that may be discovered. The NAHC recommends that contact be made with Native American Contacts on the attached list to get their input on potential project impact (APE). In some cases, the existence of a Native American cultural resources may be known only to a local tribe(s).

√ Lack of surface evidence of archeological resources does not preclude their subsurface existence.

- Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5 (f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities. 1-5
- A culturally-affiliated Native American tribe may be the only source of information about a Sacred Site/Native American cultural resource.
- Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.

√ Lead agencies should include provisions for discovery of Native American human remains or unmarked cemeteries in their mitigation plans.

- CEQA Guidelines, Section 15064.5(d) requires the lead agency to work with the Native Americans identified by this Commission if the initial Study identifies the presence or likely presence of Native American human remains within the APE. CEQA Guidelines provide for agreements with Native American, identified by the NAHC, to assure the appropriate and dignified treatment of Native American human remains and any associated grave liens.

1-6

√ Health and Safety Code §7050.5, Public Resources Code §5097.98 and Sec. §15064.5 (d) of the California Code of Regulations (CEQA Guidelines) mandate procedures to be followed, including that construction or excavation be stopped in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery until the county coroner or medical examiner can determine whether the remains are those of a Native American. . Note that §7052 of the Health & Safety Code states that disturbance of Native American cemeteries is a felony.
√ Lead agencies should consider avoidance, as defined in §15370 of the California Code of Regulations (CEQA Guidelines), when significant cultural resources are discovered during the course of project planning and implementation

1-7

Please feel free to contact me at (916) 653-6251 if you have any questions.

Sincerely,

Dave Singleton
Program Analyst

Attachment: List of Native American Contacts

Cc: State Clearinghouse

Native American Contacts
Los Angeles County
March 26, 2008

LA City/County Native American Indian Comm
Ron Andrade, Director
3175 West 6th Street, Rm. 403
Los Angeles , CA 90020
(213) 351-5324
(213) 386-3995 FAX

Randy Guzman - Folkes
1931 Shadybrook Drive
Thousand Oaks , CA 91362
ndnrandy@hotmail.com
(805) 905-1675 - cell
Chumash
Fernandeño
Tataviam
Shoshone Paiute
Yaqui

Ti'At Society
Cindi Alvitre
6515 E. Seaside Walk, #C
Long Beach , CA 90803
calvitre@yahoo.com
(714) 504-2468 Cell
Gabrielino

Gabrielino/Tongva Council / Gabrielino Tongva Nation
Sam Dunlap, Tribal Secretary
761 Terminal Street; Bldg 1, 2nd floor
Los Angeles , CA 90021
office @tongvatribe.net
(213) 489-5001 - Office
(909) 262-9351 - cell
(213) 489-5002 Fax
Gabrielino Tongva

Tongva Ancestral Territorial Tribal Nation
John Tommy Rosas, Tribal Admin.
,
tattnlaw@gmail.com
310-570-6567
Gabrielino Tongva

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Tribal Chair/Cultural Resources
5450 Slauson, Ave, Suite 151 PMB
Culver City , CA 90230
gtongva@verizon.net
562-761-6417 - voice
562-925-7989 - fax
Gabrielino Tongva

Gabrieleno/Tongva San Gabriel Band of Mission
Anthony Morales, Chairperson
PO Box 693
San Gabriel , CA 91778
ChiefRBwife@aol.com
(626) 286-1632
(626) 286-1758 - Home
(626) 286-1262 Fax
Gabrielino Tongva

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native American with regard to cultural resources for the proposed, SCH#2007081057; CEQA Notice of Completion; ; draft Environmental Impact Report (DEIR) for the Chevron Products Company El Segundo Refinery Product Reliability and Optimization Project; located at the El Segundo Boulevard at Sepulveda Boulevard in El Segundo; Los Angeles County, California.

