SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

FINAL ENVIRONMENTAL IMPACT REPORT

Chevron Products Company – El Segundo Refinery Heavy Crude Project

SCH NO. 2005091152
August 2006

Executive Officer
Barry R. Wallerstein, D.Env.

Deputy Executive Officer
Planning, Rule Development, and Area Sources
Elaine Chang, Dr.PH

Assistant Deputy Executive Officer
Planning, Rule Development, and Area Sources
Laki Tisopulos, Ph.D., P.E.

Planning and Rules Manager
CEQA and Socioeconomic Analyses
Susan Nakamura

Prepared by: ENSR Corporation
Reviewed by: Michael Krause, Air Quality Specialist
Steve Smith, Ph.D. – Program Supervisor, CEQA
Barbara Baird – Principal Deputy District Counsel, SCAQMD
Frances Keeler – Senior Deputy District Counsel, SCAQMD
Jeri Voge – Senior Deputy District Counsel, SCAQMD

PREFACE

This document constitutes the Final Environmental Impact Report (EIR) for the Chevron Products Company - El Segundo Refinery Heavy Crude Project. The Draft EIR was released for a 45-day public review and comment period on April 25, 2006. The comment period ended on June 8, 2006. Two comment letters were received during the public comment period, and one additional letter was received after the close of the public comment period. The comment letters and responses are included in Appendix F of this document. The analyses of air quality impacts and mitigation measures in the Final EIR were modified from those in the Draft EIR due to some additional information provided by the applicant. Additionally, due to delays in review of the proposed project, construction will not begin in June 2006 as originally planned. As such, the construction schedule is expected to shift accordingly. However, the shift in project schedule is not expected to result in any new significant impacts during construction. 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. To facilitate identification, modifications to the document are included as underlined text and text removed from the document is indicated by ~~strikethrough~~.

Final Environmental Impact Report

Chevron Products Company – El Segundo Refinery
Heavy Crude Project

August 2006

South Coast Air Quality Management District

ENSR
1220 Avenida Acaso
Camarillo, California 93012

This page intentionally left blank

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT GOVERNING BOARD

Chairman: WILLIAM A. BURKE, Ed.D.
Speaker of the Assembly Representative

Vice Chairman: S. ROY WILSON, Ed.D.
Supervisor, Fourth District
Riverside County Representative

MEMBERS:

MICHAEL D. ANTONOVICH
Supervisor, Fifth District
Los Angeles County Representative

JANE CARNEY
Senate Rules Committee Appointee

RONALD O. LOVERIDGE
Mayor, City of Riverside
Cities Representative, Riverside County

GARY OVITT
Supervisor, Fourth District
San Bernardino County Representative

JAN PERRY
Councilmember, 9th District
Cities Representative, Los Angeles County, Western Region

MIGUEL A. PULIDO
Mayor, City of Santa Ana
Cities Representative, Orange County

TONIA REYES URANGA
Councilwoman, City of Long Beach
Cities Representative, Los Angeles County, Eastern Region

JAMES SILVA
Supervisor, Second District
Orange County Representative

CYNTHIA VERDUGO-PERALTA
Governor's Appointee

DENNIS YATES
Mayor, City of Chino
Cities Representative, San Bernardino County

EXECUTIVE OFFICER:
BARRY R. WALLERSTEIN, D. Env.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

AHM	Acutely Hazardous Material
ANSI	American National Standards Institute
AQMP	Air Quality Management Plan
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AST	Aboveground storage tank
BACT	Best available control technology
Basin	South Coast Air Basin
BOD	Biochemical oxygen demand
CAAA	California Air Act Amendments
CAAQS	California Ambient Air Quality Standards
CalARP	California Accidental Release Prevention
Cal-OSHA	California Occupational Safety and Health Association
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CMP	Congestion Management Plan
CNEL	Community noise equivalent level
CO	Carbon monoxide
COS	Carbonyl sulfide
CR(VI)	Hexavalent chromium
CSLC	California State Land Commission
CWA	Clean Water Act
DAF	Dissolved air flotation
dB	Decibels
dBA	A-weighted sound level
D/C	Demand to capacity ratio
DDT	Dichloro-diphenyl trichloroethane
DEA	Diethanolamine
DOT	Department of Transportation
DPM	Diesel exhaust particulate matter
DWT	Deadweight tons
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
ERPG	Emergency Response Planning Guideline

ABBREVIATIONS AND ACRONYMS (continued)

ESMT	El Segundo Marine Terminal
FAA	Federal Aviation Administration
g/l	Grams per liter
gpm	Gallons per minute
H_2S	Hydrogen sulfide
HAP	Hazardous air pollutant
HCM	Highway Capacity Manual
HI	Hazard index
HP	Horsepower
HQ	Hazard quotient
HRA	Health risk assessment
HSC	Health and Safety Code
IAF	Inducted air flotation
ICE	Internal combustion engine
ICU	Intersection capacity utilization
IS	Initial Study
ISCST3	Industrial Source Complex Short-Term 3
kts	Knots
kW/m^2	Kilowatts per meter squared
LACDPW	Los Angeles County Department of Public Works
LACSD	Los Angeles County Sanitation Districts
LARWQCB	Los Angeles Regional Water Quality Control Board
L_{eq}	Exterior equivalent sound level
LOS	Level of service
LPG	Liquid petroleum gas
lb/day	Pounds per day
lb/gal	Pounds per gallon
LOS	Level of service
L_x	A-weighted sound level that is exceeded x percent of the time
$\mu g/m^3$	Micrograms per cubic meter
MACT	Maximum achievable control technology
MATES II	Multiple Air Toxics Exposure Study, 2000
MBPOD	Thousand barrels per operating day
MICR	Maximum individual cancer risk
MMscf/day	Million standard cubic feet per day
MTBE	Methyl tertiary butyl ether
NAAQS	National Ambient Air Quality Standards

ABBREVIATIONS AND ACRONYMS (continued)

NFPA	National Fire and Protection Association
NH_3	Ammonia
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NSPS	New source performance standards
NSR	New Source Review
O_3	Ozone
OCD	Offshore and Coastal Dispersion Model
OEHHA	Office of Environmental Health Hazards Assessment
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PM10	Particulate matter less than 10 microns
PM2.5	Particulate matter less than 2.5 microns
ppm	Parts per million
PRV	Pressure relief valve
psi	Pounds per square inch
PSM	Process safety management
RCRA	Resource Conservation and Recovery Act
RECLAIM	Regional Clean Air Incentives Market
REL	Reference exposure level
RMP	Risk Management Program
RMPP	Risk Management Prevention Program
RTC	Reclaim Trading Credit
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SCAQMD	South Coast Air Quality Management District
SCR	Selective catalytic reduction
SJV	San Joaquin Valley
SMBRP	Santa Monica Bay Restoration Project
SO_2	Sulfur dioxide
SO_x	Oxides of Sulfur
SPCC	Spill Prevention Control and Countermeasure
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board

ABBREVIATIONS AND ACRONYMS (concluded)

T-BACT	Best available control technology for toxic air contaminants
TAC	Toxic air contaminant
TSS	Total suspended solids
U.S. EPA	(United States) Environmental Protection Agency
V/C	Volume to capacity ratio
VLCC	Very Large Crude Carrier
VOC	Volatile organic compound
vph	Vehicles per hour
WBMWD	West Basin Municipal Water District

This page intentionally left blank

CHAPTER 1

INTRODUCTION AND EXECUTIVE SUMMARY

This page intentionally left blank

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

Chevron Products Company (Chevron) is proposing to modify the El Segundo Refinery. This Final Environmental Impact Report (EIR) has been prepared to assess the impacts of the proposed project on the environment as required under the California Environmental Quality Act (CEQA).

1.1 Introduction

Chevron's proposed project was developed to enable the refinery to maintain or slightly increase its current production levels of saleable products while processing more heavy crude oil and less light crude oil than it currently processes. Maintaining current production levels of saleable products while processing more heavy crude oil will require an annual increase of approximately five percent in the total amount of crude oil processed by the refinery. The proposed project will also reduce sulfur dioxide (SO_2) emissions from refinery fuel gas combustion.

1.1.1 Project Need

The refinery processes crude oil to produce motor fuels and other saleable petroleum products. The refinery processes both heavy and light crude oils. Heavy crude oils are more dense and viscous than light crude oils and generally produce smaller amounts of motor fuels per barrel than light crude oils. Because most new crude oil discoveries in the world are heavier than historic crude oil supplies, Chevron is proposing modifications to the refinery to maintain or slightly increase its current production levels of saleable petroleum products by being able to process more heavy crude oil and less light crude oil than it currently processes.

1.1.2 Purpose and Authority

CEQA requires the environmental impacts of proposed projects to be evaluated and feasible methods to reduce, avoid, or eliminate identified significant adverse impacts of these projects to be considered. To fulfill the purpose and intent of CEQA, the South Coast Air Quality Management District (SCAQMD), as the CEQA lead agency, directed the preparation of the Final EIR, which addresses the potential environmental impacts associated with the Chevron Products Company - El Segundo Refinery Heavy Crude Project.

Lead Agency means "the public agency which has the principal responsibility for carrying out or approving a project which may have a significant effect upon the environment" (Public Resources Code, §21067). For this project, the SCAQMD and the City of El Segundo, where the refinery is located, evaluated the lead agency determination. Because the SCAQMD has primary discretionary approval authority over the proposed project, it was determined that the SCAQMD would be the appropriate lead agency.

While the SCAQMD is the lead agency, the CEQA Guidelines, §§15082 and 15103, require responsible agencies, trustee agencies, and the public to be notified of the intent and scope of the proposed project. Consistent with the above CEQA Guidelines sections, a Notice of Preparation (NOP) and Initial Study (IS) were prepared and distributed to the identified responsible agencies and parties for a 30-day review and comment period from September 29, 2005 to October 28, 2005. The NOP/IS and comments received, and responses to these comments are included in Appendix A to this Final EIR.

1.2 Scope of EIR and Format

The scope of this Final EIR meets the requirements identified under CEQA and includes a description of the proposed project in Chapter 2. The existing environmental setting is discussed in Chapter 3. The potential adverse impacts associated with the proposed project are analyzed and presented in Chapter 4. Chapter 4 also includes mitigation measures identified to reduce or lessen potential significant adverse impacts of the proposed project. CEQA requires that both alternatives to the proposed project and cumulative impacts be analyzed in an EIR. These areas are presented in Chapters 5 and 6, respectively. The organizations and persons consulted and references used in the preparation of this document are provided in Chapters 7 and 8, respectively. Supporting documentation to the impact analysis is provided as technical appendices to this Final EIR as recommended by CEQA Guidelines §15147.

In the IS, 11 environmental areas were determined not to be significant: Aesthetics, Agricultural Resources, Biological Resources, Cultural Resources, Energy, Geology and Soils, Land Use and Planning, Mineral Resources, Population and Housing, Public Services, and Recreation. Therefore, these subject areas are not further analyzed in this Final EIR.

The CEQA Guidelines §15123(b)(2) requires the identification of areas of controversy in the EIR summary section. There are no known areas of controversy at this time.

1.3 Chapter 2 Summary - Project Description

To process more heavy crude oil, the refinery operators are proposing modifications to the No. 4 Crude Distillation Unit and the Delayed Coking Unit (Coker). Chevron is also proposing modifications to the No. 6 H_2S Plant to improve the removal of sulfur compounds from refinery fuel gas to assist the refinery in complying with SCAQMD Regulation XX - Regional Clean Air Incentives Market (RECLAIM) and to increase the reliability of the removal process.

The No. 4 Crude Unit performs the initial steps in refining most of the crude oil processed by the refinery. The No. 4 Crude Unit includes both an atmospheric distillation column and a vacuum distillation column. The atmospheric distillation column performs an initial separation of the crude oil at atmospheric pressure into several components, including methane, ethane, liquid petroleum gas (LPG), naphtha, raw jet fuel, raw diesel fuel, gas oil and atmospheric residuum. These components are processed by other process units in the refinery. The atmospheric residuum is sent from the atmospheric distillation column to the vacuum distillation column for separation into light gas oil, heavy gas oil and vacuum residuum.

Processing more heavy crude oil will change the relative amounts of various products produced by the No. 4 Crude Unit. In particular, the quantity of vacuum residuum produced from each barrel of crude oil will increase, and the No. 4 Crude Unit cannot handle the increase. Therefore, Chevron is proposing modifications to the No. 4 Crude Unit that will enable it to handle the increased vacuum residuum production. The design changes required to handle the increased vacuum residuum production will result in an overall increase in the crude-oil processing capacity of the No. 4 Crude Unit of approximately five percent, while resulting in a reduction in the amount of light crude oil processed.

Proposed modifications to the No. 4 Crude Unit include modifying internal components of the atmospheric and vacuum distillation columns to improve distillation efficiency; replacing steam ejectors on the vacuum distillation column to increase column production capacity; modifying and adding new heat exchangers to increase heat recovery and reduce pressure drop; modifying pumps to handle higher viscosity material; replacing piping with larger diameter pipes to reduce pressure drop; and installing additional automated controls for existing equipment to improve emergency response and normal operating efficiency.

The Coker processes the vacuum residuum produced by the crude units. The vacuum residuum is heated and fed into vessels called coke drums. It remains inside the coke drums under pressure for approximately 12 hours, where it cracks into lighter materials. These light materials boil off in the coke drums, leaving behind a solid coal-like material called petroleum coke. The light materials are separated intro raw gasoline, raw jet fuel, raw diesel fuel, and gas oil in the Coker Main Fractionator column, and are processed further by other process units in the refinery. After the cracking process is completed, the coke drum is stripped with steam, cooled with water, opened, and the coke is “drilled” out of the drum with a high-pressure water system. The entire cycle drum for a batch of coke in a coke drum is 15 hours. The petroleum coke is reduced in size by a primary crusher. Belt conveyors transport the crushed petroleum coke from the primary crusher to a secondary crusher, which discharges into truck loading hoppers. The loaded trucks transport the petroleum coke to the Port of Los Angeles. The petroleum coke is exported from the Port of Los Angeles for use in heating and manufacturing operations by third parties at various locations within or outside California.

The current annual average vacuum residuum feed capacity of the Coker is 60 MBPOD. Chevron is proposing modifications to increase the annual average capacity of the Coker to 75 MBPOD to accommodate the increase in vacuum residuum production by the crude units when they process more heavy crude oil. Petroleum coke production will increase by 510 tons per day, from an annual average of 3,950 tons per day to 4,460 tons per day. Approximately 20 additional truck trips per day will be required to export the increased quantities of petroleum coke from the refinery. The production of light products by the Coker will also increase.

Proposed modifications to the Coker include the installation of new heat exchangers to increase heat transfer; installation of a new cooling water supply and return system from Cooling Tower No. 9 to the Coker to increase coke-drum cooling capacity; replacement of an existing depropanizer with a larger depropanizer to increase propane removal capacity; replacement of the Coker Main Fractionator column with a larger column to increase light-product separation capacity; installation of new pumps and upgrades to existing pumps to increase pumping capacity, upgrades to the gas compression equipment at the Coker to increase capacity, modifications to the coke drums and coke drilling systems to reduce the cycle time from 15 hours to 12 hours; and installation of additional automated controls for existing equipment to improve emergency response and normal operating efficiency. Subsequent to release of the Draft EIR for public review and comment, it was determined that an emission control device for emissions during coke drum depressurization needs to be installed to comply with the requirement to apply Best Available Control Technology (BACT) in SCAQMD Rule 1303. Therefore, Chevron is also proposing to install a control device to reduce emissions when the coke drums are depressurized before they are opened.

The current capacity of the petroleum coke conveying system is adequate to accommodate the proposed increase in petroleum coke production, and Chevron is not proposing to increase the conveying system's capacity. Chevron is, however, proposing to modify portions of the petroleum coke conveying system to allow more efficient handling of the petroleum coke and to reduce particulate matter emissions during petroleum coke transport and export truck loading operations.

The No. 6 H_2S Plant treats the sulfur-containing gases (called sour gases) from the Coker overhead gas compressor, the Coker waste compressor, the Low Pressure Distillation gas recovery compressor, the flare gas recovery Houdry Compressors and overhead gas from a Depropanizer to remove sulfur compounds. The No. 6 H_2S plant includes a Stacked Absorber column, which consists of a diethanolamine (DEA) absorber section at the bottom of the column and a water wash section at the top of the column. The DEA absorber section removes most of the hydrogen sulfide (H_2S) in the sour gas by dissolving it in DEA, and the water wash section prevents DEA carryover in the gases leaving the column. The gas from the Stacked Absorber is further processed in the Merox section of No. 6 H_2S Plant to remove mercaptans. The treated fuel gas (called sweet fuel gas) is then routed to an existing fuel gas mix drum.

The H_2S-containing DEA (called rich DEA) that leaves the DEA absorber section in the Stacked Absorber column is processed by the No. 5 H_2S Plant to remove the H_2S. The resulting lean DEA is returned to the No. 6 H_2S plant for reuse. Currently, the No. 6 H_2S Plant must be shut down when the No. 5 H_2S Plant is out of service, either for planned maintenance or when operational problems occur, because rich DEA from the No. 6 H_2S Plant cannot be regenerated. The process units that produce the sour gas that is treated by the No. 6 H_2S Plant must also be shut down when the No. 6 H_2S Plant is shut down, in order to avoid combustion of untreated fuel gas with high sulfur concentrations. Thus, shutdown of the No. 5 H_2S Plant requires shutdown of refinery process units serviced by the No. 6 H_2S Plant in addition to the units serviced by the No. 5 H_2S Plant.

Chevron is proposing to install a new DEA Regenerator in the No. 6 H_2S Plant, which will regenerate the rich DEA from the No. 6 H_2S Plant and eliminate the need to send the rich DEA to the No. 5 H_2S Plant for regeneration. The H_2S produced by the regenerator will be processed by the refinery's Sulfur Recovery Units to remove the H_2S and convert it to elemental sulfur, which is subsequently exported from the refinery for sale. Chevron is also proposing to install a new Relief Caustic Scrubber in the No. 6 H_2S Plant to remove H_2S from the acid gas produced by the proposed new DEA regenerator in case of an emergency that would prevent the Sulfur Recovery Units from processing the acid gas. Chevron is also proposing to install a new Jet Wash Column to absorb any remaining COS from the process gas stream leaving the Merox section of the No. 6 H_2S Plant. The proposed Jet Wash column will use circulating jet or diesel fuel to absorb COS from the gas stream.

The overall construction period for the proposed project is expected to last a total of 22 months, beginning in June 2006 and ending in March 2008. Peak overall construction employment is anticipated to be 694 workers during October 2007, and average construction employment over the entire 22-month construction period is estimated at about 242 workers.

During most of the construction period, construction will take place 10 hours per day, from 6:30 a.m. to 5:00 p.m., five days per week, Monday through Friday. Turnarounds, which are times when refinery equipment is removed from service for maintenance activities, are scheduled for the No. 4 Crude Unit from late-March 2007 through early-May 2007 and for the Coker from mid-September 2007 through November 2007. A substantial amount of the construction for the proposed modifications to the No. 4 Crude Unit and the Coker, such as replacement of internal components, can only take place during these turnarounds when the units are out of service. Therefore, to minimize the amount of time that the units are out of service, construction during the turnarounds will take place in two 10-hour shifts, from 6:30 a.m. to 5:00 p.m. and from 6:30 p.m. to 5:00 a.m., six days per week, Monday through Saturday.

Chevron will arrange for parking for construction workers at an off-site location (the parking lot of Dockweiler Beach State Park) on Vista Del Mar, northwest of the refinery. Shuttle buses will be used to transport the construction workers between the parking facility and the refinery. Chevron will specify in construction contracts that construction workers access the parking facility by traveling on the Interstate 105 (I-105) freeway and West Imperial Highway, which are on the northern boundary of the City of El Segundo, and Vista Del Mar, which is on the western boundary of El Segundo. This route which will avoid construction worker travel on heavily congested surface streets.

No additional employees will be required on-site to operate any new equipment as a result of implementing the proposed project. The increase in petroleum coke production from the proposed project will require 20 additional truck trips per day from the refinery to the Port of Los Angeles or Long Beach, and the increase in sulfur production will require an average of one additional truck trips per day from the refinery to the vicinity of the Port of Los Angeles.

1.4 Chapter 3 Summary - Setting

CEQA Guidelines §15125 requires that an EIR include a description of the environment within the vicinity of the proposed project as it exists at the time the NOP is published, or if no NOP is published, at the time the environmental analyses commence, from both a local and regional perspective. Chapter 3 - Setting describes the existing environment around the refinery that could be adversely affected by the proposed project for the potentially significant environmental topics identified in the IS, which include Air Quality, Hazards and Hazardous Materials, Hydrology and Water Quality, Noise, Solid and Hazardous Wastes, and Transportation and Traffic.

1.4.1 Air Quality

The determination of whether a region's air quality is healthful or unhealthful is determined by comparing contaminant levels in ambient air samples to national and state standards, which are set by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) at levels to protect public heath and welfare with an adequate margin of safety NAAQS and CAAQS have been established for the following criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), sulfur dioxide (SO_2), and lead. The CAAQS are more stringent than the federal standards. California has also established standards for sulfate, visibility reducing particles, hydrogen sulfide (H_2S), and vinyl chloride. However, H_2S and vinyl chloride are currently not monitored in the SCAQMD's jurisdiction because these contaminants are not seen as a significant air quality problem.

Chapter 3 provides a description of existing air quality for each criteria pollutant and for toxic air contaminants. State O_3 air quality standards were exceeded at the SCAQMD air quality monitoring station closest to the refinery on three days during 2001-2004, and state PM10 air quality standards were exceeded on 23 days. PM2.5 exceeded the state annual air quality standard every year from 2001 through 2004 and the federal 24-hour standard on four days during 2001-2004. CO, NO_2, SO_2, and lead concentrations did not exceed either the CAAQS or the NAAQS during these four years.

1.4.2 Hazards and Hazardous Materials

The refinery imports, stores and processes several toxic and flammable materials to refine crude oil and produce motor fuels and other products. Accidental releases of these materials, caused by either natural events such as an earth quake or by equipment failures or human error, could lead to fires, explosions or exposure of people to toxic gases.

Chevron has developed a Risk Management Plan as required under the federal Risk Management Program (RMP) and California Accidental Release Program (CalARP) regulations. The City of El Segundo Fire Department administers these programs for the refinery. In addition, the refinery has prepared an emergency response manual, which 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. Chevron also maintains its own emergency response capabilities, including on-site equipment and trained emergency response personnel who are available to respond to emergency situations anywhere within the refinery.

Based on a review of current operations of the equipment that is proposed to be modified in the affected refinery units (No. 4 Crude Unit, Coker and No. 6 H_2S Plant), the upset conditions that would currently have the greatest potential impacts would result in release and subsequent ignition of flammable vapors or liquids in the Coker. However, the impacts from these releases would not extend beyond the refinery boundary and would not affect the public.

1.4.3 Hydrology and Water Quality

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 purchased from the West Basin Municipal Water District (WBMWD), is used. In addition, approximately 7.5 million gallons per day of reclaimed water, which is also purchased from the WBMWD, is consumed. Approximately 200,000 gallons of reclaimed water per day are used for irrigation of refinery landscaping, approximately 3.5 million gallons per day of nitrified reclaimed water are used for the cooling towers, and approximately 3.8 million gallons per day of reclaimed water are used for boiler feed water.

Under its National Pollutant Discharge Elimination System (NPDES) Permit, the refinery is authorized to discharge up to 8.8 million gallons of treated wastewater during dry weather and up to 23 million gallons per day during wet weather to the Pacific Ocean, near Dockweiler State Beach in El Segundo. The wastewater is discharged through Refinery Outfall 001, which is located approximately 3,500 feet offshore. Currently, the refinery discharges approximately seven million gallons per day of treated wastewater during dry weather.

1.4.4 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 (El Segundo Boulevard, Sepulveda Boulevard, Rosecrans Avenue, and Vista Del Mar Avenue).

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 north of the refinery in December 2000 and south of the refinery in January 2001. Current refinery facilities and equipment, as well as surrounding land uses, are essentially the same as in 2001. Thus, results from the survey are considered representative of current conditions. Based on the noise survey, the existing community noise equivalent level (CNEL) in the residential area to the south of the refinery is 59 to 62 dBA, which is in the “normally acceptable” to “conditionally acceptable” range for residential land use categories, but the measured noise levels at two residential locations in Manhattan Beach exceeded the Manhattan Beach’s noise standards for residential receptors of 55 dBA during the day and 50 dBA at night. Noise levels at these residences are dominated by traffic noise.

The existing CNEL in the vicinity of commercial and residential areas to the north of the refinery, in the City of El Segundo, is 61 to 63 dBA, which is in the “normally acceptable” range for both commercial and residential land uses.

1.4.5 Solid and Hazardous Wastes

The refinery generated approximately 6,100 tons of non-hazardous solid wastes and 3,300 tons of hazardous wastes during 2004. These wastes were recycled, disposed in landfills, or incinerated.

Several landfills in Los Angeles County accept non-hazardous solid waste. The Bradley Canyon Landfill located in Sun Valley is operated by Waste Management, Inc., and is permitted to receive a maximum of 10,000 tons of solid waste per day. The Bradley Canyon Landfill is expected to close in June 2007. The Los Angeles County Sanitation District maintains three active Class III landfills that handle approximately 20,000 tons per day of non-hazardous solid waste. These landfills include Puente Hills Landfill, Scholl Canyon Landfill, and Calabasas Landfill. Projected closure dates for the three landfills range from 2013 at Puente Hills Landfill to 2028 at Calabasas. Permitted daily capacity ranges from 3,400 tons per day at Scholl Canyon to 13,200 tons per day at Puente Hills.

There are two Class I landfills in California that are approved to accept hazardous wastes. Chemical Waste Management Corporation in Kettleman City, California is a treatment, storage, and disposal facility that has a permitted capacity of approximately 10.7 million cubic yards. Clean Harbors operates a Class I landfill in Buttonwillow, California that has a permitted capacity of 14.3 million cubic yards and an expected closure date of 2040.

1.4.6 Transportation and Traffic

The transportation network in the vicinity of the refinery includes surface streets and two freeways (Interstate 105 to the north of the refinery and Interstate 405 to the east of the refinery). Traffic count information to establish existing conditions at intersections in El Segundo was obtained from several sources, including manual traffic counts in late 2005 and early 2006 at 14 intersections, as well as traffic data from the Final EIR for the Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development project in the City of El Segundo. The level of service (LOS) at these intersections ranges from A (best) to F (worst), with five of the intersections operating at unacceptable levels (LOS E or F).

1.5 Chapter 4 Summary - Potential Environmental Impacts and Mitigation Measures

This section summarizes the environmental impacts, mitigation measures, and residual impacts associated with the proposed project. Impacts are divided into four classifications: Unavoidable Adverse Impacts, Potentially Significant but Mitigable Impacts, Less Than Significant Impacts, and Beneficial Impacts. Unavoidable adverse impacts are significant impacts that require a Statement of Findings pursuant to CEQA Guidelines §15091 and a Statement of Overriding Considerations to be issued per CEQA Guidelines §15093 if the project is approved. Potentially Significant but Mitigable Impacts are adverse impacts that can be feasibly mitigated to less than significant levels. The SCAQMD interprets §15091 to require findings only if impacts are significant. If an impact is mitigated to insignificance, findings are not required. Less than significant impacts may be adverse but do not exceed any significance threshold levels and do not require mitigation measures. Beneficial impacts reduce existing environmental problems or hazards.

1.5.1 Unavoidable Adverse Impacts

Air Quality: Construction emissions of CO, volatile organic compounds (VOC) and nitrogen oxides (NO_x) are expected to remain significant following mitigation. Construction emissions of NO_x may cause significant adverse impacts to localized ambient NO_2 air quality following mitigation.

Hazards: The proposed modifications to the No. 6 H_2S Plant could result in potential public exposure to significant adverse H_2S concentrations under "worst-case" consequence analysis conditions. As a result, the potential consequences of a release of H_2S associated with these modifications are significant.

1.5.2 Potentially Significant but Mitigable Adverse Impacts

Air Quality: Construction emissions of PM10 are expected to be reduced to less than significant levels following mitigation.

Noise: Construction noise impacts are expected to be reduced to less than significant levels following mitigation.

1.5.3 Less Than Significant Impacts

Air Quality: Construction emissions of SO_x are expected to be less than significant.

On-site CO and PM10 construction emissions are not expected to cause significant localized ambient air quality impacts.

Operational CO, VOC, NOx, SOx and PM10 emissions are less than significant.

The estimated maximum individual cancer risk due to the operation of the proposed project at the refinery is expected to be less than the significance threshold of 10 per million so that the project impacts are less than significant.

The acute hazard index and the chronic hazard index from exposure to non-carcinogenic compounds during operation of the proposed project are both less than the significance threshold of 1.0 so that the project impacts are expected to be less than significant.

The estimated maximum individual cancer risk due to diesel exhaust particulate matter emissions from refinery export trucks and from marine crude oil tanker hoteling during operation of the proposed project are expected to be less than the significance threshold of 10 per million so that the project impacts are expected to be less than significant.

Ambient air quality CO, NOx and PM10 impacts during operation are expected to be less than significant.

No significant traffic impacts were identified at local intersections so no significant increases in CO hot spots are expected.

Potential odor impacts from the proposed project are expected to be less than significant.

Hazards: The proposed modifications to the No. 4 Crude Unit and the Coker are not expected to result in significant adverse impacts.

Hydrology/
Water Quality: The proposed project is not expected to cause significant adverse impacts to water supply, water quality or wastewater disposal during construction or operation.

Noise: Operation of the proposed project is not expected to cause significant adverse noise impacts.

Solid/Hazardous
Waste: The proposed project is not expected to cause significant adverse impacts from generation of solid or hazardous wastes during construction or operation.

Traffic/
Transportation: The proposed project is not expected to cause significant adverse impacts to traffic or transportation during construction or operation.

Potential impacts, mitigation measures, and impacts remaining after mitigation are summarized in Table 1.5-1.

Table 1.5-1
Summary of Impacts and Mitigation Measures

Impact	Mitigation Measures	Residual Impact
Air Quality		
Construction emissions of CO, VOC, NO_x and PM10 are significant.	Mitigation measures include fueling construction equipment with emulsified diesel; requiring construction equipment to meet Tier 2 or Tier 1 emission standards for off-road engines or, if equipment is rated at 100 hp or more and equipment meeting Tier 2 or Tier 1 standards is not available, to be equipped with diesel particulate filters, if feasible; maintaining and tuning construction equipment engines according to manufacturers' specifications; limiting engine idling to five minutes; applying retrofit technologies such as selective catalytic reduction, oxidation catalysts, air enhancement, etc. to construction equipment if technologies are commercially available; using electric welders instead of diesel or gas welders when electricity is available; using on-site electric power instead of diesel generators where electricity is available; sweeping paved roads used by on-site construction vehicles; watering active excavation and storage pile locations a minimum of three times per day; and using coatings with no more than 100 g/l VOC.	Mitigation measures will reduce construction emissions of PM10 to less than significant. Construction CO, VOC, and NO_x emissions are expected to remain significant after mitigation.
On-site NO_x construction emissions may cause significant localized NO_2 ambient air quality impacts.	Same as above	On-site NO_x construction emissions may cause significant NO_2 ambient air quality impacts after mitigation.
Construction emissions of SO_x are less than significant.	None required	SO_x construction emissions are expected to be less than significant.
On-site CO and PM10 construction emissions are not expected to cause significant localized ambient air quality impacts.	No additional required	On-site CO and PM10 construction emissions are not expected to cause significant localized ambient air quality impacts.

Table 1.5-1 (continued)
Summary of Impacts and Mitigation Measures

Impact	Mitigation Measures	Residual Impact
Air Quality (continued)		
Operational CO, VOC, NO_x, SO_x and PM10 emissions are less than significant.	None required	Operational CO, VOC, NO_x SO_x and PM10 emissions are expected to be less than significant.
The estimated maximum individual cancer risk due to the operation of the proposed project at the refinery is expected to be less than the significance threshold of 10 per million so that the project impacts are less than significant.	None required	Cancer risk impacts from operation of the proposed project at the refinery are expected to be less than significant.
The acute hazard index and the chronic hazard index from exposure to non-carcinogenic compounds during operation of the proposed project are both less than the significance threshold of 1.0 so that the project impacts are less than significant.	None required	Non-cancer risk impacts from operation of the proposed project are expected to be less than significant.
The estimated maximum individual cancer risk due to diesel exhaust particulate matter emissions from refinery export trucks and from marine crude oil tanker hoteling during operation of the proposed project are expected to be less than the significance threshold of 10 per million so that the project impacts are less than significant.	None required	Cancer risk impacts from refinery export truck and marine crude oil tanker emissions are expected to be less than significant.
Ambient air quality CO, NO_x and PM10 impacts during operation are less than significant.	None required	Ambient air quality CO, NO_x and PM10 impacts during operation are expected to be less than significant.
No significant traffic impacts were identified at local intersections so no significant increases in CO hot spots are expected.	None required	CO hot spot impacts are expected be less than significant.
Potential odor impacts from the proposed project are expected to be less than significant.	None required	Odor impacts are expected to be less than significant.

Table 1.5-1 (continued)
Summary of Impacts and Mitigation Measures

Impact	Mitigation Measures	Residual Impact
Hazards		
Impacts associated with modifications to No. 6 H_2S Plant could result in off-site exposure to H_2S at levels that could cause injury.	Perform a pre-startup safety review by qualified personnel.	Hazard impacts associated with modifications to the No. 6 H_2S Plant are expected to remain significant.
Hazard impacts associated with modifications to the No. 4 Crude Unit and the Coker are not expected to be significant.	None required	Hazard impacts associated with modifications to the No. 4 Crude Unit and the Coker are not expected to be significant.
Hydrology and Water Quality		
No significant adverse water demand, water quality, or wastewater disposal impacts are expected during construction or operation of the proposed project.	None required	No significant adverse water demand, water quality, or wastewater disposal impacts are expected during construction or operation of the proposed project.
Noise		
Construction of the proposed project may cause significant adverse noise impacts	Locate compressors used during construction of the proposed No. 4 Crude Unit modifications south of existing process equipment or shield them with 3/4-inch thick plywood shrouds located on the north side of the compressors.	Noise impacts during construction of the proposed project are not expected to be significant after mitigation.
Operation of the proposed project is not expected to cause significant adverse noise impacts.	None required.	Operation of the proposed project is not expected to cause significant adverse noise impacts.
Solid and Hazardous Wastes		
Solid and hazardous wastes generated during construction of the proposed project are not expected to cause significant adverse impacts.	None required	Solid and hazardous wastes generated during construction of the proposed project are not expected to cause significant adverse impacts.
Operation of the proposed project is not expected to generate additional solid or hazardous wastes, so no impacts will occur.	None required	Operation of the proposed project will not cause significant adverse impacts to solid or hazardous wastes.

Table 1.5-1 (concluded)
Summary of Impacts and Mitigation Measures

Impact	Impact	Impact
Traffic and Transportation		
Significant adverse impacts on local intersections are not expected during construction or operation of the proposed project.	None required	Significant adverse impacts on local intersections are not expected during construction or operation of the proposed project.
Significant adverse impacts to freeway segments in the vicinity of the proposed project are not expected during construction or operation of the proposed project.	None required	Significant adverse impacts to freeway segments in the vicinity of the proposed project are not expected during construction or operation of the proposed project.

1.5.4 Growth Inducing Impacts of the Proposed Project

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 and additional refinery workers are not expected to be needed. 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 proposed project.

1.5.5 Significant Irreversible Environmental Changes

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.

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.

1.5.6 Environmental Effects Found Not to be Significant

In the IS, 11 environmental areas were determined not to be significant: Aesthetics, Agricultural Resources, Biological Resources, Cultural Resources, Energy, Geology and Soils, Land Use and Planning, Mineral Resources, Population and Housing, Public Services, and Recreation.

1.6 Chapter 5 Summary - Project Alternatives

Pursuant to CEQA Guidelines §15126.6, this Final EIR identifies and compares the relative merits of a range of reasonable alternatives to the proposed project. A detailed discussion of the alternatives is presented in Chapter 5.

In order to evaluate the environmental impacts of the proposed project, the environmental characteristics of the existing environment has been compared to the proposed project as well as the environmental impacts of two project alternatives. The two project alternatives consider other possible means of feasibly attaining some or all of the objectives of the proposed project that would avoid or substantially lessen any of the significant effects of the proposed project, and provide a means for evaluating the comparative merits of each alternative. These alternatives to the project would implement the proposed project except for the following differences:

- **Alternative 1 - Use the Existing Coker Main Fractionator Column Instead of Replacing It with a Larger, More Efficient Column.**

  Alternative 1 would use the existing Coker Main Fractionator column and not replace it with a new column. The new column would be constructed on-site under the proposed project. So, by not installing a new Coker Main Fractionator column, on-site construction activities under Alternative 1 would be substantially reduced. It would reduce the peak construction workforce by 60 workers and avoid the use of one 600-ton crane, one 230-ton crane, two welders, and a portable heater that would be used for stress relief for the new column.

  This alternative was not included as part of the proposed project because the capacity of the existing Coker Main Fractionator column would limit the increase in heavy crude oil that could be processed by the refinery to approximately one-quarter of the increase that could be realized by the proposed project. Thus, Alternative 1 would only partially meet the objective of the project to increase the quantity of heavy crude oil processed by the refinery.

- **Alternative 2 - Add Heating and Insulation to Crude Oil Storage Tanks**

  Crude oil imported to the refinery is stored in tanks prior to processing. Heavy crude oil requires heating to reduce its viscosity so that it can be handled in the refinery. The refinery currently has three different crude oil storage and feed systems, each containing multiple storage tanks. Only one of those systems includes tanks that are heated and insulated to handle heavy crude oil. The other two crude oil storage and feed systems are not heated, so they cannot handle heavy crude oil.

Chevron currently imports and stores heavy crude oil from different sources at the same time. Because crude oils from different sources have different properties, such as sulfur content, they need to be stored in separate storage tanks. The refinery currently has sufficient heated crude oil storage tank capacity to store the additional quantity of heavy crude oil that will be imported during operation of the proposed project, but the number of different types of heavy crude oil that Chevron can store at the same time will decrease. Alternative 2 would provide additional heavy crude oil storage capacity that would enable the refinery to maintain its current capabilities to store heavy crude oil from multiple sources during operation of the proposed project. This alternative was not included as part of the proposed project because the increased flexibility to store heavy crude oils from multiple sources was not considered to be absolutely necessary by Chevron for the cost to implement it.

Currently, as well as during operation of the proposed project, marine tankers occasionally need to wait offshore or in the Port of Los Angeles before they offload at the ESMT because of a number of reasons. One primary reason is if the tankers are carrying a different type of heavy crude oil than is already in storage at the refinery and none of the heavy crude oil storage tanks is empty. Alternative 2 would potentially reduce the amount of time that marine tankers would need to wait before offloading heavy crude oil by increasing the number of storage tanks that can accommodate heavy crude oil. By allowing the marine tankers to unload heavy crude oil sooner, emissions from the idling of marine tankers as well as emissions from the hoteling (auxiliary power) sources are reduced. However, the reduction in the amount of time tankers would need to wait to offload cannot be predicted at this time because the quantities of heavy crude oil that will be in refinery storage tanks when a crude oil tanker arrives with a different type of heavy crude oil cannot be predicted. Thus, related emission reductions cannot be quantified.

Alternative 2 includes adding insulation to one crude oil storage tank, adding heating systems to two crude oil storage tanks, adding piping, and upgrading pumps associated with crude oil storage tanks to enable them to handle the higher viscosity crude oil.