COMMENT LETTER NO. 1
NATIVE AMERICAN HERITAGE COMMISSION
MARCH 26, 2008

Response 1-1

The SCAQMD is aware of the requirements of CEQA Guidelines §15064.5 and has complied with this section as well as all other relevant CEQA requirements. As stated on pages 2-15 and 2-16 of the Initial Study for the Chevron Products Company Product Reliability and Optimization Project (NOP/IS) (see Appendix A of the Final EIR), potential significant adverse impacts on cultural resources were not anticipated, and therefore were not analyzed further in the Draft EIR. This conclusion is based on the fact that there are no prehistoric or historic structures or objects within the Refinery or adjacent areas.

Literature reviews and records search have been conducted at the Refinery for previous projects (Final EIR, Chevron Products Company – El Segundo Refinery Heavy Crude Project, SCH No. 2005091152, August, 2006). An August 2005 records search indicated that 14 archaeological investigations have been performed within a 0.5-mile radius of the Refinery, including three surveys of small linear areas within the Refinery boundaries (SCAQMD, 2006). No prehistoric sites or Native American sacred lands are recorded within the Refinery boundaries or within a 0.5-mile radius of the facility. One historic site, P-186856, (that could include buildings, structures, objects, districts, and landscapes, the details of which are kept confidential to protect the resource) is recorded at the outer edge of the 0.5-mile radius and outside of the Refinery boundary (SCAQMD, 2006, Appendix A). Because the proposed project activities will occur entirely within the existing Refinery boundaries, site P-186856 would not be directly or indirectly impacted by the proposed project. Construction activities associated with the proposed project will be located within the confines of the existing Refinery. No historic sites have been identified within the Refinery boundaries.

The entire Refinery has been previously graded and developed. No known human remains or burial sites have been identified at the site during previous construction activities so the proposed projects are not expected to result in impacts to cultural resources. If cultural resources were to be encountered unexpectedly during ground disturbance associated with construction of the proposed projects, proper procedures (i.e., contacting professional archaeologist, temporarily halting disturbance work in vicinity, etc.) will be taken. Further, the Refinery's site does not contain known paleontological resources and thus the proposed project also is not expected to impact any sites of paleontological value.

Therefore, based on the above conclusions, no impacts to historical, archaeological or paleontological resources (as defined in §15064.5 of the CEQA Guidelines) will occur as a result of the implementation of the proposed project.

Response 1-2

The California Historic Resources Information Center was contacted previously and no sites were identified (SCAQMD 2006). The PRO Project is proposed to occur within the boundaries of an existing petroleum refinery. The primary objective of the proposed project is to increase the reliability of the Refinery's existing equipment, increase the capacity of certain existing equipment, and optimize the ability of specific processes to increase production of transportation fuels and other chemical products derived from the refining process. The sites adjacent to the existing equipment or proposed new equipment have been previously disturbed to accommodate Refinery projects associated with the placement and relocation of infrastructure (i.e., underground utilities and piping) and no cultural resources or Native American remains were found during these subsurface activities in or surrounding the property (i.e., area of potential effect).

As a result, based on historical activities at the sites, the proposed project was determined to not cause a potential "substantial adverse change in the significance of any historical resource" which would require a further evaluation of cultural resources in the Draft EIR. See also response 1-1.

Response 1-3

An archaeological inventory survey was not required to be performed for the proposed project. See responses 1-1 and 1-2 for reasons why a survey was not required because a previous 2005 survey of records indicated that no prehistoric or historic resources are located in the Refinery property or within a 0.05 mile radius of the Refinery.

Response 1-4

The NAHC was contacted previously and no site were identified (SCAQMD 2006). As noted in response 1-1, archaeological investigations have been performed in the past and no prehistoric sites or Native American sacred lands were recorded, so additional archaeological investigations are not required. In addition, a mailing list of the Native American contacts provided by the commentator during the NOP/IS comment period was created by the SCAQMD. All contacts on that mailing list received a Notice of Completion (NOC) alerting the public of the release and availability of the Draft EIR. The NOC provided locations, phone numbers and internet links where the Draft EIR could be obtained or accessed. In addition, the mailing list of the Native American contacts will be used for noticing the availability of all future CEQA documents prepared when SCAQMD is the lead agency under CEQA.