Construction of the crude oil storage tank modifications would take place from September 2006 through December 2006 and require a peak of 25 additional construction workers as well as the use of additional construction equipment. No additional employees will be required on-site to operate any new equipment as a result of implementing Alternative 2.

A third alternative, the "no project" alternative, was also evaluated as required by CEQA §15126.6(e). Under the "no project" alternative, Chevron would not implement any portions of the proposed project, and there would not be any potential impacts to the existing environment. However, none of the objectives of the proposed project would be met. In the future, refinery output would be reduced as available crude oils become heavier, assuming permit conditions are not exceeded, because the production capacity of the equipment that currently processes light crude oil would be reduced when processing heavy crude oil. Alternatively, the costs to main current production levels would increase as the price of lighter crude oils increases and overall supply is reduced. Both of these situations would threaten the future economic viability of the refinery and supplies to the regional community.

The significance of potential environmental impacts from the alternatives as compared to the proposed project are summarized in Table 1.6-1.

Table 1.6-1
Significance of Environmental Impacts of Alternatives Compared with the Proposed Project

Environmental Topic	Proposed Project[a]	Alternative 1[a]	Alternative 2[a]	"No Project" Alternative[a]
Air Quality				
Construction	S	S (-)	S (=)[b]	N (-)
Operation	N	N (=)	N (+)	N (-)
Toxics	N	N (=)	N (+)	N (-)
Hazards	S	S (=)	S (=)	N (-)
Hydrology/ Water Quality				
Construction	N	N (-)	N (=)	N (-)
Operation	N	N (=)	N (=)	N (-)
Noise				
Construction	M	M (=)	M (+)	N (-)
Operation	N	N (=)	N (=)	N (-)
Solid/Hazardous Waste				
Construction	N	N (-)	N (+)	N (-)
Operation	N	N (=)	N (=)	N (=)
Traffic/ Transportation				
Construction	N	N (-)	N (+)	N (-)
Operation	N	N (=)	N (=)	N (-)

[a] Key:
S = Significant
N = Less than significant
M = less than significant after mitigation
(+) = Greater impacts than proposed project
(=) = same impacts as proposed project
(-) = Less impacts than proposed project

[b] Although Alternative 2 will require more construction activities and manpower than the proposed project, construction activities for Alternative 2 do not overlap with the other construction activities that cause the peak daily construction emissions.

1.7 Chapter 6 Summary - Cumulative Impacts

In order to assess cumulative impacts, other planned projects within and in the area of the refinery were identified. These cumulative impacts and discussion are presented in Chapter 6.

Following are the conclusions from the cumulative impacts analyses:

1.7.1 Unavoidable Adverse Cumulative Impacts

Air Quality: Cumulative construction emissions of CO, VOC, NO_x and PM10 are expected to remain significant following mitigation.

Operational emissions of CO, VOC, NO_x and PM10 are expected to be cumulatively significant. Because emissions of these pollutants during the operation of the proposed project by itself are not significant, feasible mitigation measures for the proposed project have not been identified.

Hazards: The proposed modifications to the No. 6 H_2S Plant could result in public exposure to significant adverse H_2S concentrations under "worst-case" consequence analysis conditions. As a result, the potential consequences of a release of H_2S associated with these proposed modifications are cumulatively significant.

Traffic/
Transportation: Traffic associated with construction of the proposed project will cause a significant adverse cumulative impact on two freeway segments. Feasible mitigation measures for these potential impacts have not been identified.

1.7.2 Potentially Significant but Mitigable Adverse Cumulative Impacts

Noise: Cumulative construction noise impacts are expected to be reduced to less than significant levels without additional mitigation.

1.7.3 Less Than Significant Cumulative Impacts

Air Quality: Cumulative construction emissions of SO_x are expected to be less than significant.

On-site CO and PM10 construction emissions are not expected to cause significant cumulative localized ambient air quality impacts.

Cumulative operational SOx emissions are less than significant.

Cumulative adverse health impacts are less than significant.

Cumulative ambient air quality CO, NOx and PM10 impacts during operation are expected to be less than significant.

No significant traffic impacts were identified at local intersections so no significant cumulative increases in CO hot spots are expected.

Cumulative potential odor impacts are expected to be less than significant.

Hazards: The proposed modifications to the No. 4 Crude Unit and the Coker are not expected to result in significant adverse cumulative impacts.

Hydrology/
Water Quality: The proposed project is not expected to cause significant adverse cumulative impacts to water supply, water quality or wastewater disposal during construction or operation.

Noise: Operation of the proposed project is not expected to cause significant adverse cumulative noise impacts.

Solid/Hazardous
Waste: The proposed project is not expected to cause significant adverse cumulative impacts from generation of solid or hazardous wastes during construction or operation.

Traffic/
Transportation: The proposed project is not expected to cause significant adverse cumulative impacts to traffic or transportation during operation.

1.8 Chapters 7 and 8 Summary – Persons and Organizations Consulted and References

Information on persons and organizations contacted and references cited is presented in Chapters 7 and 8, respectively.

CHAPTER 2

PROJECT DESCRIPTION

This page intentionally left blank

2.0 PROJECT DESCRIPTION

2.1 Introduction

The Chevron Products Company (Chevron) El Segundo Refinery processes crude oil to produce motor fuels and other saleable petroleum products. The refinery processes both heavy and light crude oils. Heavy crude oils are more dense and viscous than light crude oils and generally produce smaller amounts of motor fuels per barrel than light crude oils. Because most new crude oil discoveries in the world are heavier than historic crude oil supplies, Chevron is proposing modifications to the refinery to maintain or slightly increase its current production levels of saleable petroleum products by being able to process more heavy crude oil and less light crude oil than it currently processes. Maintaining current production levels of saleable products while processing more heavy crude oil will require an annual increase of approximately five percent in the total amount of crude oil processed by the refinery. To process more heavy crude oil, the refinery operators are proposing modifications to the No. 4 Crude Distillation Unit and the Delayed Coking Unit (Coker). Chevron is also proposing modifications to improve the removal of sulfur compounds from refinery fuel gas to assist the refinery in complying with SCAQMD Regulation XX - Regional Clean Air Incentives Market (RECLAIM) and to increase the reliability of the removal process.

The No. 4 Crude Unit performs the initial steps in refining most of the crude oil processed by the refinery. Processing more heavy crude oil will change the relative amounts of various products produced by the No. 4 Crude Unit. In particular, the quantity of the heaviest material produced from each barrel of crude oil, which is called vacuum residuum (or residue), will increase. The No. 4 Crude Unit, where this vacuum residuum is produced, cannot handle the increase. Therefore, Chevron is proposing modifications to the No. 4 Crude Unit that will enable it to handle the increased vacuum residuum production. The design changes required to handle the increased vacuum residuum production will result in an overall increase in the crude-oil processing capacity of the No. 4 Crude Unit of approximately five percent, while resulting in a reduction in the amount of light crude oil processed.

The refinery's No. 2 Crude Unit also produces vacuum residuum. However, its crude-oil throughput capacity is only about one-third of the No. 4 Crude Unit's capacity. To maintain current production levels while processing more heavy crude oil, only modifications to the No. 4 Crude Unit are necessary. Therefore, Chevron is not proposing to modify the No. 2 Crude Unit, and the total amount of crude oil that it processes will not increase.

Vacuum residuum produced by the No. 2 and No. 4 Crude Units is processed by the Coker. Chevron is proposing modifications to the Coker to increase its throughput to accommodate the increase in vacuum residuum produced by the No. 4 Crude Unit.

While the purpose of the proposed project is to enable the refinery to process more heavy crude oil, the actual crude oil processed in the future will vary depending on market conditions. The design changes required to process more heavy crude oil will result in an overall increase in the annual crude throughput capacity of the No. 4 Crude Unit of approximately five percent. The overall increase results from improving the unit's capability to handle vacuum residuum while maintaining the current processing capability for the intermediate products.

The refinery burns fuel gas, which is produced during the refining process, to provide heat for various refinery process units. Sulfur compounds are removed from the fuel gas before it is burned in order to reduce SO_2 emissions when the fuel gas is burned. The No. 6 H_2S Plant treats fuel gas produced in several refinery process units to remove sulfur compounds. Currently, the No. 6 H_2S plant removes hydrogen sulfide (H_2S), mercaptans and carbonyl sulfide (COS) from the fuel gas. Chevron is proposing modifications to decrease the COS concentration in the treated fuel gas, which will decrease SO_2 emissions when the treated fuel gas is burned. Additionally, operation of the No. 6 H_2S plant currently depends on operation of the No. 5 H_2S Plant, which treats fuel gas produced by different process units than those that generate the fuel gas treated by the No. 6 H_2S Plant. As a result, the No. 6 H_2S Plant and the process units that produce the fuel gas that it treats must be shut down when the No. 5 H_2S Plant is not operational. Chevron is also proposing modifications to permit the No. 6 H_2S Plant to operate independently of the No. 5 H_2S Plant.

Implementation of the proposed modifications to the No. 6 H_2S Plant and implementation of the proposed modifications required to process more heavy crude oil are not dependent on each other. However, the construction and operation schedules of the proposed modifications to the No. 6 H_2S Plant will overlap with the proposed modifications to the No. 4 Crude Unit and the Coker. Because of this spatial and temporal overlap, impacts from implementing the proposed modifications will overlap within the same geographic area (e.g., the refinery and vicinity) during both construction and operation. Therefore, evaluating these proposed modifications as a single project ensures that potential overlapping impacts are evaluated and disclosed to the public.

2.2 Project Objectives

The objectives of the proposed project are to:

- Increase the amount of heavy crude oil processed by the refinery while maintaining, or slightly increasing, the production of motor fuels and other saleable petroleum products; and

- Decrease concentrations of sulfur compounds in refinery fuel gas to assist the refinery in complying with the RECLAIM program and to improve the reliability of the fuel-gas treatment equipment.

2.3 Project Location

The location of the refinery within the overall southern California region is 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. The 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. All proposed modifications would occur within the confines of the existing refinery.

2.4 Land Use and Zoning

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).

2.5 Overview of Petroleum Refining

The following discussion provides an overview of the petroleum refining process. This discussion is intended to enhance the reader's understanding of the proposed project.

All crude oil consists of a mixture of hydrocarbons, which are chemical compounds made up of hydrogen and carbon atoms that are combined into molecules of different sizes, shapes, and degrees of complexity. The smallest hydrocarbons in crude oil contain only a few atoms of hydrogen and carbon and are gases, such as propane and butane. Somewhat larger hydrocarbon molecules are liquids, such as gasoline and diesel fuel. Very large hydrocarbon molecules are solids, such as asphalt and tar. Crude oil also contains impurities, such as sulfur and metals.

The overall purpose of the refinery is to separate these mixtures in the crude oil into useful refinery products. This separation is accomplished by heating the crude oil in order to change the form of the complex hydrocarbon mixtures from liquids to vapors and then separating the different hydrocarbon compounds by their physical properties. Figure 2-3 is a simplified overview of refinery operations which shows the incoming crude oil, key refinery processing operations and key refinery products.

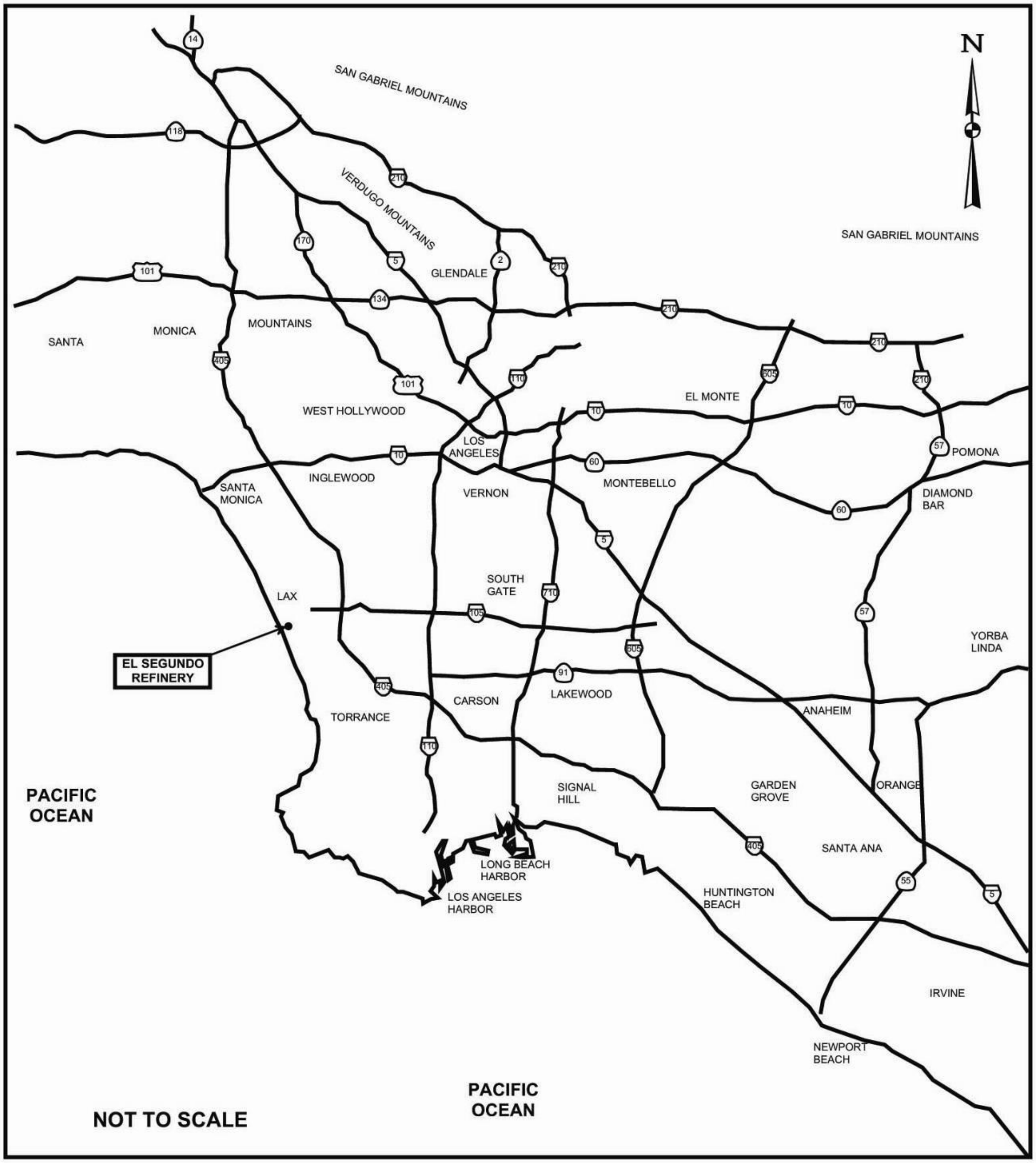


Figure 2-1 Regional Location Map

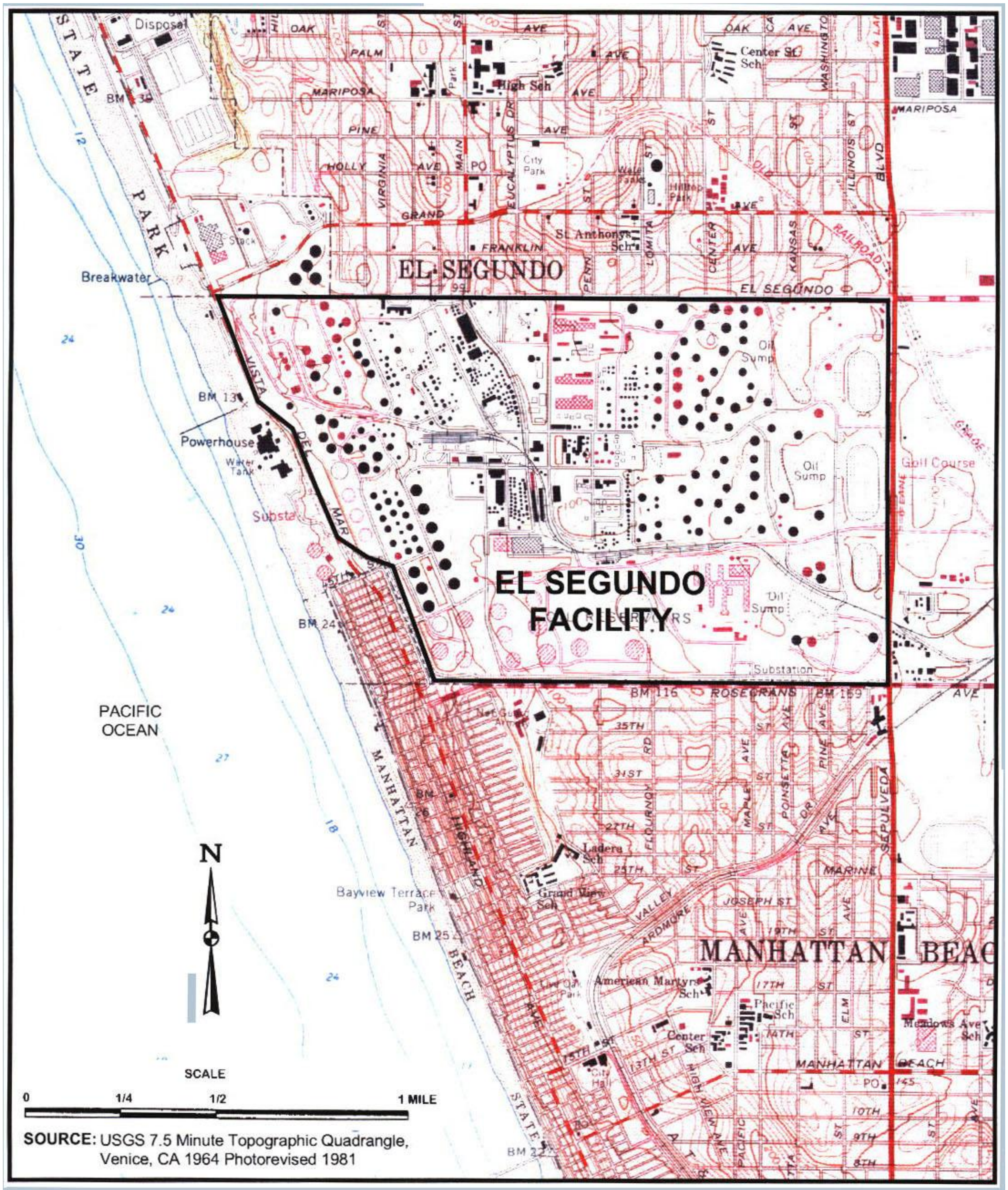


Figure 2-2 Site Location Map Chevron El Segundo Refinery

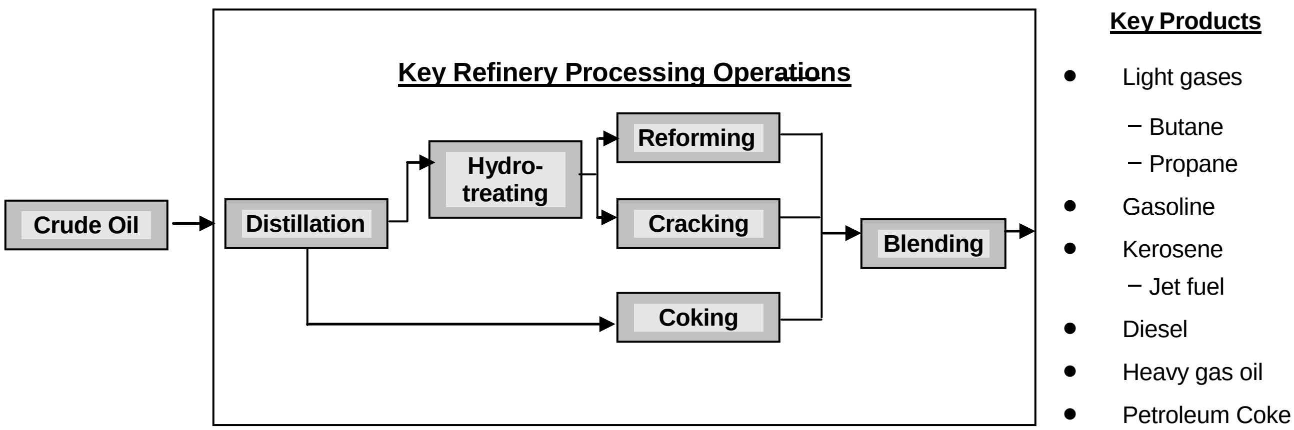


Figure 2-3 Simplified Overview of Petroleum Refinery Operations

The first major step in the refining process is to heat the crude oil until it is partly vaporized. The heated vapors are then introduced into what are called "distillation units," where the mixed hydrocarbon vapors rise through the distillation columns. The distillation process takes advantage of the fact that hydrocarbons boil at different temperatures and pressures according to the size of their molecules. Inside the distillation columns are a series of horizontal trays that allow separation of the many types of hydrocarbon compounds into several distinct streams. The temperature at the bottom of the distillation column is higher than at the top, so that heavy hydrocarbons with high boiling points condense on the lower trays of the tower and lighter hydrocarbons with lower boiling points condense on trays near the top.