Response 1-5

As noted in response 1-1, no previous surveys or excavation activities at the Refinery have discovered any cultural or archaeological resources. Further, as concluded on pages 2-15 and 2-16 of the NOP/IS (see Appendix A of the Final EIR), no impacts to cultural resources were determined to result from the proposed project. As a result, no further analysis of cultural resources in the Draft EIR was required.

Based on the historical use of the site and the numerous construction activities, which included subsurface activities, the likelihood of encountering cultural resources is low. It should be noted, however, that Chevron has written procedures in the event any archaeological, Native American or cultural resources is encountered on-site during construction activities for the proposed project at the Refinery. Compliance with all local, state and federal regulations (and notifications) will occur in the event of an accidental discovery of any cultural or historic resources.

Response 1-6

With regard to the potential for discovery of Native American remains, refer to responses 1-1, 1-2 and 1-5.

As stated on pages 2-15 and 2-16, the NOP/IS (see Appendix A of the Final EIR) did not identify the presence or likely presence of Native American human remains. Therefore, agreements with Native Americans to assure appropriate treatment of Native American human remains are not required unless Native American human remains are discovered during site excavation. However, in the unlikely event cultural resources are encountered during construction appropriate contacts will be made and procedures followed. See also responses 1-1, 1-2 and 1-5.

Response 1-7

As noted in responses 1-1 and 1-2, discovery of human remains relative to the proposed project is not anticipated. However, the PRO Project' construction activities will cease to prevent further disturbance if human remains are unearthed, until the County Coroner has made the necessary findings with respect to origin and disposition, as required by Public Resources Code 5097.98-99 and Health and Safety Code 7050.5.

CEQA Guidelines §15370(a) defines avoidance as: "Avoiding the impact altogether by not taking a certain action or parts of an action." As stated on pages 2-15 and 2-16 of the NOP/IS (see Appendix A of the Final EIR), the presence or likely presence of Native American human remains was not identified. However, in the event significant cultural resources in the form of Native American human remains are discovered, construction activities will cease and Chevron will comply with proper federal, state and local regulations as described in response 1-5.

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF AERONAUTICS – M.S.#40
1120 N STREET
P. O. BOX 942873
SACRAMENTO, CA 94273-0001
PHONE (916) 654-4959
FAX (916) 653-9531
TTY 711

Flex your power
Be energy efficient

Mr. Mike Krause
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765

April 2, 2008

Dear Mr. Krause:

Draft Environmental Impact Report for Chevron Products Company El Segundo Refinery Product Reliability and Optimization Project; SCH# 2007081057

The California Department of Transportation (Caltrans), Division of Aeronautics (Division), reviewed the above-referenced document with respect to airport-related noise and safety impacts and regional aviation land use planning issues pursuant to the California Environmental Quality Act (CEQA). The Division has technical expertise in the areas of airport operational safety, noise, and airport land use compatibility. We are a funding agency for airport projects, and we have permit authority for public-use and special-use airports and heliports. 2-1

The proposal is for the modification to and installation of new equipment at the El Segundo Refinery approximately 6,400 feet south of the Los Angeles International Airport.

According to page 2-15 of the Draft Environmental Impact Report, the "Federal Aviation Administration regulates the heights of structures that could impact navigable airspace." As we stated in our August 22, 2007 response letter to the Notice of Preparation, submission of a Notice of Proposed Construction or Alteration (Form 7460-1) will be required by the Federal Aviation Administration (FAA) in accordance with Federal Aviation Regulations Part 77. Form 7460-1 is available on-line at https://oeaaa.faa.gov/oeaaa/external/portal.jsp and should be submitted electronically to the FAA. 2-2

These comments reflect the areas of concern to the Division with respect to airport-related noise and safety impacts and regional airport land use planning issues. We advise you to contact our Caltrans District 7 Los Angeles office concerning surface transportation issues. 2-3

Thank you for the opportunity to review and comment on this proposal. If you have any questions, please call me at (916) 654-5314.