Refineries have two types of distillation units, referred to as atmospheric and vacuum distillation units. Atmospheric distillation separates the hydrocarbon compounds under atmospheric pressure conditions. The vacuum distillation unit receives the heavy hydrocarbons collected from the lower trays of the atmospheric distillation unit and further separates these heavy hydrocarbons under a vacuum.

Certain hydrocarbon fractions from the distillation processes are further refined in a variety of refinery processes. These downstream processes change the molecular structure of hydrocarbon molecules by breaking them into small molecules, joining them together to form larger molecules, or reshaping them into higher quality molecules. Some of the major downstream processes are coking, treating, cracking, and reforming, each of which is briefly addressed in the following discussion.

Coking is a process designed to increase the volume of liquid products, including gasoline, jet fuel and diesel, produced at a refinery. It is a high-temperature cracking process that converts heavy hydrocarbons from the initial crude oil distillation operations into lighter products that can be blended later into gasoline. Another product from the coking process is petroleum coke, which has a variety of uses ranging from electrodes in the aluminum industry to charcoal briquettes.

In order to meet the product specifications for gasoline, diesel and other fuels, refineries use several processes to remove impurities, including a sulfur-removal technique called **hydrotreating**. In hydrotreating, the hydrocarbon mixture and hydrogen are heated together and then fed into a reaction chamber containing a catalyst. When the hydrocarbon and hydrogen molecules come in contact with the catalyst, a chemical reaction occurs that strips sulfur from the hydrocarbon to form hydrogen sulfide (H_2S). Hydrogen sulfide is then sent to the refinery's H_2S plants, where the H_2S is removed from the hydrocarbon streams. The H_2S removed in the H_2S plants is processed in the sulfur recovery plant where the sulfides are converted to elemental sulfur.

Cracking takes large hydrocarbon molecules and uses a combination of catalysts, high pressures, and high temperatures to break the long carbon chains into shorter-chain hydrocarbons, including gasoline. There are two main types of cracking, called Fluid Catalytic Cracking and Hydrocracking. Fluid Catalytic Cracking yields mostly gasoline and diesel, as well as some light gases, while hydrocracking yields kerosene.

Reforming is a refining process designed to increase the volume of gasoline production at a refinery. Reforming uses high temperatures and catalysts to rearrange the chemical structure of certain hydrocarbons into gasoline molecules.

Blending is the final step in the production of finished refinery fuels. Blending involves mixing intermediate refinery streams in proportions to meet product specifications such as octane level and vapor pressure requirements for gasoline.

2.6 Proposed Refinery Modifications

The following discussion describes modifications proposed by Chevron to the No. 4 Crude Unit, the Coker and the No. 6 H_2S Plant at the refinery and also presents the construction schedule. The locations of the proposed modifications within the refinery are shown in Figure 2-4.

Additionally, although Chevron is not proposing modifications to its El Segundo Marine Terminal (ESMT), importing more heavy crude oil by marine tanker through the ESMT to the refinery may change the types and number of marine tankers calling at the terminal.

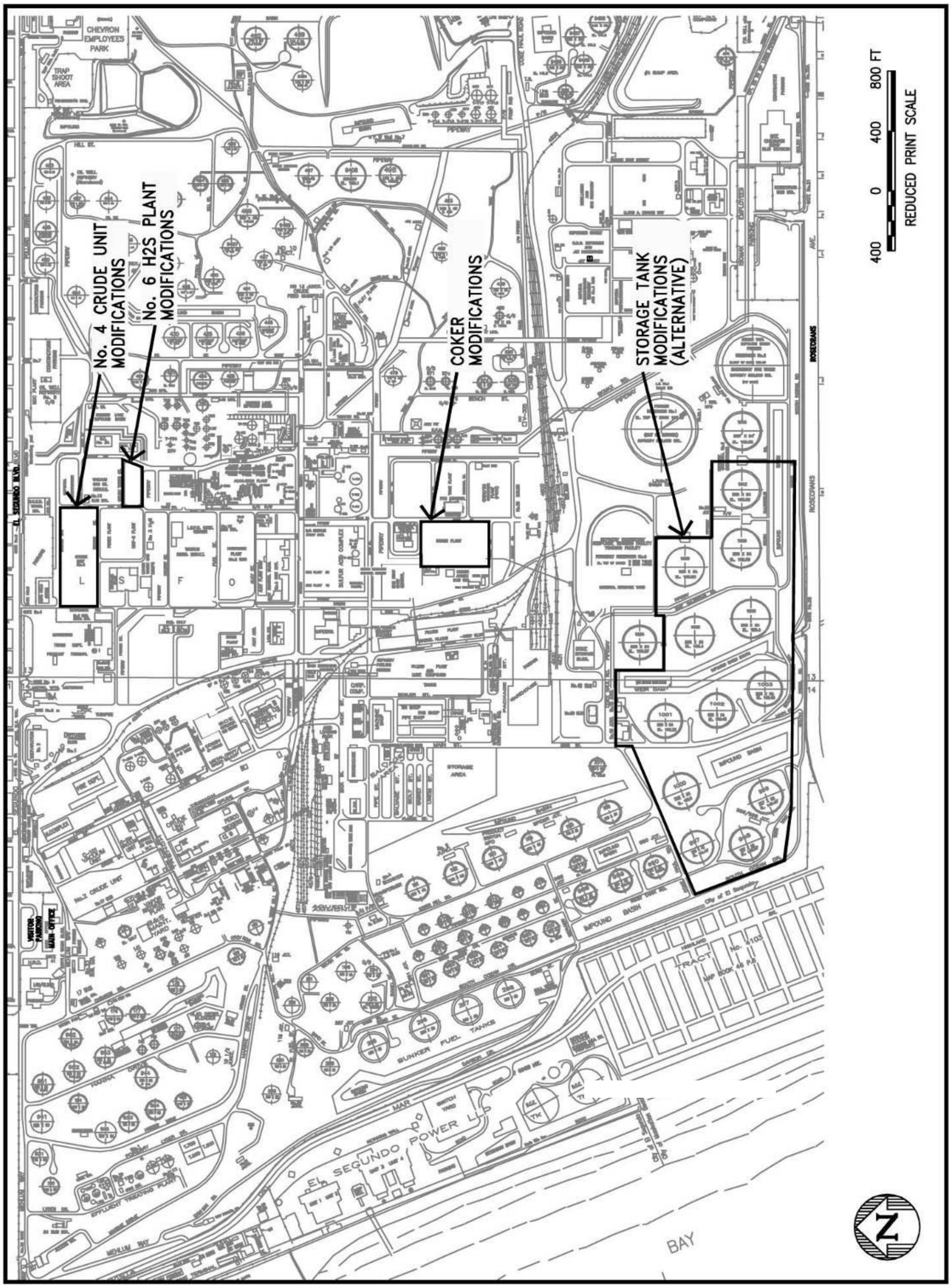


Figure 2-4 Site Plan Showing Locations of Project Components

2.6.1 No. 4 Crude Unit

The following paragraphs discuss current operations and the proposed modifications at the No.4 Crude Unit.

2.6.1.1 Current Operations

The No. 4 Crude Unit performs the initial steps in refining most of the crude oil processed by the refinery. The No. 4 Crude Unit includes both an atmospheric distillation column and a vacuum distillation column. The atmospheric distillation column performs an initial separation of the crude oil at atmospheric pressure into several components, including methane, ethane, liquid petroleum gas (LPG), naphtha, raw jet fuel, raw diesel fuel, gas oil and atmospheric residuum. These components are processed by other process units in the refinery.

Atmospheric residuum is composed of the heaviest hydrocarbons in crude oil, which boil at the highest temperatures and cannot be further separated at the operating pressures and temperatures in the atmospheric distillation column. For this reason, the atmospheric residuum is sent from the atmospheric distillation column to the vacuum distillation column for separation into light gas oil, heavy gas oil and vacuum residuum. The vacuum distillation column operates at a pressure that is below atmospheric pressure. The reduced pressure allows the atmospheric residuum to be distilled at lower temperatures than would otherwise be required if the distillation unit operated at atmospheric pressure.

The crude oil entering the No. 4 Crude Unit is heated to the temperatures needed for the distillation process to occur by feed heaters in the No. 4 Crude Unit and by several heat exchangers that recover heat from the vacuum residuum as it leaves the unit.

2.6.1.2 Proposed Modifications

The proposed processing of more heavy crude oil by the No. 4 Crude Unit will increase the amount of atmospheric and vacuum residuum produced. The vacuum residuum production rate is anticipated to increase from the current annual average rate of approximately 45 thousand barrels per operating day (MBPOD) to approximately 57 MBPOD when more heavy crude oil is processed. The rate of vacuum residuum production by the No. 4 Crude Unit is currently limited primarily by the flow rate capacity of the heat exchangers that recover heat from it as it leaves the unit. Chevron is proposing modifications to the heat exchangers to reduce pressure drop.

Because heavy crude oil contains less lighter hydrocarbons than light crude oil, the quantity of lighter products produced by the No. 4 Crude Unit per barrel of crude oil processed is less when processing heavy crude oil than when processing light crude oil. Chevron currently processes heavy crude oil but at lower volumes than contemplated for the proposed project. The proposed modifications will increase the throughput capacity of the No. 4 Crude Unit by approximately five percent. As a result of this capacity increase, processing heavy crude oil by the No. 4 Crude Unit can increase but the production rate of lighter products by the No. 4 Crude Unit is not expected to substantially change from the current rates.

The proposed increase in the throughput capacity of the unit will require an increase in the heating rate of crude oil entering the unit. Chevron is proposing modifications to the heat exchangers to increase heat recovery from the vacuum residuum leaving the unit, which will provide the additional heating of the crude oil entering the unit. Thus, the firing rates of the No. 4 Crude Unit feed heaters are not anticipated to change substantially from the current rates that already occur routinely as part of Chevron's refinery operations. Any additional increases in heating requirements from the No. 4 Crude Unit furnaces can be provided within the heaters' current capacity, and modifications of existing permits to accommodate any change in firing rates will not be required.

Chevron is also proposing modifications to the No. 4 Crude Unit to improve distillation in the unit and to reduce the production of vacuum residuum per barrel of heavy crude oil processed.

Specific proposed modifications to the No. 4 Crude Unit include:

- Modify trays in the atmospheric distillation column to improve distillation efficiency;
- Modify packing and liquid distribution in the vacuum distillation column to improve distillation efficiency;
- Modify the vacuum system on the vacuum distillation column by replacing existing and adding new eductors, which produce the vacuum, to increase the removal of gas oil from the feed;
- Replace up to 12 existing heat exchangers with new heat exchangers to reduce pressure drop (final engineering designs may ultimately require replacement of fewer heat exchangers);
- Modify up to five existing heat exchangers to reduce pressure drop (final engineering designs may ultimately require modifications to fewer heat exchangers);
- Add up to two heat exchangers to increase the amount of heat recovery (final engineering designs may ultimately require fewer heat exchangers);
- Modify up to eight pumps to handle higher viscosity materials (final engineering designs may ultimately require modifications to fewer pumps);

- Replace internal components and electrical supply on the desalters to be able to better process heavy crude oil;
- Replace piping with larger diameter piping to reduce pressure drop; and
- Install additional automated controls for existing equipment to improve emergency response and normal operating efficiency.

2.6.2 Coker

The following paragraphs discuss current operations and the proposed modifications to the Coker.

2.6.2.1 Current Operations

The Coker processes the vacuum residuum produced by the crude units. The vacuum residuum is heated to 900 to 940 degrees Fahrenheit and fed into vessels called coke drums. It remains inside the coke drums under a pressure of 30 to 60 pounds per square inch gauge for approximately 12 hours, where it cracks into lighter materials. These light materials boil off in the coke drums, leaving behind a solid coal-like material called petroleum coke. The light materials are separated into raw gasoline, raw jet fuel, raw diesel fuel, and gas oil in the Coker Main Fractionator column, and are processed further by other process units in the refinery. At the end of the coking cycle, the drums are stripped with steam to remove remaining hydrocarbons, cooled with water and depressurized. The tops and bottoms of the drums are then removed, and high-pressure water "drilling" systems are used to break up and remove the petroleum coke from the drums. After the petroleum coke is removed, the coke drums are re-sealed and heated before receiving another batch of residuum. The coke drums are operated in pairs. While the filling and coking processes occur in one drum of the pair, the other drum is stripped with steam, cooled, depressurized, emptied and reheated. The entire cycle for a pair of drums requires approximately 15 hours. The Coker has six coke drums, so coke is removed from three drums every 15 hours.

The petroleum coke is reduced in size by a primary crusher. Belt conveyors transport the crushed petroleum coke from the primary crusher to a secondary crusher, which discharges into truck loading hoppers. Chevron does not normally operate the secondary crusher, and the petroleum coke passes through it into the truck loading hopper. The loaded trucks transport the petroleum coke to the Port of Los Angeles. The petroleum coke is exported from the Port of Los Angeles for use in heating and manufacturing operations by third parties at various locations within or outside California.

2.6.2.2 Proposed Modifications

The current annual average vacuum residuum feed capacity of the Coker is 60 MBPOD. Chevron is proposing modifications to increase the annual average capacity of the Coker to 75 MBPOD. This change will accommodate the increase in vacuum residuum production by the No. 2 and 4 Crude Units when they process more heavy crude oil. Petroleum coke production will increase by 510 tons per day, from an annual average of 3,950 tons per day to 4,460 tons per day. Approximately 20 additional trips per day by 26-ton capacity trucks (510 tons per day / 26 tons per truck) will be required to transport the increased quantities of petroleum coke to the Port of Los Angeles or the Port of Long Beach.

The increased heating required by the increase in Coker feed rate can be accommodated within the current permitted capacity of the Coker feed heaters. As a result, no permit modifications relative to the heating capacity of the Coker feed heaters are required.

Proposed modifications to the Coker include the installation of new heat exchangers to increase heat transfer, upgrades to the gas compression equipment at the Coker to increase capacity, replacement of distillation columns to increase their capacities, and modifications to the coke drums and coke drilling systems to reduce the cycle time for each pair of coke drums from 15 hours to 12 hours. Specifically, Chevron is proposing the following modifications to increase the Coker's capacity:

- Install approximately 11 new heat exchangers, change service on existing exchangers and add or modify piping to increase heat transfer and removal;
- Install a new refrigeration unit to provide chilled cooling water to further improve cooling;
- Install a new cooling water supply and return system from Cooling Tower No. 9 to the Coker to increase cooling capacity. These modifications will increase the cooling water flow rate through Cooling Tower No. 9 by 13,000 to 14,000 gallons per minute;
- Install a new depropanizer column and associated heat exchangers, pumps and piping at the Coker. This equipment will replace the existing depropanizer (C-73), which is nearly 60 years old and cannot be upgraded to handle the needed capacity;
- Replace the Wet Gas Compressor (K-501) and the interstage cooler and knockout vessel to increase gas compression capabilities;
- Replace the existing Main Fractionator column (C-501) with a larger diameter, higher capacity column. The existing Main Fractionator column is 118 feet tall and 16.5 feet in

diameter. The proposed replacement Main Fractionator column will be approximately 170 feet tall and 27 feet in diameter at its widest part;

- Replace or upgrade numerous large valves to reduce pressure drop;
- Install approximately eight new pumps to increase pumping capacity;
- Install additional automated controls for existing equipment to improve emergency response and normal operating efficiency;
- Replace the lower section of each coke drum;
- Modify the coke drilling systems from pneumatic drive to hydraulic drive; and
- Connect new emergency relief pressure valves to the Coker emergency relief system (flare).

Subsequent to release of the Draft EIR for public review and comment, it was determined that an emission control device for emissions during coke drum depressurization needs to be installed to comply with the requirement to apply Best Available Control Technology (BACT) in SCAQMD Rule 1303. Therefore, Chevron is also proposing to install a control device to reduce emissions when the coke drums are depressurized before they are opened. The specific control device to be installed has not yet been determined. However, Chevron currently anticipates that the control device will reduce the pressure in the coke drums when they are vented to the atmosphere from the current pressure of approximately five pounds per square inch gauge (psig) to a lower pressure. Reducing the pressure when the coke drums are vented to the atmosphere will reduce the mass of air that is vented, which will reduce emissions. For the purpose of analyzing the potential impacts during construction and operation of the emission control device, the analysis was revised and assumes worst-case impacts during constructing and operating a system consisting of two new steam ejectors, one new heat exchanger and one new vessel. Impacts from the construction and operation of the BACT can be found in Chapter 4.

The current capacity of the petroleum coke conveying system is adequate to accommodate the proposed increase in petroleum coke production, and Chevron is not proposing to increase the conveying system's capacity. Chevron is, however, proposing to modify portions of the petroleum coke conveying system to allow more efficient handling of the petroleum coke and to reduce particulate matter emissions during petroleum coke transport and export truck loading operations. Chevron is proposing the following modifications to the petroleum coke conveying system:

- Install a second primary crusher of the same capacity as the existing primary crusher to provide operational flexibility. Only one of the primary crushers will be operated at any time;

- Replace one of the conveyor belts that transports petroleum coke from the primary crusher to the secondary crusher with a new conveyor belt that bypasses the secondary crusher and transports petroleum coke directly to the truck loading hopper. The existing belt conveyor that will be replaced is covered, but not fully enclosed. The proposed replacement belt conveyor belt and associated petroleum coke transfer locations will be fully enclosed and vented through a particulate matter control device, which will reduce particulate matter emissions; and

- Modify the truck loading system to increase loading efficiency to be able to handle the increased coke export amount. The truck loading system will also be modified to reduce the area that is open to the atmosphere, which will reduce particulate matter emissions during truck loading operations.

2.6.3 No. 6 H_2S Plant

The following paragraphs discuss current operations and the proposed modifications to the No. 6 H_2S Plant.

2.6.3.1 Current Operations

The No. 6 H_2S Plant treats the sulfur-containing gases (called sour gases) from the Coker overhead gas compressor, the Coker waste compressor, the Low Pressure Distillation gas recovery compressor, the flare gas recovery Houdry Compressors and overhead gas from a Depropanizer to remove sulfur compounds. The No. 6 H_2S plant includes a Stacked Absorber column, which consists of a diethanolamine (DEA) absorber section at the bottom of the column and a water wash section at the top of the column. The DEA absorber section removes most of the H_2S in the sour gas by dissolving it in DEA, and the water wash section prevents DEA carryover in the gases leaving the column. The gas from the Stacked Absorber is further processed in the Merox section of No. 6 H_2S Plant to remove mercaptans. The Merox section consists of a Caustic Prewash Column to remove any remaining traces of H_2S and COS and a combination Extraction-Water Wash Column where mercaptans are extracted from the hydrocarbon gas stream into the caustic Merox solution. The treated fuel gas (called sweet fuel gas) is then routed to an existing fuel gas mix drum.