Sincerely,

Sandy Hesnard
SANDY HESNARD
Aviation Environmental Specialist

c: State Clearinghouse, LAWA, Los Angeles County Airport Land Use Commission

"Caltrans improves mobility across California"

COMMENT LETTER NO. 2
DEPARTMENT OF TRANSPORTATION, DIVISION OF AERONAUTICS
APRIL 2, 2008

Response 2-1

The SCAQMD understands that Caltrans has technical expertise in airport-related land use and planning issues. The Chevron El Segundo Refinery is actually located approximately two miles (10,560 feet) from the Los Angeles International Airport, not 6,400 feet (1.2 miles).

Response 2-2

Chevron understands that the proposed project must comply with applicable reporting requirements of the Federal Aviation Administration (FAA) and is in the process of reviewing the FAA requirements and filling out the Form 7460-1. Please note that the Chevron Refinery is not located within the flight path of LAX and that there are numerous existing Refinery structures in excess of 200 feet in height at the Refinery including furnace stacks (215'), coke drums (240'), the FCCU reactor (230'), and flares. The proposed new structures will be similar in size and character to the existing structures.

Response 2-3

The SCAQMD appreciates your comments. Please see responses 2-1 and 2-2. Caltrans District 7 Los Angeles office was included on the list of Reviewing Agencies on the form sent to the State Clearinghouse. Further, Caltrans, District 7 Office, sent the SCAQMD a comment letter on the Draft EIR prepared for Chevron's PRO project (see comment letter #3).

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 7, OFFICE OF PUBLIC
TRANSPORTATION AND REGIONAL PLANNING
IGR/CEQA BRANCH
100 SOUTH MAIN STREET
LOS ANGELES, CA 90012
PHONE (213) 897-6696
FAX (213) 897-1337

Flex your power!
Be energy efficient!

April 3, 2008

IGR/CEQA DEIR CS/080324
Chevron Products Company El Segundo Refinery
Product Reliability and Optimization Project
Vic. LA-1-24.91, SCH# 2007081057

Mr. Mike Krause
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Dear Mr. Krause:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the Draft Environmental Impact Report for the Chevron Products Company El Segundo Refinery Product Reliability and Optimization Project. The project site is located at 324 W. El Segundo Boulevard at Sepulveda Boulevard in the City of El Segundo. The project involves modifications to and installation of new equipment. Based on the information received, we have the following comments: 3-1

The project is expected to generate 24 additional daily trips per day. We recommend the implementation of transportation demand management strategies to reduce peak period trips on major commute corridors. 3-2

We recommend that construction related truck trips on State highways be limited to off-peak commute periods. Transport of over-size or over-weight vehicles on State highways will need a Caltrans Transportation Permit. 3-3

Stormwater compliance measures such as best management practices will need to be implemented to clean up the discharge of any stormwater runoff from the project site. 3-4

Since State Route 1 (SR-1) Sepulveda Boulevard is a State highway, any work to be performed within the State Right-of-way will need a Caltrans Encroachment Permit. Any lane closures along Sepulveda Boulevard will need a construction management plan.

If you have any questions regarding our comments, you may reach me at (213) 897-6696 and please refer to our record number 080324/CS. 3-5

Sincerely,

Elmer Alvarez

ELMER ALVAREZ
IGR/CEQA Program Manager
Office of Regional Planning

cc: Scott Morgan, State Clearinghouse

"Caltrans improves mobility across California"

COMMENT LETTER NO. 3
DEPARTMENT OF TRANSPORTATION,
DISTRICT 7, OFFICE PUBLIC TRANSPORTATION
AND REGIONAL PLANNING
APRIL 3, 2008

Response 3-1

The SCAQMD appreciates Caltrans participating in the review of the Draft EIR for the Chevron PRO project and welcomes the comments.