The H_2S-containing DEA (called rich DEA) that leaves the DEA absorber section in the Stacked Absorber column is processed by the No. 5 H_2S Plant to remove the H_2S. The resulting lean DEA is returned to the No. 6 H_2S plant for reuse. The H_2S produced by the No. 5 H_2S Plant is processed by the refinery's Sulfur Recovery Units to remove the H_2S and convert it to elemental sulfur, which is subsequently exported from the refinery for sale. The No. 5 H_2S Plant currently regenerates rich DEA from the No. 5 H_2S Plant as well as from the No. 6 H_2S Plant.

Currently, the No. 6 H_2S Plant must be shut down when the No. 5 H_2S Plant is out of service, either for planned maintenance or when operational problems occur, because rich DEA from the No. 6 H_2S Plant cannot be regenerated. The process units that produce the sour gas that is treated by the No. 6 H_2S Plant must also be shut down when the No. 6 H_2S Plant is shut down, in order to avoid combustion of untreated fuel gas with high sulfur concentrations. Thus, shutdown of the No. 5 H_2S Plant requires shutdown of refinery process units serviced by the No. 6 H_2S Plant in addition to the units serviced by the No. 5 H_2S Plant.

2.6.3.2 Proposed Modifications

Chevron is proposing to install a new DEA Regenerator in the No. 6 H_2S Plant, which will regenerate the rich DEA from No. 6 H_2S Plant and eliminate the need to send the rich DEA to the No. 5 H_2S Plant for regeneration. Steam will be used to heat the rich DEA in the regenerator to remove the H_2S. The H_2S produced by the proposed new DEA Regenerator will be sent to the refinery Sulfur Recovery Units to remove the H_2S. Although the proposed modifications will not change the capacity of the No. 5 H_2S Plant, its acid gas production rate under typical operating conditions will be less than its current acid gas production rate.

Chevron is proposing to install a new Relief Caustic Scrubber in the No. 6 H_2S Plant to remove H_2S from the acid gas produced by the proposed new DEA regenerator in case of an emergency that would prevent the Sulfur Recovery Units from processing the acid gas. The proposed Relief Caustic Scrubber would use a basic liquid caustic stream to scrub H_2S from the acid gas prior to sending it to a relief flare system to avoid combustion of the H_2S and subsequent emissions of SO_2 by the flare system. The proposed Relief Caustic Scrubber will operate for 30 minutes or less during an emergency while the No. 6 H_2S Plant is being shut down.

Chevron is also proposing to install a new Jet Wash Column to absorb any remaining COS from the process gas stream leaving the Merox section of the No. 6 H_2S Plant. The proposed Jet Wash will use circulating jet or diesel fuel to absorb COS from the gas stream.

Specific modifications to the No. 6 H_2S Plant include:

- Install a new DEA Regenerator column. The proposed column will be nine feet in diameter and 72.5 feet tall;
- Install a new Emergency Caustic Scrubber Column. The proposed column will be 12 feel in diameter at its widest part and 64 feet tall;

- Install a new Jet Wash Column. The proposed column will be five feet in diameter and 29 feet tall;
- Install up to four new heat exchangers required for operation of the new columns;
- Install up to 19 new vessels and process stream filters required for operation of the new columns;
- Install up to six new pumps required for operation of the new columns;
- Install one new compressor required for operation of the new DEA Regenerator; and
- Connect pressure relief valves on the new DEA Regenerator to the LSFO emergency relief system (flare).

2.6.4 Import of Crude Oil

Most of the crude oil processed by the refinery is imported by marine tankers through the ESMT, which has two active berths located approximately 7,300 feet and 8,000 feet offshore of the refinery, respectively. Approximately 130 ship calls per year occur currently at the ESMT. As a result of the proposed project, the sources of crude oil imported through the ESMT will change. Chevron anticipates that the heavy crude oil that will be imported through the ESMT in the future will replace Arab Crudes, which are transported in Very Large Crude Carriers (VLCCs) with capacities in excess of one million barrels. The use of VLCCs is more cost-effective than the use of smaller marine tankers when the transport distance is long. The heavy crude oils that are anticipated to replace the Arab Crudes are generally produced in locations closer to the ESMT, such as South America. The use of VLCCs to transport crude oil is not as cost-effective as the use of smaller marine tankers, with capacities of 350,000 to 700,000 barrels, when the transport distances are shorter. Therefore, Chevron anticipates that importing more heavy crude oil may increase the number of smaller marine tankers calling at the ESMT and decrease the number of larger marine tankers. For the purpose of this analysis, the worst-case increase in crude oil imports is up to nine additional ship calls per year as a result of the proposed project.

Subsequent to the release of the Draft EIR for public review, Chevron provided more detailed information on the overall effects of the proposed project on ship calls at the ESMT, which allows a more refined analysis of the information contained in the Draft EIR regarding marine vessel emissions. The Draft EIR was based on a worst-case analysis which analyzed only increases in ship calls associated with the increase in imports of heavy crude oil. In fact, the additional ship calls associated with the increase in imports of heavy crude oil will be offset to some extent by a reduction in ship calls associated with the import and export of other materials. In addition to increasing marine crude oil tanker calls at the ESMT, operation of the proposed project will also reduce the quantities of some products that are imported into and exported from the ESMT as explained in the following paragraphs.

The analysis in the Draft EIR assumed that the crude oil marine tankers would have capacities between 350,000 and 500,000 barrels and that 15 additional annual heavy crude oil deliveries would occur during operation of the proposed project. Chevron currently anticipates that the capacities of the crude oil marine tankers will be approximately 700,000 barrels, and that nine additional crude oil marine tanker deliveries will occur during operation of the proposed project.

Currently, a portion of the vacuum residuum produced by the Crude Units is not processed by the Coker but is instead blended with other materials to produce high-sulfur fuel oil (HSFO) or Bunker Fuel. The proposed increase in the Coker capacity will allow Chevron to increase the amount of vacuum residuum that is processed by the Coker and reduce the amounts of HSFO and Bunker Fuel that are produced and exported. This reduction in exports is anticipated to reduce the number of ship calls and barge calls at the ESMT to export HSFO and Bunker Fuel by nine 150,000-barrel capacity ship calls per year and 13 barge calls per year.

Chevron currently imports vacuum gas oil into the refinery by marine tanker through the ESMT for processing in the Fluid Catalytic Cracking Unit. The proposed increase in Coker capacity will increase the amount of vacuum gas oil produced at the refinery, which will reduce the amount that needs to be imported. This reduction in vacuum gas oil imports is anticipated to reduce the number of marine tanker calls at the ESMT by seven 700,000-barrel capacity ship calls per year during operation of the proposed project. Chevron also anticipates that the proposed increase in Coker capacity will lead to excess light gas oil production, which will be exported from the refinery, leading to an increase of seven 150,000-barrel capacity ship calls per year to export light gas oil.

Although the annual number of ship calls may increase, the ESMT has two berths and can only accommodate two marine tankers at one time. The time required to offload crude oil from the tankers that currently call at the EMST as well as from tankers that are anticipated to transport heavy crude oil to the EMST after implementation of the proposed project, exceeds 24 hours. Therefore, the maximum number of marine tankers calling at the ESMT during a single 24-hour period will not change as a result of implementing the proposed project.

2.7 Construction

Table 2-1 shows the construction schedules for the proposed modifications to the No. 4 Crude Unit, the Coker and the No. 6 H_2S Plant. As shown in Table 2-1, the overall project construction period is expected to last a total of 22 months, beginning in June 2006 and ending in March 2008.

Table 2-1
Heavy Crude Project Construction Schedule

Project Component	2006							2007												2008		
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
No. 4 Crude Unit										**T**	**T**	**T**										
Coker																**T**	**T**	**T**				
No. 6 H_2S Plant																						

Note: **T** indicates months when turnarounds are scheduled for the No. 4 Crude Unit and the Coker.

Construction for the proposed modifications to the No. 4 Crude Unit is scheduled to begin in July 2006 and be completed in May 2007. A turnaround, which is a time when refinery equipment is removed from service for maintenance activities, is scheduled for the No. 4 Crude Unit from late-March 2007 through early May 2007. From July 2006 through February 2007, construction for the proposed No. 4 Crude Unit modifications is anticipated to take place 10 hours per day, from 6:30 a.m. to 5:00 p.m., five days per week, Monday through Friday. During the turnaround for the No. 4 Crude Unit from late-March through early-May 2007, construction is anticipated to take place in two 10-hour shifts, from 6:30 a.m. to 5:00 p.m. and from 6:30 p.m. to 5:00 a.m., six days per week, Monday through Saturday.

Construction for the proposed modifications to the Coker is scheduled to begin in July 2006 and be completed in March 2008. A turnaround is scheduled for the Coker from mid-September 2007 through November 2007. From July 2006 through August 2007 and from December 2007 through March 2008, construction for the proposed Coker modifications is anticipated to take place 10 hours per day, from 6:30 a.m. to 5:00 p.m., five days per week, Monday through Friday. During the turnaround for the Coker from mid-September 2007 through November 2007, construction is anticipated to take place in two 10-hour shifts, from 6:30 a.m. to 5:00 p.m. and from 6:30 p.m. to 5:00 a.m., six days per week, Monday through Saturday. Construction of the coke drum depressurization emission control system will occur from December 2007 through March 2008.

Construction for the proposed modifications to the No. 6 H_2S Plant is scheduled to begin in June 2006 and be completed in February 2007. Construction for the proposed No. 6 H_2S Plant modifications is anticipated to take place 10 hours per day, from 6:30 a.m. to 5:00 p.m., five days per week, Monday through Friday, for the entire construction period.

Table 2-2 shows anticipated peak construction manpower levels by project component for the proposed project. Peak overall construction employment for the proposed project is anticipated to be 694 workers during October 2007. Average construction employment over the entire 22-month construction period (the average of the peak monthly employment values shown in Table 2-1), is estimated at about 242 workers. A substantial amount of the construction for the proposed modifications to the No. 4 Crude Unit, such as replacement of internal components, can only take place during the turnaround when the unit is out of service. Therefore, the peak month for construction employment for the proposed modifications to the No. 4 Crude Unit is expected to occur in April 2007, where employment would reach its maximum level of 223 workers. Similarly, a substantial amount of the construction for the proposed modifications to the Coker, such as connection of the proposed replacement Coker Main Fractionator column, can only take place during the turnaround. Therefore, the peak month for construction employment for the proposed modifications to the Coker is expected to occur in October 2007, where employment would maximize at 694 workers.

Table 2-2a
Heavy Crude Project Peak Construction Manpower by Month (June '06 - March '07)

Project Component	Jun 06	Jul 06	Aug 06	Sep 06	Oct 06	Nov 06	Dec 06	Jan 07	Feb 07	Mar 07
No. 4 Crude Unit	0	3	5	9	20	14	16	18	10	84
Coker	0	148	226	233	277	320	286	293	253	264
No. 6 H_2S Plant	4	28	52	74	109	112	69	20	5	0
Total per Day	**4**	**179**	**283**	**316**	**406**	**446**	**371**	**331**	**268**	**348**
Total per Shift[a]	**4**	**179**	**283**	**316**	**406**	**446**	**371**	**331**	**268**	**306**

Table 2-2b
Heavy Crude Project Peak Construction Manpower by Month (April '07 -March '08)

Project Component	Apr 07	May 07	Jun 07	Jul 07	Aug 07	Sep 07	Oct 07	Nov 07	Dec 07	Jan 08	Feb 08	Mar 08
No. 4 Crude Unit	223	70	0	0	0	0	0	0	0	0	0	0
Coker	250	201	174	94	20	234	694	252	77	40	20	20
No. 6 H_2S Plant	0	0	0	0	0	0	0	0	0	0	0	0
Total	**473**	**271**	**174**	**94**	**20**	**234**	**694**	**252**	**77**	**40**	**20**	**20**
Total per Shift[a]	**362**	**236**	**174**	**94**	**20**	**117**	**347**	**126**	**77**	**40**	**20**	**20**

[a] Construction for the proposed No. 4 Crude Unit modifications will occur two shifts per day from late-March 2007 through early-May 2007, and construction for the proposed Coker modifications will occur two shifts per day from mid-September 2007 through November 2007. Construction will occur one shift per day for the rest of the construction period. Shaded entries indicate periods with two daily construction shifts.

Chevron will arrange for parking for construction workers at an off-site location (the parking lot of Dockweiler Beach State Park) on Vista Del Mar, northwest of the refinery, as shown in Figure 2-5. Forty-passenger shuttle buses will be used to transport the construction workers between the parking facility and the refinery. Chevron has used this same facility for off-site parking for previous construction at the refinery and has confirmed with the facility operator that parking places will be provided to accommodate the entire workforce for each construction shift.

Construction workers commuting to and from the parking facility can access the parking facility by traveling on the Interstate 105 (I-105) freeway and West Imperial Highway to Vista Del Mar, which will avoid traveling on surface streets other than West Imperial Highway and Vista Del Mar. The same route can be used to leave the refinery vicinity (Vista del Mar to West Imperial Highway to the I-105 freeway). Chevron will specify in construction contracts for the proposed project that construction workers are to use this route. Additionally, to ensure that construction workers comply with requirement to use this travel route, Chevron will implement measures such as: 1) posting signs in the parking lot reminding workers of the travel route requirement; 2) reminding the workers with fliers and through announcements by shuttle bus drivers; and 3) occasional visual audits of worker compliance.

2.8 Project Operation

No additional employees will be required on-site to operate any new equipment as a result of implementing the proposed project. The increase in petroleum coke production from the proposed project will require 20 additional truck trips per day from the refinery to the Port of Los Angeles or Long Beach, and the increase in sulfur production will require one additional truck trip per day from the refinery to the vicinity of the Port of Los Angeles. Transport of materials will be provided by independent truck operators.

Since the release of the Draft EIR, Chevron has modified the proposed project to require reducing the marine vessel speed from 13 to 12 knots an additional 20 miles out for a total of 40 miles from Point Fermin Light (marine vessels already implement this speed reduction 20 miles from Point Fermin Light). Further, Chevron will include as part of its contractual agreement with the coke purchasers one of the following options: the new trips be made by trucks that meet the year 2007 heavy heavy-duty on-road diesel engine standards, or are retrofitted with particulate traps and lean NOx catalysts, or use emulsified diesel fuel. Alternatively, the project proponent can apply for Carl Moyer funding to reduce NOx and particulate emissions. As a result of the revised analysis and modifications to the project made by Chevron, increased NOx emissions, the pollutant of most concern, would be less than two tons per year from both marine vessels and trucks.

2.9 Permits and Approvals

The proposed project would require a number of permits and approvals before construction and operation can commence. Table 2-3 outlines the federal, state, and local agencies, with approval authority over the project, and the various permits and approvals specific to each agency. The table also includes a listing of regulations and requirements that must be met during construction and/or operation.

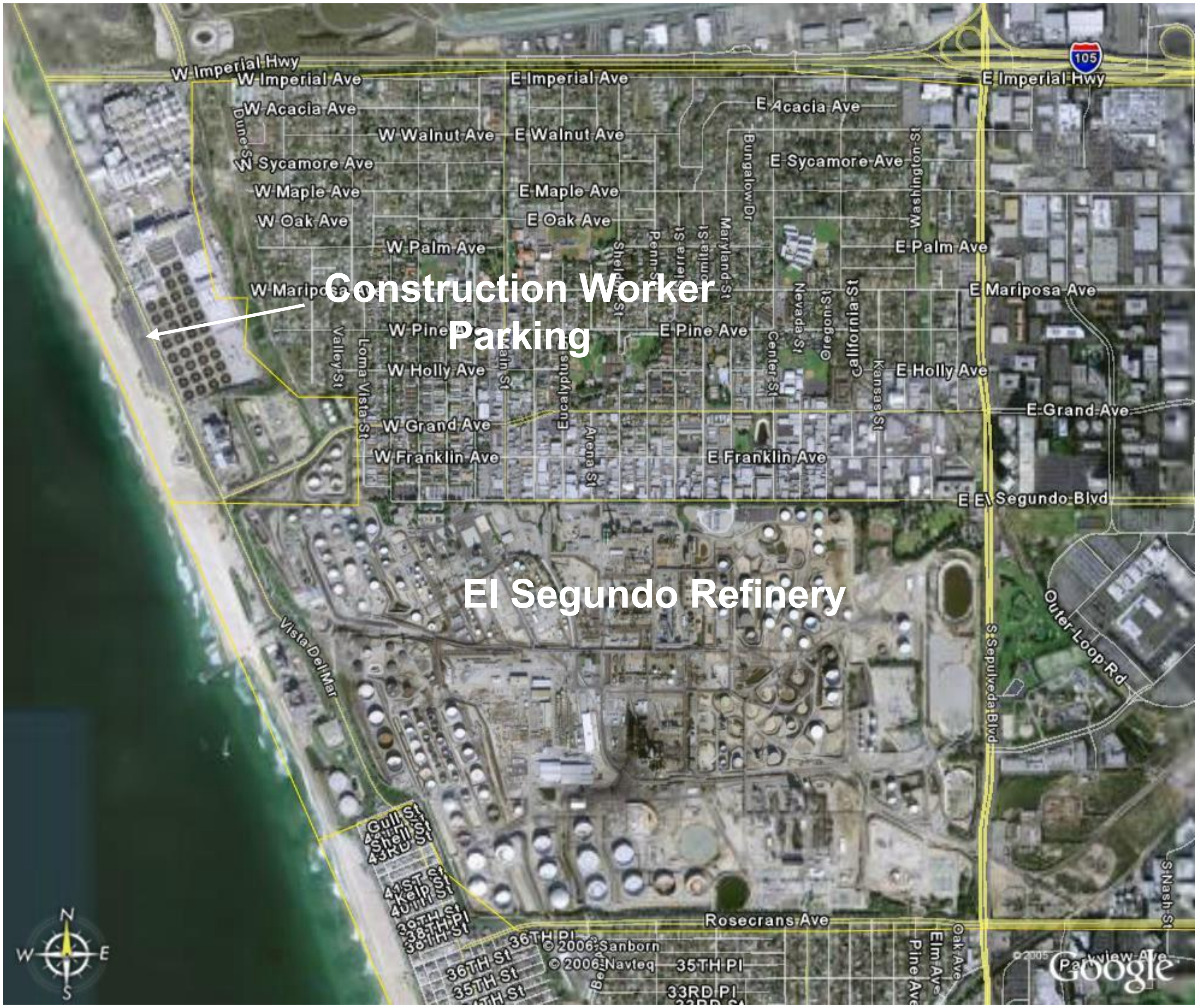


Figure 2-5 Off-Site Construction Worker Parking Location

Table 2-3
List of Agency Permits, Approvals, and Other Requirements

Agency Permit or Approval	Requirement	Applicability to Project
Federal		
Federal Aviation Administration (FAA)	*Notice of Proposed Construction or Alteration* (FAA Form 7460-1) to comply with FAA Advisory Circular 70/7460-2I, Proposed Construction or Alteration of Objects that May Affect Navigable Airspace (14 Code of Federal Regulations [CFR] Part 77.13)	Construction or alteration of a structure more than 200 feet above the ground level at its site or higher than an imaginary surface extending outward and upward at slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway or at slope of 50:1 for a horizontal distance of 10,000 feet from the nearest runway at Los Angeles International Airport. Construction equipment, such as cranes, are subject to this requirement.
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

Table 2-3 (continued)
List of Agency Permits, Approvals, and Other Requirements

Agency Permit or Approval	Agency Permit or Approval	Agency Permit or Approval
U.S. EPA (continued)	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 discharges.
	Resource Conservation and Recovery Act (RCRA), 40 CFR Parts 260-279	Requires proper handling of hazardous waste material.
	National Pollutant Discharge Elimination System (NPDES), 40 CFR Part 112	Requires compliance with Clean Water Act (CWA) standards for discharges to Santa Monica Bay.
Department of Transportation (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 sodium hydroxide and sulfuric acid, as well as hydrocarbons such as pentanes.
Occupational Safety and Health Administration (OSHA)	Process Safety Management OSHA 29 CFR Part 1910	Worker process safety standards.
State		
California Department of Transportation (Caltrans)	Transportation permit	Application required to transport overweight, oversize, and wide loads on state 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	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.
Local		
Regional Water Quality Control Board (RWQCB)	NPDES permit for stormwater runoff and point source associated with construction activities in addition to new stormwater outfalls	Required for stormwater runoff from construction activities involving 5 acres or more.

Table 2-3 (continued)
List of Agency Permits, Approvals, and Other Requirements

Agency Permit or Approval	Agency Permit or Approval	Agency Permit or Approval
RWQCB (continued)	Remedial action plan	Required if contaminated soil is found and remediated.
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 emissions sources.
	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	Provides limitations to 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 control requirements for operations or activities that cause or allow emission of fugitive dust.
	SCAQMD Rule 407: Liquid and Gaseous Contaminants	Limits carbon monoxide (CO) and sulfur dioxide (SO_2) emissions.
	SCAQMD Rule 408: Circumvention	Requires compliance with HSC Division 26 Section 41700 ff.
	SCAQMD Regulation IX: Standards of Performance for New Stationary Sources	Incorporates Federal regulations by reference.
	SCAQMD Rule 1113: Architectural Coatings	Specifies allowable VOC content of coatings for structures.
	SCAQMD Rule 1158: Storage, Handling, and Transport of Coke, Coal, and Sulfur	Places requirements on handling of solid sulfur and coke to control dust.

Table 2-3 (continued)
List of Agency Permits, Approvals, and Other Requirements

Agency Permit or Approval	Agency Permit or Approval	Agency Permit or Approval
SCAQMD (continued)	SCAQMD Rule 1166: Excavation of VOC Contaminated Soils	Required if soils to be excavated are impacted by hydrocarbons.
	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 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 Best Available Control Technology (BACT), modeling for significant impacts, and providing offsets for emission increases.
	SCAQMD Rule 1401: New Source Review (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}).
Los Angeles County Sanitation District	Industrial wastewater discharge approval	Required when discharging into sewer.
El Segundo Fire Department - Hazardous Materials Division	Permit for ASTs 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.
	Hazardous Materials Business Plan revision approval (AB 2185 et. al.)	Project-related on-site storage of regulated materials.

Table 2-3 (concluded)
List of Agency Permits, Approvals, and Other Requirements

Agency Permit or Approval	Agency Permit or Approval	Agency Permit or Approval
City of El Segundo	Building permit	Required for foundations, buildings, etc.
	Grading permit	Required prior to grading land
	Plumbing and electrical permits	General construction permit

This page intentionally left blank

CHAPTER 3

SETTING

AIR QUALITY
HAZARDS AND HAZARDOUS MATERIALS
HYDROLOGY AND WATER QUALITY
NOISE
SOLID AND HAZARDOUS WASTE
TRANSPORTATION AND TRAFFIC

This page intentionally left blank

3.0 SETTING

CEQA Guidelines §15125 requires that an EIR include a description of the environment within the vicinity of the proposed project as it exists at the time the NOP is published, or if no NOP is published, at the time the environmental analyses commence, from both a local and regional perspective. This chapter describes the existing environment around the refinery that could be adversely affected by the proposed project. Information regarding the environmental setting has been developed in this Final EIR.

The Final EIR focuses on the potentially significant environmental topics identified in the Initial Study (see Appendix A), which include Air Quality, Hazards and Hazardous Materials, Hydrology and Water Quality, Noise, Solid and Hazardous Wastes, and Transportation and Traffic. The reader is referred to the Initial Study for discussions of environmental topics not considered in this Final EIR and the rationale for inclusion or exclusion of each environmental topic.

3.1 Air Quality

The current air quality in the vicinity of the refinery is presented in this section. The reader is referred to the SCAQMD's 2003 Air Quality Management Plan (AQMP) (SCAQMD, 2003) for information specifically related to air quality in the South Coast Air Basin (Basin).

3.1.1 Regional Climate

All of California is divided into air basins, which are served by either individual-county or multi-county air pollution control districts or air quality management districts. The refinery is located within the SCAQMD's jurisdiction (referred to hereafter as the district). The district consists of the Basin, which includes portions of Los Angeles, Riverside, and San Bernardino counties and all of Orange County. Within Riverside County, the district also has jurisdiction over portions of the Salton Sea Air Basin and the Mojave Desert Air Basin. Figure 3.1-1 shows the Southern California Air Basins. 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.

The area in the vicinity of the refinery is dominated by a semi-permanent, subtropical, Pacific high-pressure system. Generally mild, the climate is tempered by cool sea breezes, but may be infrequently interrupted by periods of extremely hot weather, passing winter storms, or Santa Ana winds.

Figure 3.1-1 SCAQMD Jurisdiction

Source: SCAQMD 2003 Air Quality Management Plan

3.1.2 Meteorology of the Project Vicinity

The refinery is located on the coast in an area where the topography is relatively flat. Because of the close proximity of the ocean, winters are seldom cold, frost is rare, and minimum temperatures average around 45 ^{o}F. Spring days may be cloudy because of the presence of high fog. Rainfall averages about 10 inches a year, falling almost entirely from late October to early April. Temperature (mean, maximum, and minimum) and precipitation data from Los Angeles International Airport are used to determine the historical meteorological profile of the area in the vicinity of the refinery. These data are presented in Table 3.1-1.

Table 3.1-1
Average Monthly Temperatures and Precipitation for Los Angeles International Airport 1939-1978

Month	Los Angeles Airport		
	Mean Monthly Temperatures		Total Precipitation (inches)
	Maximum (°F)	Minimum (°F)	
January	64	46	2.44
February	65	48	2.71
March	65	49	1.84

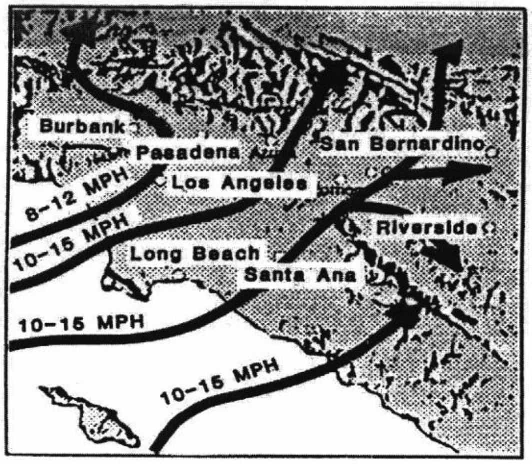
Table 3.1-1 (concluded)
Average Monthly Temperatures and Precipitation for Los Angeles International Airport 1939-1978

Month	Los Angeles Airport		
	Mean Monthly Temperatures		Total Precipitation (inches)
	Maximum (°F)	Minimum (°F)	
April	67	52	0.90
May	69	55	0.12
June	72	59	0.03
July	75	62	0.01
August	76	63	0.07
September	76	61	0.21
October	74	58	0.36
November	70	51	1.41
December	66	47	2.12
Annual Average	70	54	
Absolute extreme temperatures	110	23	**12.22**
Reference: Weather of U.S. Cities (Gale 1981)			

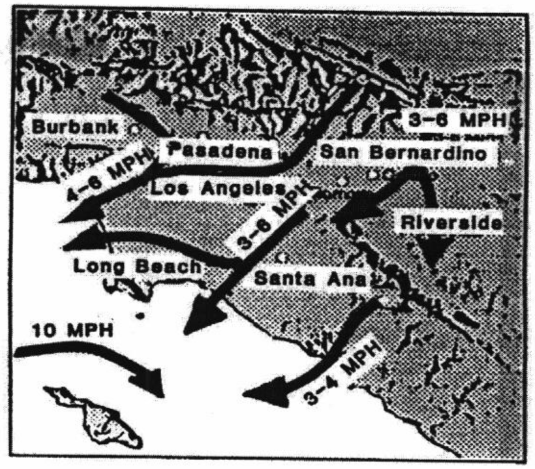
Seasonal and diurnal wind regimes affect the horizontal transport of air in the vicinity of the refinery. Diurnal sea breeze-drainage flow typically dominates the local wind pattern with the onshore winds split by the Palos Verdes hills unless the marine layer is very deep. Typical winter and summer season wind patterns for morning and afternoon for the Basin are shown in Figure 3.1-2.

A wind rose depicts the frequency of the annual average wind speeds by direction. An annual wind rose for Lennox, representative of the refinery, is shown in Figure 3.1-3.

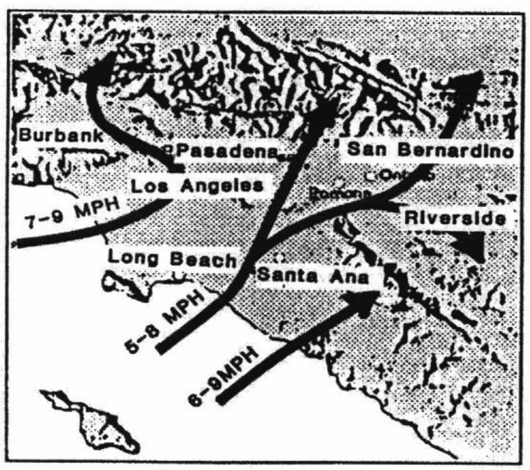
Normally, the temperature of the atmosphere decreases with altitude. However, the phenomenon of temperature increase with altitude is termed an inversion. This inversion condition can exist at the surface or at any height above the ground. The height of the base of the inversion often corresponds to the mixing height. Usually, the mixing height increases throughout the morning and early afternoon because the sun warms the ground, which in turn warms the adjacent air. As this warm air rises, it erodes and raises the base of the inversion layer. If enough surface heating takes place, the inversion layer breaks and the surface air layers can mix upward essentially without limit. The district is characterized by frequent occurrence of strong elevated inversions. These inversions, created by atmospheric subsidence, severely limit vertical mixing, especially in the late morning and early afternoon.



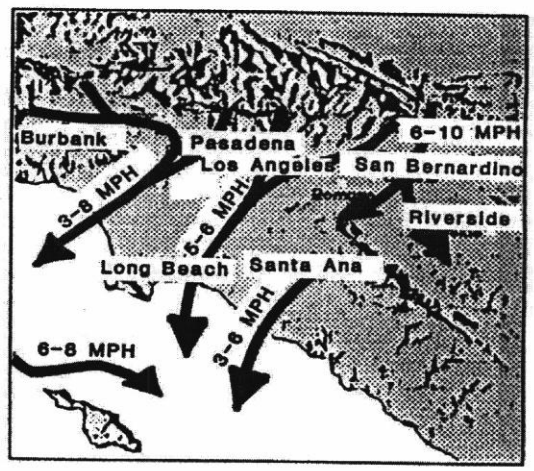
Typical Summer Daytime Ocean Winds
(noon to 7:00 pm)



Typical Summer Night Drainage Winds
(midnight to 5:00 am)

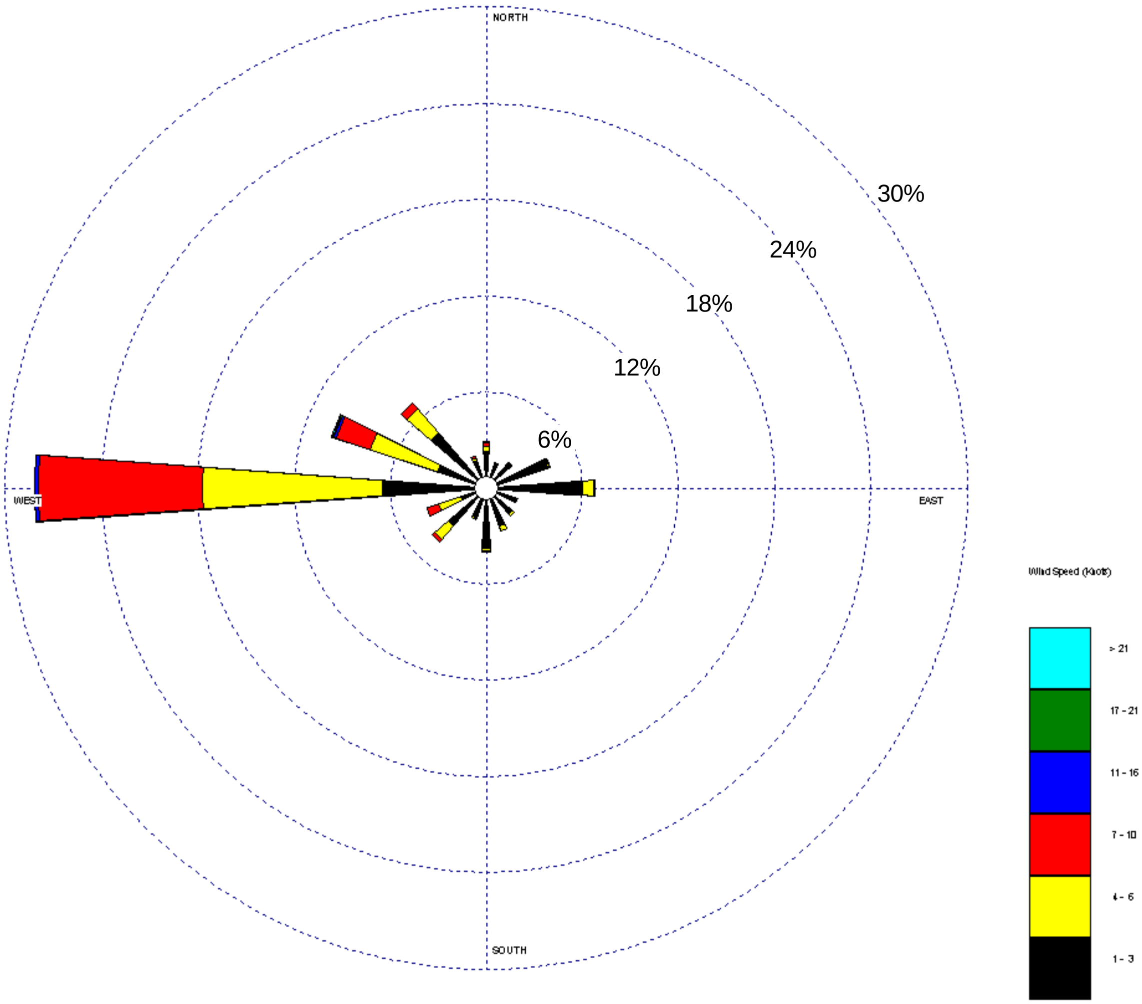


Typical Winter Daytime Ocean Winds
(noon to 7:00 pm)



Typical Winter Night Drainage Winds
(midnight to 5:00 am)

Figure 3.1-2 Dominant Wind Patterns in the Basin



Note: Wind direction is the direction from which the wind is blowing

Figure 3.1-3 Lennox Station, 1981 Annual Wind Rose

3.1.3 Existing Air Quality

Pollutants that impact air quality are generally divided into two categories: criteria pollutants (those for which health-based ambient standards have been set) and toxic air contaminants (those that cause cancer or have adverse human health effects other than cancer).

3.1.3.1 Criteria Pollutants

The determination of whether a region's air quality is healthful or unhealthful is determined by comparing contaminant levels in ambient air samples to national and state standards. These standards are set by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) at levels to protect public heath and welfare with an adequate margin of safety. National Ambient Air Quality Standards (NAAQS) were first authorized by the federal Clean Air Act of 1970. California Ambient Air Quality Standards (CAAQS) were authorized by the state legislature in 1967.

Health-based air quality standards have been established by California and the federal government for the following criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), sulfur dioxide (SO_2), and lead. The CAAQS are more stringent than the federal standards. California has also established standards for sulfate, visibility reducing particles, hydrogen sulfide (H_2S), and vinyl chloride. However, H_2S and vinyl chloride are currently not monitored in the district because these contaminants are not seen as a significant air quality problem. CAAQS and NAAQS for each of these pollutants and their effects on health are summarized in Table 3.1-2.

The refinery is located within the SCAQMD Southwest Coastal Los Angeles County monitoring area. Recent background air quality data for criteria pollutants for the Southwest Coastal Los Angeles County monitoring station, located approximately 1.7 miles northwest of the refinery in Hawthorne, are presented in Table 3.1-3. Ambient air quality was compared to the most stringent of either the CAAQS or NAAQS. These monitored data indicate that the Southwest Coastal Los Angeles County area is in compliance with the CO, NO_2, SO_2, and lead standards for both the CAAQS and NAAQS, and the CAAQS sulfate standard.

For NO_2, the maximum measured concentrations each year were less than the 0.25 ppm one-hour state standard and the annual federal standard. For CO, SO_2 and lead, measured concentrations were well below both the state and federal standards. The maximum sulfate concentrations were below the state 24-hour standard each year.

Table 3.1-2
Ambient Air Quality Standards

Air Pollutant	State Standard	Federal Primary Standard	Most Relevant Effects
	Concentration/ Averaging Time	Concentration/ Averaging Time	
Ozone	0.09 ppm, 1-hr. avg. 0.070 ppm, 8-hr avg.[a]	0.12 ppm, 1-hr avg. 0.08 ppm, 8-hr avg.	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals (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 altered 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.	9.0 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, annual avg. 0.14 ppm, 24-hr avg.	(a) Bronchoconstriction accompanied by symptoms that may include wheezing, shortness of breath, and chest tightness during exercise or physical activity in persons with asthma

Table 3.1-2 (concluded)
Ambient Air Quality Standards

Air Pollutant	State Standard	Federal Primary Standard	Most Relevant Effects
	Concentration, Averaging Time	Concentration, Averaging Time	
Suspended Particulate Matter (PM10)	20 µg/m^3, annual arithmetic mean 50 µg/m^3, 24-hr avg.	50 µg/m^3, annual 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, 24-hr avg.	15 µg/m^3, annual arithmetic mean 65 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
Sulfates	25 µg/m^3, 24-hr avg.	Not applicable	(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardiopulmonary 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	Extinction coefficient of 0.23 per kilometer - visibility of 10 miles or more due to particles when relative humidity is less than 70 percent, 8-hour average (10 a.m. - 6 p.m. PST)	Not applicable	Visibility impairment on days when relative humidity is less than 70 percent
Hydrogen Sulfide	0.03 ppm, 1-hr avg.	Not applicable	Odor annoyance
Vinyl Chloride	0.010 ppm, 24-hr avg.	Not applicable	Known carcinogen

ppm – parts per million   µg/m^3= micrograms per cubic meter.

[a] This concentration was approved by the Air Resources Board on April 28, 2005 and is expected to become effective in early 2006.