Response 3-2

The additional trips noted in the comments refer to the addition of 12 permanent employees at the Refinery during operation of the proposed project. As noted on page 4-52 of the Draft EIR, in addition to workers, the proposed project is expected to alter the volume of truck traffic at the Refinery, resulting in a net decrease of about two trucks per day. Based on the traffic analysis, operational traffic impacts are expected to be less than significant as they would result in an increase of six trips per the evening and morning peak hour as compared to the existing traffic volume of about 7,200 vehicles during peak hours (the intersection of El Segundo Boulevard and Sepulveda Boulevard). Since operational transportation/traffic impacts from the proposed project were concluded to be less than significant, no mitigation measures are required.

Response 3-3

As noted on page 4-52 of the Draft EIR, significant impacts to traffic/transportation occur during the construction phase of the proposed project when approximately 900 workers will be commuting to the Refinery. The traffic analysis indicates that the LOS and volume-to-capacity ratios will exceed significance thresholds at one intersection and two freeway segments during evening peak hour periods during construction.

As one of the mitigation measures for construction air quality impacts, the SCAQMD included the requirement to develop a Construction Emission Management Plan (CEMP) (see page 4-24 of the EIR). As part of that plan, delivery of materials associated with the proposed project during peak hours, is prohibited, except for time sensitive materials (e.g., cement). The requirements in the CEMP will be implemented and enforced as part of the Mitigation Monitoring Plan and conditions on the permit to construct.

As stated in the Draft EIR (see pages 2-15 and 2-17), the use of oversized transport vehicles on state highways will require a transportation permit. Chevron will file the application permit applications if and when they will need such a permit.

Response 3-4

Please see Chapter 3, Section 3.5 of the Draft EIR for a discussion on the handling of stormwater at the Refinery. Stormwater runoff from impermeable surfaces is treated in the unsegregated wastewater treatment system, which consists of an API separator and induced air flotation units. The proposed project is not expected to generate additional storm water or change the quality of stormwater at the Refinery so no impacts are expected on the existing wastewater treatment system (see Chapter 4, Section 4.5.2 of the Draft EIR). However, specifically with regard to stormwater impacts, it was concluded on page 2-29 of the NOP/IS (see Appendix A of the Final EIR) that ground disturbance related to the proposed project would be minimal and, therefore, stormwater runoff is not expected to change in volume or water quality. As a result, storm water at the Refinery will continue to be treated prior to discharge.

Response 3-5

The SCAQMD understands that a Caltrans Encroachment Permit will be required for any work performed within the right-of-way of Sepulveda Boulevard. Please note that no such work associated with the proposed project is expected at this time. Since no lane closures along Sepulveda Boulevard are anticipated, a construction management plan is not warranted at this time.

-----Original Message-----
From: Julia May [mailto:jmay@sbcglobal.net]
Sent: Tuesday, April 22, 2008 4:49 PM
To: Michael Krause
Subject: Comments on Chevron El Segundo Draft EIR

Dear Mr. Krause,

The following are my comments on the Chevron El Segundo DEIR, due to you today. Due to the short comment period and many other projects impacting communities in the region at this time, my comments are brief. I am very concerned about deficiencies in the DEIR and failure to include feasible mitigations for significant impacts as follows: 4-1