Table 3.1-3
Background Air Quality Data for the
Southwest Coastal Los Angeles County Monitoring Station (ID No. 094)
(2001-2004)

Constituent	State Standard	Federal Standard	Maximum Observed Concentration (No. of Standard Exceedances - most restrictive) 2001	2002	2003	2004
Carbon monoxide						
1-hour	20.0 ppm	35.0 ppm	7 (0 days)	7 (0 days)	7 (0 days)	6 (0 days)
8-hour	9.0 ppm	9.5 ppm	5.1 (0 days)	6.1(0 days)	5.0 (0 days)	4.4 (0 days)[b]
Ozone						
1-hour	0.09 ppm	0.12 ppm	0.098 (1 day)	0.088 (0 days)	0.11 (2 days)	0.069 (0 days)[b]
8-hour	---	0.08 ppm	0.080 (0 days)	0.073 (0 days)	0.078 (0 days)	0.060 (0 days)[b]
Nitrogen dioxide						
1-hour	0.25 ppm	--	0.11 (0 days)	0.10 (0 days)	0.12 (0 days)	0.08 (0 days)[b]
Annual	---	0.053 ppm	0.0250	0.0244	0.0238	0.0310[b]
Sulfur dioxide						
1-hour	0.25 ppm	--	0.04 (0 days)	0.07 (0 days)	0.03 (0 days)	0.03 (0 days)[b]
24-hour	0.04 ppm	0.14 ppm	0.012 (0 days)	0.007 (0 days)	0.006 (0 days)	0.004 (0 days)[b]
Annual	---	0.03 ppm	0.004	0.0012	0.0006	---
PM10						
24-hour	50 µg/m^3	150 µg/m^3	75 (8 days)	121 (12 days)	58 (3 days)	47 (0 days)[b]
Annual	20 µg/m^3	50 µg/m^3	37.1	37.4	29.7	25.1[b]
PM2.5						
24-hour	---	65 µg/m^3	72.9 (1 day)[a]	62.7 (0 days)[a]	115.2 (3 days)[a]	66.6 (1 day)[a]
Annual	12.0 µg/m^3	15.0 µg/m^3	21.4[a]	19.5[a]	18.0[a]	17.6[a]
Lead						
30-day	1.5 µg/m^3	--	0.04 (0 months)	0.02 (0 months)	0.17 (0 months)	0.01 (0 months)
Calendar Quarter	---	1.5 µg/m^3	0.04 (0 quarters)	0.02 (0 quarters)	0.10 (0 quarters)	0.01 (0 quarters)
Sulfates						
24-hour	25 µg/m^3	---	20.6 (0 days)	15.6 (0 days)	16.4 (0 days)	14.3 (0 days)

[a] PM2.5 is not measured in the Southwest Coastal Los Angeles County Monitoring area. Data are from the South Coastal Los Angeles County Monitoring area.
[b] Less than 12 full months of data. May not be representative
Reference: SCAQMD air quality data summaries (SCAQMD, 2005a). Downloaded from http://www.aqmd.gov/smog/historicaldata.htm

State O_3 air quality standards were exceeded at the Southwest Coastal Los Angeles County air monitoring station on three days during 2001-2004, and state PM10 air quality standards were exceeded on 23 days (see Table 3.1-3). PM2.5 is not monitored at the Southwest Coastal Los Angeles County air monitoring station, but PM2.5 concentrations monitored at the South Coastal Los Angeles County Monitoring Station exceeded the state annual air quality standard every year and the federal 24-hour standard on four days during 2001-2004 (see Table 3.1-3). The national PM10 standards were met in all years. The maximum O_3 concentrations observed have remained relatively the same, whereas the maximum concentration of PM10 observed has decreased at this site from a high of 121 µg/m^3 in 2002 to 58 µg/m^3 in 2003 (2004 was lower than 2003, but the data may not be representative because less than 12 months of data are available). There was not a consistent year-to-year trend in PM2.5 concentrations.

3.1.3.2 Toxic Air Contaminants

The California Health and Safety Code (§39655) defines a toxic air contaminant (TAC) as an air pollutant which may cause or contribute to an increase in mortality or 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.

Cancer Risk

One of the primary health risks of concern due to exposure to toxic air contaminants (TACs) is the risk of contracting cancer. Health statistics show that one in four people will contract cancer over their lifetime, or 250,000 in a million, from all causes, including diet, genetic factors, and lifestyle choices. The carcinogenic potential of TACs is a particular public health concern because it is currently believed by many scientists that there is no "safe" level of exposure to carcinogens. Any exposure to a carcinogen poses some risk of contracting cancer. It is currently estimated that about one in four deaths in the United States is attributable to cancer. About two percent of cancer deaths in the United States may be attributable to environmental pollution (Doll and Peto, 1981).

Non-cancer Health Risks

Unlike carcinogens, it is believed that there is a threshold level of exposure to most non-carcinogens below which the compound will not pose a health risk. The California Environmental Protection Agency and Office of Environmental Health Hazard Assessment have developed reference exposure levels (RELs) for TACs that are health-conservative estimates of the levels of exposure at or below which health effects are not expected. The non-cancer health risk due to exposure to a TAC is assessed by comparing the estimated level of exposure to the REL. The comparison is expressed as the ratio of the estimated exposure level to the REL, called the hazard index.

Multiple Air Toxics Exposure Study II (MATES II) Study

The MATES II study (SCAQMD, 2000), which is the most comprehensive study of urban toxic air pollution ever undertaken, shows that motor vehicles and other mobile sources of air pollution are the predominant source of cancer-causing air pollutants in the Basin. The SCAQMD's Governing Board directed staff to undertake the MATES II study as part of the agency's environmental justice initiatives (e.g., Environmental Justice Initiative #7) adopted in late 1997. A panel of scientists from universities, an environmental group, businesses, and other government agencies helped design and guide the study. The study was aimed at determining the cancer risk from toxic air pollution throughout the area by monitoring toxics continually for one year at 10 monitoring sites. Another goal was to determine if there were any sites where TAC concentrations emitted by local industrial facilities were causing a disproportionate cancer burden on surrounding communities. To address this second goal, the SCAQMD monitored toxic pollutants at 14 sites for one month each with three mobile monitors. Monitoring platforms were placed in or near residential areas adjacent to clusters of facilities. Although no TAC hotspots were identified, models show that elevated levels can occur very close to facilities emitting TACs.

In the MATES II study, SCAQMD monitored more than 30 toxic air pollutants at 24 sites over a one-year period in 1999. The SCAQMD collected more than 4,500 air samples, and together with the CARB, performed more than 45,000 separate laboratory analyses of these samples. A similar, but less extensive study, known as MATES I, was conducted in 1986 and 1987. In each study, SCAQMD calculated cancer risk assuming 70 years of continuous exposure to monitored levels of pollutants.

The MATES II study found that the average carcinogenic risk throughout the Basin is about 1,400 in one million (1,400 x 10^{-6}). Mobile sources (e.g., cars, trucks, trains, ships, aircraft, etc.) represent the greatest contributors. As shown in Figure 3.1-4, about 70 percent of all risk is attributed to diesel particulate emissions; about 20 percent to other toxics associated with mobile sources (including benzene, 1,3-butadiene, and carbonyls); and about 10 percent of all risk is attributed to stationary sources (which include industries and other certain businesses such as dry cleaners and chrome plating operations).

The MATES III study is currently underway, and ambient air toxics sampling is being conducted. In addition, particulate matter samples are being analyzed for elemental carbon and organic carbon. Supplemental analysis of organic compounds from particulate matter will be conducted to better characterize the sources contributing to ambient particulate matter, including diesel particulate matter.

3.1.4 Regional Emissions Inventory

3.1.4.1 Criteria Pollutants Inventory

The SCAQMD and CARB compile emissions inventories for anthropogenic sources, i.e., those associated with human activity, and natural sources such as vegetation and wind erosion. The emissions inventory for the anthropogenic sources is made up of stationary sources (both point and area sources are in this category) and mobile sources encompassing on-road and off-road mobile sources. On-road mobile sources include light-duty passenger vehicles; light-, medium-, and heavy-duty trucks; motorcycles; and urban buses. Off-road mobile sources include off-road vehicles, trains, ships, aircraft, and mobile equipment.

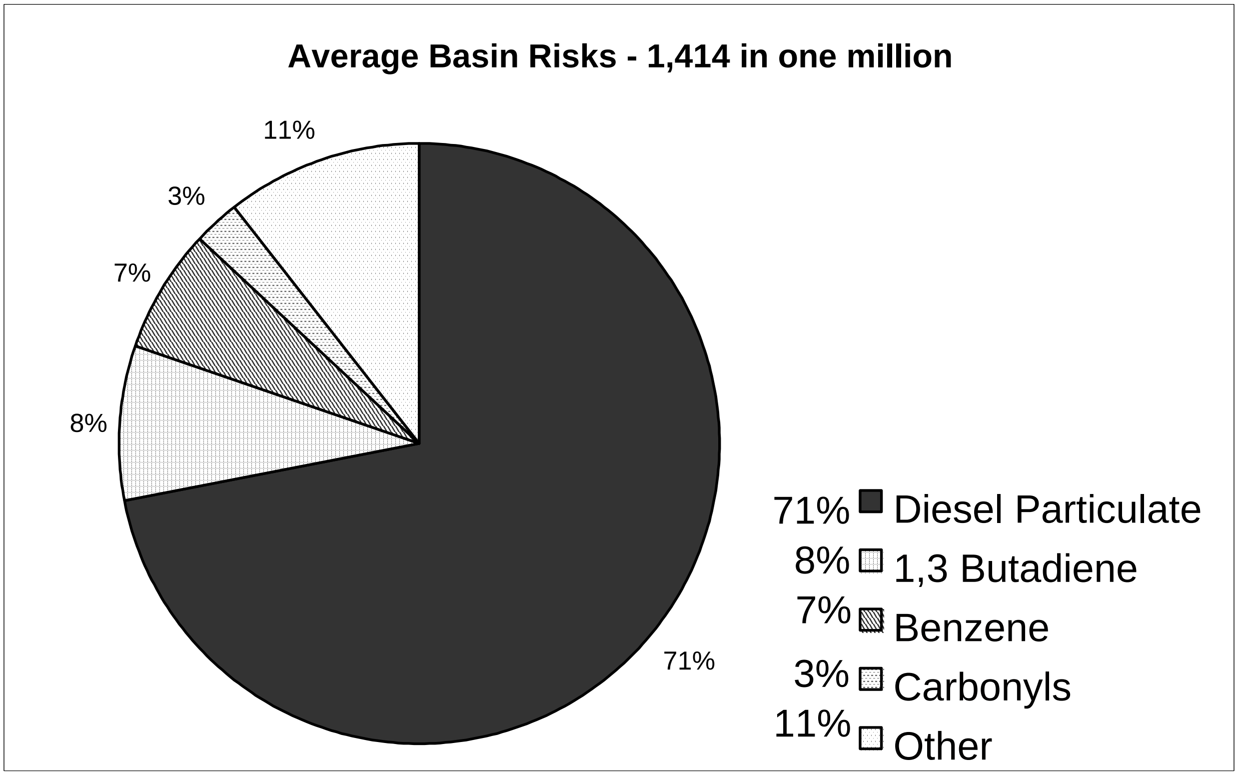


Figure 3.1-4 Major Pollutants Contributing to Cancer Risk in the South Coast Air Basin

Source: MATES II Final Report, March 2000, Page ES-9

The emissions inventory includes Basin totals for the criteria air pollutants CO, VOC (a precursor of criteria air pollutants), NO_x, SO_x, and PM10. Since O_3 is formed by photochemical reactions involving the precursors VOC and NO_x, it is not specifically inventoried.

Estimated emissions for the Basin during 2004 are summarized in Table 3.1-4. As shown in Table 3.1-4, mobile sources are the major contributors to CO (95 percent), VOC (60 percent), NO_x (90 percent) and SO_x (60 percent) emissions in the Basin. Entrained paved road dust is the largest contributor to PM10 emissions (47 percent) and to PM2.5 emissions (23 percent).

Table 3.1-4
Estimated Anthropogenic Criteria Pollutant Emissions in the South Coast Air Basin in 2004
(ton/day, annual average)

Source Category	CO	VOC	NO_x	SO_x	PM10	PM2.5
Stationary and area sources	229.2	324.7	103.6	25.3	250.6	74.0
Mobile sources (on- and off-road)	4,217.9	479.6	941.3	37.6	39.9	31.5
Total	**4,447.1**	**804.3**	**1,044.9**	**62.9**	**290.5**	**105.5**
Source: California Air Resources Board (2005c): http://www.arb.ca.gov/ei/maps/statemap/abmap.htm						

3.1.4.2 Toxic Pollutants Inventory

The data available for toxic emissions inventories are not nearly as complete as the data for criteria pollutants. Starting in 1989, industrial facilities have been required to compile toxic emissions inventories under the Assembly Bill 2588 (AB 2588) program. Companies subject to the program are required to report their toxic emissions to the SCAQMD.

The SCAQMD's first toxic air pollutant emissions inventory was compiled for 30 TACs for the year 1982 for stationary sources only. This inventory was updated during the preparation of the MATES I study and updated again for the MATES II study. This is the most up-to-date inventory prepared by the SCAQMD. A summary of the 1998 toxics emissions inventory is presented in Table 3.1-5, which provides the estimated toxic emissions for selected compounds by source category.

Table 3.1-5
1998 Annual Average Day Toxic Emissions for the South Coast Air Basin (lbs/day)

Pollutant	On-Road	Off-Road	Point	AB2588	Area	Total
Acetaldehyde[a]	5485.8	5770.3	33.9	57.1	189.1	11536.2
Acetone	4945.8	4824.7	3543.5	531.4	23447.4	37292.8
Benzene	21945.5	6533.4	217.7	266.8	2495.4	31458.8
Butadiene [1,3]	4033.8	1566.1	6.7	2.0	151.3	5759.9
Carbon tetrachloride	0.0	0.0	8.8	1.8	0.0	10.6
Chloroform	0.0	0.0	0.0	35.5	0.0	35.5
Dichloroethane [1,1]	0.0	0.0	0.0	0.1	0.0	0.1

Table 3.1-5 (concluded)
1998 Annual Average Day Toxic Emissions for the South Coast Air Basin (lbs/day)

Pollutant	On-Road	Off-Road	Point	AB2588	Area	Total
Dioxane [1,4]	0.0	0.0	0.0	105.0	0.0	105.0
Ethylene dibromide	0.0	0.0	0.0	0.2	0.0	0.2
Ethylene dichloride	0.0	0.0	4.9	17.6	0.0	22.5
Ethylene oxide	0.0	0.0	58.1	12.3	454.1	524.4
Formaldehyde[a]	16664.9	16499.3	521.6	674.7	1107.5	35468.0
Methyl ethyl ketone[a]	905.1	906.9	3240.2	385.9	14535.4	19973.5
Methylene chloride	0.0	0.0	1378.6	1673.6	9421.7	12473.9
MTBE	58428.9	2679.2	40.5	434.4	5473.7	67056.7
p-Dichlorobenzene	0.0	0.0	0.0	4.5	3735.6	3740.1
Perchloroethylene	0.0	0.0	4622.0	2249.1	22813.1	29684.2
Propylene oxide	0.0	0.0	0.0	22.3	0.0	22.3
Styrene	1114.8	287.1	447.0	3836.7	21.4	5707.0
Toluene	63187.6	11085.9	5689.6	3682.4	52246.7	135892.2
Trichloroethylene	0.0	0.0	1.1	58.0	2550.3	2609.3
Vinyl chloride	0.0	0.0	0.0	4.3	0.0	4.3
Arsenic	0.1	0.3	2.7	0.7	21.4	25.2
Cadmium	1.6	1.5	0.5	0.7	27.5	31.8
Chromium	2.4	2.3	3.9	2.2	302.2	313.0
Diesel particulate	23906.3	22386.3	0.0	5.4	815.3	47113.4
Elemental carbon[b]	27572.1	6690.3	702.8	0.0	16770.5	51735.7
Hexavalent chromium	0.4	0.4	0.3	1.0	0.1	2.2
Lead	0.7	0.9	1.9	24.5	1016.3	1044.3
Nickel	2.5	2.2	2.9	21.6	85.6	114.9
Organic carbon	16426.2	15381.8	0.0	0.0	108612.1	140420.2
Selenium	0.1	0.1	3.0	5.7	2.6	11.6
Silicon	68.6	67.6	167.2	0.0	248614.0	248917.4

Source: Final MATES II Study, SCAQMD (March 2000).
[a] Primarily emitted.
[b] Including elemental carbon from all sources, including diesel particulates.

3.1.5 Refinery Emissions

Criteria pollutant emissions from the refinery during the 12-month period from July 2004 through June 2005 are listed in Table 3.1-6. It should be noted that the emissions in Table 3.1-6 are in tons per year, while the total Basin emissions in Table 3.1-4 are in tons per day.

Table 3.1-6
Refinery Annual Stationary Source Emissions from July 2004 through June 2005

Pollutant	Emissions (ton/year)
CO	2,068
VOC	775
NO_x	1,088
SO_x	1,142
PM10	427

3.2 Hazards and Hazardous Materials

In general, hazard impacts are not a discipline with specific environmental characteristics that can be easily described or quantified. Instead, hazard impacts typically consist of random, unexpected 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 that are taken into consideration to determine the magnitude of the risk of an upset event are:

- The impact of the event;
- The types of materials potentially involved in the upset event; and
- The location of sensitive receptors, e.g., residences, schools, and businesses.

3.2.1 Applicable Hazards Regulations

The following discussion describes laws and regulations affecting the proposed project and the management of risk associated with process upsets.

A variety of safety laws and regulations have been in existence for many years to reduce the risk of accidental releases of chemicals at industrial facilities. Initially, the federal government passed legislation to enhance emergency planning efforts in Title III of SARA. Next, the U.S. EPA developed Emergency Preparedness and Community Right-to-Know regulations.

OSHA passed a rule in 1992, known as Process Safety Management of Highly Hazardous Chemicals (29 CFR 1910.119), which addresses the prevention of catastrophic accidents. The rule requires companies handling hazardous substances in excess of specific threshold amounts to develop and implement process safety management (PSM) systems. The requirements of the

PSM rule are directed primarily at protecting workers within the facility. One of the key components of the required PSM systems is the performance of process hazard analyses. The process hazard analyses are assessments to anticipate causes of potential accidents and to improve safeguards to prevent these accidents.

In California, Assembly Bill 3777 first required facilities handling Acutely Hazardous Materials (AHMs) to establish Risk Management Prevention Programs (RMPPs) in 1986. The objective of these regulations was to identify facilities that handle AHMs above certain threshold limits and to require these facilities to develop RMPPs to address the potential hazards involved. The RMPPs were intended to identify hazards involving AHMs, evaluate potential consequences of releases, and identify recommended changes in equipment, training, operating and maintenance procedures, mitigation systems, and emergency response plans to minimize both the potential for these releases and their effects should they occur. The California Office of Emergency Services (OES) published guidelines for preparing RMPPs in November 1989. In some cases, administering agencies (usually cities or counties responsible for emergency response and preparedness) have issued additional guidance. The RMPP program has been replaced with the California Accidental Release Prevention (CalARP) Program discussed below. These regulations are codified under California Code of Regulations Title 19, Division 2, Chapter 4.5, (Sections 2735.1 – 2785.1).

The U.S. EPA established a federal Risk Management Program (RMP) under the 1990 Clean Air Act Amendments (CAAA), which were passed in November 1990 (40 CFR 68). The 1990 CAAA mandated that U.S. EPA create regulations to require facilities possessing and/or storing listed chemicals above specified threshold amounts to develop and implement RMPs. The RMPs contain a hazard assessment of potential worst-credible accidents, an accident prevention program, and an emergency response program. Federal regulations were promulgated for RMPs in June 1996. The Federal RMP was provisionally accepted by California in January 1997 to replace the California RMPP and California regulations. The CalARP program was finalized by June 1997, as California's version of the federal RMP. RMP/CalARP regulations require that risk management programs be completed for affected processes by the time a listed substance exceeds the threshold quantity in the processes for the first time.

The proposed refinery modifications will require modifications by Chevron under the refinery's RMP and CalARP programs.. The City of El Segundo Fire Department administers this program for the refinery. In addition, the refinery has prepared an emergency response manual, which 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.

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 the American Petroleum Institute, the American Society of Mechanical Engineers, the American Institute of Chemical Engineers, the American National Standards Institute, and the American Society of Testing and Materials; and
- The applicable Cal-OSHA requirements.

Chevron maintains its own emergency response capabilities, including on-site equipment and trained emergency response personnel who are available to respond to emergency situations anywhere within the refinery.

3.2.2 Types of Existing On-site Hazards and Release Scenarios

Based on a review of current operations of the equipment that is proposed to be modified in the affected refinery units (No. 4 Crude Unit, Coker and No. 6 H_2S Plant), the upset conditions that would currently have the greatest potential impacts on the public would result in release and subsequent ignition of flammable vapors or liquids in the Coker. In particular, Chevron proposes to replace the existing C-73 Depropanizer and the Coker Main Fractionator, which both contain flammable gases and liquids, as part of the modifications to the Coker.