- Failure to include significant flaring emissions caused by the Project through the new flare (which must include all startup/shutdown, maintenance, and routine flaring) and alternatives which would eliminate most flaring, including failure to do a full analysis of BACT for flaring, applying the Shell Martinez CA BACT model and Flint Texas refinery model which meet very low flaring levels including emergnecy flaring. 4-2
- Failure to mitigate all Greenhouse Gas emissions (a significant impact) due to the Project 4-3
- Failure to provide an analysis of energy efficiency for all new and modified units included in the Project and for the baseline conditions at the existing refinery which could be sources for mitigating significant emissions increases, 4-4
- Failure to provide a BACT analysis for significant CO2 and methane emissions increases for the Project 4-5
- Failure to analyze phaseout of methane exemptions 4-6
- Failure to include all increases of TRS (Total Reduced Sulfur) and H2S from project components and fugitive sources, due to the high sulfur crude input on all the Project components 4-7
- Failure to evaluate the increased risk of upset, flaring, including SOx emissions due to heavier, higher sulfur crude 4-8
- Failure to consider feasible alternatives to the Project including installing clean alternative electricity to reduce Chevron's reliance on fossil-fueled grid electricity (which according to a presentation last year of aqmd, uses over 100MW from the grid), 4-9
- Failure to consider feasible alternative including routing all existing Pressure Relief Devices to atmosphere to reduce impacts of the existing refinery and to decrease methane greenhouse gas emissions, VOCs, and sulfur compounds (last year the AQMD provided a slide show that showed Chevron as the refinery in the region with the second highest number of uncontrolled PRDs) 4-10
- Failure to consider a limit on carbon content and sulfur content in the crude, as proposed in the Chevron Richmond DEIR process and required to be evaluated by the lead agency (City of Richmond, CA) 4-11
- Failure to consider alternatives to pay to pollute for GHG emissions. Such alternatives should include, but should not be limited to, technologies that are in 4-12

place or are being put in place at other refineries to increase energy efficiency and reduce emissions from cracking processes. 4-12 Cont.

Thank you for your attention to these important issues,

Julia May, CBE

COMMENT NO. 4
E-MAIL FROM CBE
APRIL 22, 2008

Response 4-1

The commenter states that due to the short comment period and many other projects impacting communities in the region comments will be short. The Draft EIR for the Chevron proposed project was available for public review and comment from March 7, 2008 to April 22, 2008, a period of 47 days, which is slightly longer than the review period of 45 days mandated by state law (Public Resources Code § 21091(a)). Consequently, the commenter had more time to review the Draft EIR than required by state law. Therefore, to say the Draft EIR was available for a short period of time is misleading and incorrect with regard to the alleged "deficiencies", please see the following responses.

Response 4-2

The SCAQMD strongly disagrees with the incorrect opinion expressed in this comment. As discussed in the Environmental Impacts chapter on pages 4-10 and 4-11, and Appendix C – Operational Emission Calculations, operational emissions from the flare have been included in the EIR. As discussed on page 2-12 of the Draft EIR, the new flare is a safety flare. Since the flare is a safety flare, the only routine emissions associated with the flare are from the pilot and those have been included in the EIR. As required under SCAQMD Rule 1118, flaring is required to be minimized except during emergencies, startups, shutdowns, turnarounds or essential operating needs. The proposed Vapor Recovery and Safety Flare System is designed to capture potential emissions from PRDs that currently vent to atmosphere. As a safety flare, flaring will only occur in the event of an emergency release from PRDs. Since flaring would only occur in emergency situations, the number of flaring events per year and the length of any flaring event is currently unknown. Therefore, it would be speculative at this time to calculate some theoretical emissions from flaring events. CEQA Guidelines § 15145 prohibits speculation when evaluating impacts from proposed projects. Therefore, no emissions are expected from startup/shutdown, maintenance, or "routine" flaring. As a new source the new safety flare is subject to Regulation XIII, which requires a BACT analysis and compliance with current BACT requirements. BACT determinations of other agencies will be considered at the time BACT is determined.

Response 4-3

The SCAQMD strongly disagrees with the opinion expressed in the comment indicating that GHG emissions have not been mitigated because it is incorrect. As noted in the Cumulative Impacts chapter on page 5-27 of the Draft EIR, a specific mitigation measure, GHG1, will be implemented "to produce verifiable and quantifiable permanent GHG emission reductions, for example, which could include energy efficiency projects such as cogeneration facilities, solar collectors, wind turbines, biogas generators, geothermal energy generation, hydroelectric energy generation, biosolids energy production, transportation efficiency or other GHG emission reduction projects and, thus offset the net increase in the PRO Project GHG emissions (see table 5-7)." The total estimated CO_2 equivalent emission increases for the proposed project are included in Table 5-7. Therefore, Chevron has been required to mitigate all GHG emission increases to zero, so that cumulative GHG impacts are less than significant (see page 5-28 of the Draft EIR).

Response 4-4

The SCAQMD strongly disagrees with the opinion expressed in this comment because it is patently incorrect. The Cumulative Impacts Chapter, Section 5.2.4.3 of the Draft EIR contains a comprehensive discussion of the energy efficiency of the proposed project. In addition, Chevron has been recognized as being an energy efficient Refinery (see Energy Efficiency Study discussion on pages 5-24 and 5-25 of the Draft EIR). With regard to new and modified units, the PRO Project is expected to increase the energy efficiency of the Refinery by generating electricity on-site. The new Cogeneration Unit is, in itself, one of the preeminent technologies for minimizing GHG emissions included on CAPCOA's "Green List of Projects." Cogeneration is far more efficient (in both energy and GHG emissions) than separate generation of electricity (either by simple cycle gas turbine or utility boilers) and steam. As noted by CAPCOA, cogeneration plants are consistent with the goals of AB32 because they are much more efficient in generating electricity at the site where it is used, thus minimizing energy losses associated with the transmission and distribution of electricity. Installing Cogen Train D as part of the PRO Project is consistent with CAPCOA's Green List of Projects, and thus the goals of AB32. The proposed Cogen Train D, in addition to providing energy efficient electricity, will provide steam required for Refinery operations. In 2005, a Refinery-wide Energy Efficiency Study was conducted by an independent third party to identify potential energy inefficient processes within the Refinery. As a result of the study 30 separate energy projects were identified that could potentially improve energy efficiency at the Refinery. Of the 30 projects, three have been completed, two are in progress, 12 are undergoing further feasibility studies (if implemented before 2010 and not otherwise required by state or federal law, would be included in as a reduction), ten have been identified as infeasible, one is in the PRO Project, i.e., Cogen Train D, a portion of a second project for modification of the FCCU gas recovery section is in the PRO Project, and one is a major project that is still under evaluation. Feasibility studies are not able to be done in a reasonable time period in order to allow the project to proceed in a timely manner. The projects completed so far reduced GHG emissions by 4,067 metric tons per year with the two projects in progress reducing GHG emissions by an additional 17,215 metric tons per year when completed. Other reductions of up to 61,000 metric tons per year may be realized from implementation of projects still under evaluation. Section 5.2.4.3 also includes a list of projects the Refinery has performed in the recent past to improve energy efficiency (see page 5-23 of the Draft EIR).

Response 4-5

A BACT analysis for CO_2 and methane emissions is not currently required as CO_2 and methane are not criteria pollutants that are subject to BACT requirements. In addition, there is no BACT for CO_2 and methane. See Response 4-6 for a discussion of the GHG emissions from the proposed project. See also Cumulative Impacts chapter page 5-27 of the Draft EIR and Response 4-3 with regard to a discussion on measures to mitigate GHG (including CO_2 and methane) impacts.

Response 4-6

Currently, methane is exempt under SCAQMD so this project complies with this exemption. Future activities to remove the methane exemption would be speculative and not part of this proposed project. Further, methane emission increases from the proposed project are included in the GHG emissions estimates in the EIR and mitigated to less than significant, as discussed in the Response 4-3.

Response 4-7

The SCAQMD strongly disagrees with the opinion expressed in this comment. See the Environmental Impacts chapter Tables 4-5 and 4-8 of the Draft EIR for the proposed project increases of SOx and H_2S emissions. No other total reduced sulfur compound increases are anticipated as part of the proposed project. The proposed project includes Sulfur Recovery Facilities to accommodate the increased production of commercial grade sulfur recovered from the crude oil. The Sulfur Recovery Facilities will remove sulfur from refinery streams so that potentially significant SOx and H_2S emission increases associated with the proposed project will not occur. Therefore, all SOx and H_2S emission estimates from the proposed project have been included in the EIR.

Response 4-8

The SCAQMD strongly disagrees with the opinion expressed in this comment because the comment is patently incorrect. See the Hazards and Hazardous Materials Section 4.4.2 of the Draft EIR and Appendix D – Hazards Analysis for the hazard analysis, which thoroughly analyzes the risk of upset and thermal radiation impacts. The proposed project only includes a safety flare which will not increase "routine" flaring at the Refinery (see Response 4-2). A flare, being a safety device, by design does not have hazard impacts such as ground level thermal radiation (i.e., the flare is elevated to avoid thermal radiation impacts). The potential hazard impacts related to the operation of the new Sulfur Recovery Facilities, which process H_2S to commercial grade molten sulfur for sale, have been thoroughly evaluated in the Draft EIR (see Section 4.4.2 of the Draft EIR and Appendix D).

Response 4-9

The SCAQMD strongly disagrees with the opinion expressed in this comment because it is incorrect. As stated in the Project Description Section 2.6.1.9 of the Draft EIR, the proposed project includes a 49.9 MW cogeneration plant. As discussed in Response 4-4, installing Cogen Train D as part of the PRO Project is consistent with CAPCOA's Green List of Projects, and thus the goals of AB32. The proposed cogeneration facility will be more efficient than conventional power and will reduce Chevron's demand for third-party supplied power (i.e., will reduce its "reliance on fossil-fueled grid electricity," as suggested by the commentator) (see Section 5.2.4.3 of the Draft EIR). In addition, installation of Cogen Train D eliminates the need to install a boiler to produce steam as the waste heat from Cogen Train D will provide the necessary steam. As a result, potential GHG emissions are further eliminated.

Response 4-10

The SCAQMD strongly disagrees with the opinion expressed in this comment because it is incorrect and contradictory in that it states a "failure to consider feasible alternative including routing all existing Pressure Relief Devices to atmosphere to reduce impacts of the existing refinery… Chevron as the refinery in the region with the second highest number of uncontrolled PRDs)". As stated in Project Description Sections 2.6.1.1, 2.6.1.2, 2.6.1.3, 2.6.1.4, and 2.6.2.2 of the Draft EIR, the proposed project includes voluntarily rerouting PRDs that currently vent to atmosphere to a new Vapor Recovery and Safety Flare System. Therefore, the proposed project includes routing PRDs to a control system which will reduce the number of PRDs that currently vent to atmosphere, and thereby, reduce the potential VOC emissions associated with a release. The SCAQMD has no requirement for routing all existing PRDs to control devices. The choice of PRDs is based on feasibility in coordination with the Proposed Project. The rerouting of the selected PRDs generates an air quality benefit, not a significant impact and, therefore, does not warrant an alternative analysis for further benefit pursuant to Section 15126.6(b) of the CEQA Guidelines.

Response 4-11

No reference to a limit on carbon content and sulfur content in crude could be located in the referenced Chevron Richmond DEIR. No significant impacts were identified that could be mitigated by limiting the carbon or sulfur content of the crude oils. It is not feasible to limit carbon content and sulfur content of crude oils due to the wide variety of available crude oils. Limiting crude oils does not meet the project objective of allowing for processing of a wider range of crude oils. In addition, neither the state of California or the SCAQMD has requirements that impose carbon and sulfur content limits of crude oils to a facility. As discussed in Response 4-7, Sulfur Recovery Facilities are part of the proposed project and will remove sulfur from various streams at the Refinery to comply with applicable rules and regulations. Further, CARB is in the process of developing a low carbon fuel standard, but this affects the final transportation fuel produces, not the crude stocks used to produce the fuel.

Response 4-12

The SCAQMD strongly disagrees with the opinion expressed in this comment. This comment is vague and does not identify specific technologies that are available for use as mitigation. See Responses 4-4 and 4-9 regarding energy efficiency. The proposed project has feasible mitigation imposed that will fund projects that will "produce verifiable and quantifiable permanent GHG emission reductions" (see page 5-27 of the Draft EIR). In addition, the proposed project includes the installation of a cogeneration unit that is more energy efficient and produces less GHG emissions per kWh than conventional power generation.