The most catastrophic accident scenario involving the existing C-73 Depropanizer vessel or the Coker Main Fractionator column would be a structural failure resulting in an atmospheric release of flammable vapor to the atmosphere, followed by ignition and a vapor explosion. A secondary, less catastrophic accident scenario would be the formation of a pool of flammable liquids as a result of the failure of the containment vessel, with subsequent formation of a liquid pool fire upon ignition.

The flammable substances that could be released by failure of the existing Depropanizer and their approximate fraction of the total flammable substances in the vessel are propane (30 percent), butane (45 percent), and pentane (25 percent). Potential releases from the Depropanizer could occur either as gases, liquids, or a combination of both phases, depending on the specific release scenario. The highly flammable substances that could be released by failure of the Main Coker Fractionator column are vapors (consisting of tail gas, liquid propane gas, gasoil vapors, jet and diesel fuel vapors, and gasoline vapors) and liquids (diesel fuel and residual).

The existing vapor and liquid volumes, and corresponding masses of flammable substances in the existing Depropanizer and Main Coker Main Fractionator column are listed in 3.2-1. The potential consequences from the release and ignition of the contents of both the existing and proposed replacements for the C-73 Depropanizer and the Coker Main Fractionator column are analyzed in Section 4.2. The consequences are summarized in Table 3.2-2 for the existing equipment. The last column of Table 3.2-2 shows that potential significant adverse impacts do not extend beyond the refinery boundaries.

Table 3.2-1
Steady-State Quantities of Flammable Vapors and Liquids in Existing C-73 Depropanizer and Coker Main Fractionator Column

Parameter	Volume (ft^3)	Mass (lbs)
Depropanizer Vapor Phase	1,227	2,944
Depropanizer Liquid Phase	138	4,905
Coker Main Fractionator Vapor Phase (assume diesel)	20,200	5,065
Coker Main Fractionator Liquid Phase (diesel)	215,430	429,910
Coker Main Fractionator Liquid Phase (residual)	892,250	2,493,800

Table 3.2-2
Potential Consequences from Release and Subsequent Ignition of Existing C-73 Depropanizer and Coker Main Fractionator Column Contents

Scenario	Significant Impact Distance (meters)[a]	Distance to Refinery Boundary (meters)	Off-Site Impact Distance (meters)
Vapor Explosion from Release from C-73 Depropanizer	190	510	0
Pool Fire from Release from C-73 Depropanizer	70	510	0
Vapor Explosion from Release from Coke Main Fractionator Column	230	700	0
Pool Fire from Release from Coke Main Fractionator Column	230	700	0
[a] Distance to overpressure of 1 pound per square inch for vapor explosion and distance to thermal flux of 5 killoWatt per square meter for pool fire			

3.3 Hydrology and 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. Elements of both the regional and local hydrologic environment are presented in this section.

3.3.1 Water Supply

3.3.1.1 Los Angeles Basin

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.

3.3.1.2 Refinery

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 purchased from the West Basin Municipal Water District (WBMWD), is used. In addition, approximately 7.5 million gallons per day 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 gallons of reclaimed water per day are used for irrigation of refinery landscaping, approximately 3.5 million gallons per day of nitrified reclaimed water are used for the cooling towers, and approximately 3.8 million gallons per day of reclaimed water are used for boiler feed water.

3.3.2 Water Quality

Extensive urbanization in the area has resulted in significant alteration and deterioration of the natural hydrologic environment. Due to extensive paving and surfacing of the land throughout the area, groundwater recharge by infiltration has steadily decreased while pumping has increased.

3.3.2.1 Surface Water Quality

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. Three categories of pollutants are regulated under the CWA: "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 CWA regulates both direct and indirect discharges. The NPDES Program (CWA §502) controls direct discharges into waters of the U.S. 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.

California received U.S. EPA approval of its NPDES permit program on May 14, 1973. Pursuant to §402(p) of the CWA and 40 CFR Parts 122, 123, and 124, the State Water Resources Control Board (SWRCB) adopted a general NPDES permit to regulate storm water discharges associated with industrial activity. Storm water discharges from petroleum refining operations are subject to requirements under this general permit unless a site-specific NPDES permit has been issued to the facility. CWA requirements also include both spill prevention (Spill Prevention Control and Countermeasure) and spill response (Facility Response) plans for certain facilities.

On July 23, 1997, the SWRCB adopted a revised Water Quality Control Plan for Ocean Water of California (Ocean Plan). The Ocean Plan contains water quality objectives for coastal waters of California.

On May 18, 1972 (amended on September 18, 1975), the SWRCB adopted a Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan). The Thermal Plan contains temperature objectives for the Pacific Ocean.

On June 13, 1994, the Los Angeles Regional Water Quality Control Board (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's water quality control plans for ocean waters, control of temperature, significant SWRCB's 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:

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

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

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

Discharges from the refinery must comply with the following objectives for these affected water bodies:

Physical Characteristics

- Floating particulates and grease and oil shall not be visible.
- The discharge of waste shall not cause aesthetically undesirable discoloration of the ocean surface.
- Natural light shall not be significantly reduced at any point outside the initial dilution zone as the result of the discharge of waste.
- The rate of deposition of inert solids and the characteristics of inert solids in ocean

sediments shall not be changed such that benthic communities are degraded.

Chemical Characteristics

- The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen-demanding waste materials.
- The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.
- The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions.
- The concentration of substances set forth in Chapter IV, Table B of the LA Basin Plan, in marine sediments shall not be increased to levels which would degrade indigenous biota.
- The concentration of organic materials in marine sediments shall not be increased to levels which would degrade marine life.
- Nutrient materials shall not cause objectionable aquatic growths or degrade indigenous biota.

Biological Characteristics

- Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.
- The natural taste, odor, and color of fish, shellfish, or other marine resources used for human consumption shall not be altered.
- The concentration of organic materials in fish, shellfish, or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

Radioactivity

- Discharge of radioactive waste shall not degrade marine life.

The refinery is located adjacent to the Santa Monica Bay (Bay) on the Pacific Ocean. The Bay is recognized by the U.S. EPA and the State as a natural resource of national significance and is preserved and protected under the National Estuary Program.

The Santa Monica Bay Restoration Project (SMBRP) is a coalition of environmentalists, government, scientists, business, and the public that was formed in 1988 to develop a restoration plan for the Bay. It was one of the first National Estuary Programs nationwide. The SMBRP is funded by the U.S. EPA, the State of California, and the Santa Monica Bay Restoration Foundation. The project was approved by Governor Wilson in 1994, and by U.S. EPA Administrator Browner in 1995. The pollutants of concern identified by the SMBRP for the El Segundo sub-watershed include heavy metals (cadmium, chromium, copper, lead, nickel, silver, zinc), debris, pathogens, oil and grease, chlordane, and polycyclic aromatic hydrocarbons (PAHs). In addition, the SMBRP implements the Mass Emission Approach. The objective is to reduce mass emissions of pollutants that have detectable inputs into the Bay and can accumulate in the marine environment. Copper, lead, silver, and zinc have interim mass emission performance caps. These caps are reflected in Chevron's NPDES permit discharge limits.

In addition to the pollutants identified by the SMBRP, the 1998 CWA Section 303(d) California List, approved by the U.S. EPA on May 12, 1999, identified the following as pollutants of concern for the Bay (Offshore and Nearshore): dichloro-diphenyl trichloroethane (DDT), polychlorinated biphenyls (PCBs), PAHs, chlordane, heavy metals (cadmium, copper, lead, mercury, nickel, silver, zinc), and debris.

Under its NPDES Permit, the refinery is authorized to discharge up to 8.8 million gallons of treated wastewater during dry weather and up to 23 million gallons per day during wet weather to the Bay (Pacific Ocean), near Dockweiler State Beach in El Segundo. The wastewater is discharged through Refinery Outfall 001, which is located approximately 3,500 feet offshore. Currently, the refinery discharges approximately seven million gallons per day of treated wastewater during dry weather.

The requirements of the permit specifically address effluent discharges to the Bay, receiving water quality, and monitoring/reporting. Effluent monitoring reports are submitted monthly to the LARWQCB.

Refinery wastewater is 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 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 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 13,770,540 gallons. From the tanks, the water can be routed to either system for treatment prior to discharge.

California Senate Bill 1196 allows dischargers to adjust their discharge requirements to reflect the additional contaminants in reclaimed water not normally present in potable water. The refinery's NPDES permit implements this allowance and provides the method of calculating the credit associated with the use of reclaimed water. However, Chevron has not requested any credit under Senate Bill 1196 since 1995.

The ground surface generally slopes from east to west in the site vicinity. Surface water flows into impound basins located throughout the refinery. Each of the impound basins can only be emptied by manual activation of pumps, ejectors, or vacuum trucks. None of the impound basins is connected to the refinery drainage system; however, rainfall runoff from these areas may be pumped to the wastewater system.

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

3.3.2.2 Groundwater Quality

The refinery is located in the Los Angeles Basin, which is bordered by the Newport-Inglewood Fault on the east, by the Santa Monica Bay on the west, by the Ballona Gap on the north, and by the Palos Verdes Hills on the south. Many of the shallow water-bearing units in the Los Angeles Basin area are hydraulically connected to offshore sediments. Withdrawal of fresh water from these zones has resulted in significant seawater intrusion into the groundwater basins. The West Coast Basin Barrier Project is an ongoing project operated by the Los Angeles County Department of Public Works (LACDPW), which involves a series of injection and monitoring wells installed and maintained by the LACDPW to prevent seawater intrusion.

Groundwater resources are managed by the Water Replenishment District of Southern California, formerly known as the Central and West Basin Water Replenishment District. The State Department of Water Resources acts as the court-appointed Watermaster in connection with water rights adjudications. In addition to limiting total extractions from the Basin, groundwater resources management programs administered by the Water Replenishment District include:

- Purchase of imported and reclaimed water for replenishment;
- Creation of fresh water barriers along the coast by injection of purchased imported water into injection wells. (This allows water levels in the more inland portions of the Basin to be drawn below sea level without the threat of seawater intrusion.); and
- Monitoring of groundwater quality and determination of the relative quantities of local, imported, and reclaimed water to be used for replenishment to maintain the chemical quality of the groundwater.

Several measures have been taken to stabilize groundwater levels in the project vicinity and thereby combat the further intrusion of seawater (e.g., groundwater extractions are limited to adjudicated amounts under court control).

The groundwater below the refinery has been affected by past site operations. In May 1988, the LARWQCB issued cleanup and abatement orders for the extraction and treatment of hydrocarbon-contaminated groundwater from the Old Dune Sand Aquifer underneath the refinery. In August 1995, the order was revised requiring Chevron to increase the rate of groundwater extraction to enhance free product removal in order to prevent further vertical migration of petroleum hydrocarbons into deeper aquifers.

3.4 Noise

Noise is usually defined as sound that is undesirable because it interferes with speech communication and hearing, is intense enough to damage hearing, or is otherwise annoying (unwanted sound). Sound levels are measured on a logarithmic scale in decibels (dB). The universal measure for environmental sound is the “A” weighted sound level, dBA, which is the sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. “A” scale weighting is a set of mathematical factors applied by the measuring instrument to shape the frequency content of the sound in a manner similar to the way the human ear responds to sounds.

3.4.1 Guidelines and Local Ordinances

Noise impacts from the operation and construction of the proposed project at the refinery are evaluated in terms of compliance with the requirements of the local city noise regulations summarized in Table 3.4-1, and in terms of an incremental increase in existing noise levels. In addition, most community local noise elements contain land use compatibility standards required by the State of California. Figure 3.4-1 shows state land use categories and the recommended noise levels associated with each (California, 2003).

Table 3.4-1
Local Noise Guidelines and Ordinances

City	Construction Limit	Operations Limit (exterior dBA except where noted)
El Segundo	Residential[a]: L_{eq}= 5 dBA over ambient noise level; Commercial/Industrial[a]: 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[a]: L_{eq}= 5 dBA over ambient noise level; Commercial/Industrial[a]: L_{eq}= 8 dBA over ambient noise level
Manhattan Beach	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[a,b,c]: L_{eq}= 55 dBA (7 a.m.. to 10 p.m.) L_{eq}= 50 dBA (10 p.m. to 7 a.m.) Commercial[a,b,c]: Residential limits + 15 dBA Industrial[a,b,c]: Residential limits + 20 dBA

[a] 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
[b] If ambient noise exceeds limit then limit is increased to ambient noise
[c] 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

3.4.1.1 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 3.4-1, noise is limited in residential zones to five dBA above ambient (existing) sound level and eight dBA above ambient for commercial or industrial zones.

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 are expected to occur at night, it will not be exempt from the requirements of Section 7-2-4 of El Segundo's Municipal Code.

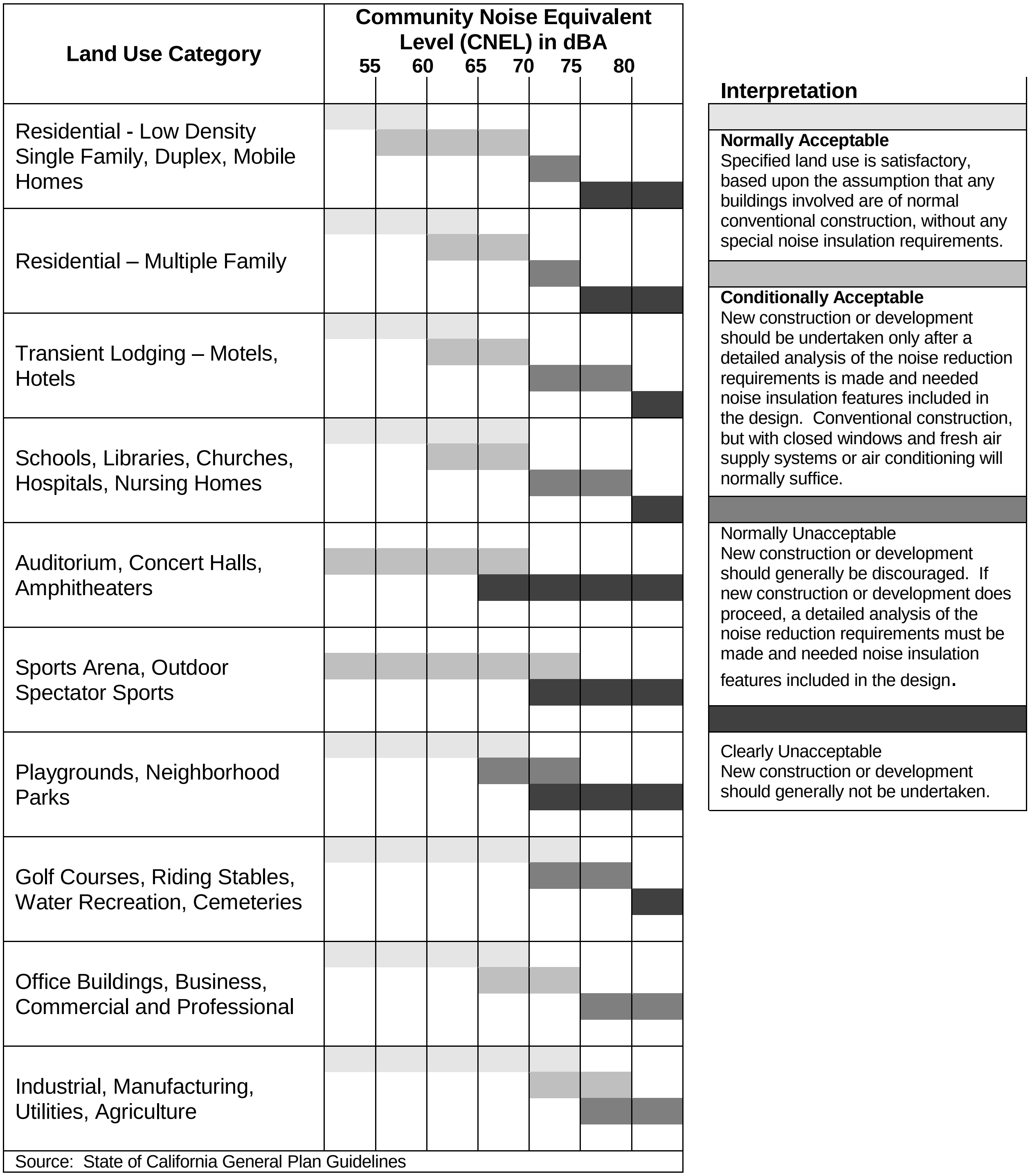


Figure 3.4-1 Land Use Compatibility for Community Noise Environments

3.4.1.2 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" 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 equivalent sound level (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 3.4-1.

Section 5.48.060 limits construction 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. No construction noise is permitted on Sunday. Under Section 5.48.250, construction activities are exempted from the other provisions of the noise ordinances. Thus, the City of Manhattan Beach Municipal Codes do not specify noise limits for construction noise.

3.4.2 Existing Noise Environment

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).

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 north of the refinery on December 15 through 17, 2000, and south of the refinery on January 5 through 6, 2001 and January 13 through 17, 2001, for the Chevron - El Segundo Refinery CARB Phase 3 Clean Fuels Project EIR (SCAQMD, 2001a). Results of the noise survey are summarized in Table 3.4-2 and discussed in further detail in Appendix D.1. Current refinery facilities and equipment, as well as surrounding land uses, are essentially the same as in 2001. Thus, results from the survey are considered representative of current conditions. The noise survey locations are shown on Figure 3.4-2.

Table 3.4-2
Noise Survey Results

Location	Description	Zoning Designation	Date/Time Period	Average Leq Day/Evening/ Night (dBA)	CNEL[1] (dBA)
1	Gate 20 - Refinery south property line	Industrial	Jan. 17-18, 2001 1400 to 1400	68/67/62	70
2	Gate 21 - Refinery south property line	Industrial	Jan. 16-17, 2001 1300 to 1300	68/68/62	71
3	Gate 22 - Refinery south property line	Industrial	Jan. 5-6, 2001 1400 to 1400	64/62/59	67
4	3600 Pine Ave. - ~500 ft. south of Gate 20	Residential	Jan. 17-18, 2001 1500 to 1500	56/56/55	62
5	Pacific Ave. - ~900 ft. south of Gate 21	Residential	Jan. 16-17, 2001 1300 to 1300	59/56/53	61
6	Armory Ave. - ~200 ft. south of Gate 22	Residential	Jan. 5-6, 2001 1400 - 1400	55/53/51	59
7	Lomita Ave. and El Segundo Blvd. - near north property line of refinery	Commercial	Dec. 15-16, 2000 1600 to 1600	66/66/65	72
8	Lomita Ave. and Franklin Ave. - ~600 ft. north of refinery	Commercial	Dec. 16-17, 2000 1900 to 1900	60/58/56	63
9	Lomita Ave. at school behind St. Anthony's Church - ~1,000 ft. north of refinery	Commercial/ Residential	Dec. 16-17, 2000 1900 to 1900	59/56/52	61

[a] CNEL – Community Noise Equivalent Level - 24-hr A-weighted sound level from weighted average of hourly equivalent sound level.

Based on the noise survey, the existing community noise equivalent level (CNEL) in the residential area to the south of the refinery is 59 to 62 dBA, which is in the "normally acceptable" to "conditionally acceptable" range for residential land use categories (see Figure 3.4-1). However, as shown in Table 3.4-2, the measured L_{eq} noise levels at receptors 4 and 5 exceeded the Manhattan Beach's noise standards for residential receptors of 55 dBA during the day and 50 dBA at night. The nighttime L_{eq} at receptor 6 slightly exceeded the city's residential receptor noise standard. Noise levels at these residences are dominated by traffic noise.

The existing CNEL in the vicinity of commercial and residential areas to the north of the refinery is 61 to 63 dBA, which is in the "normally acceptable" range for both commercial and residential land uses.

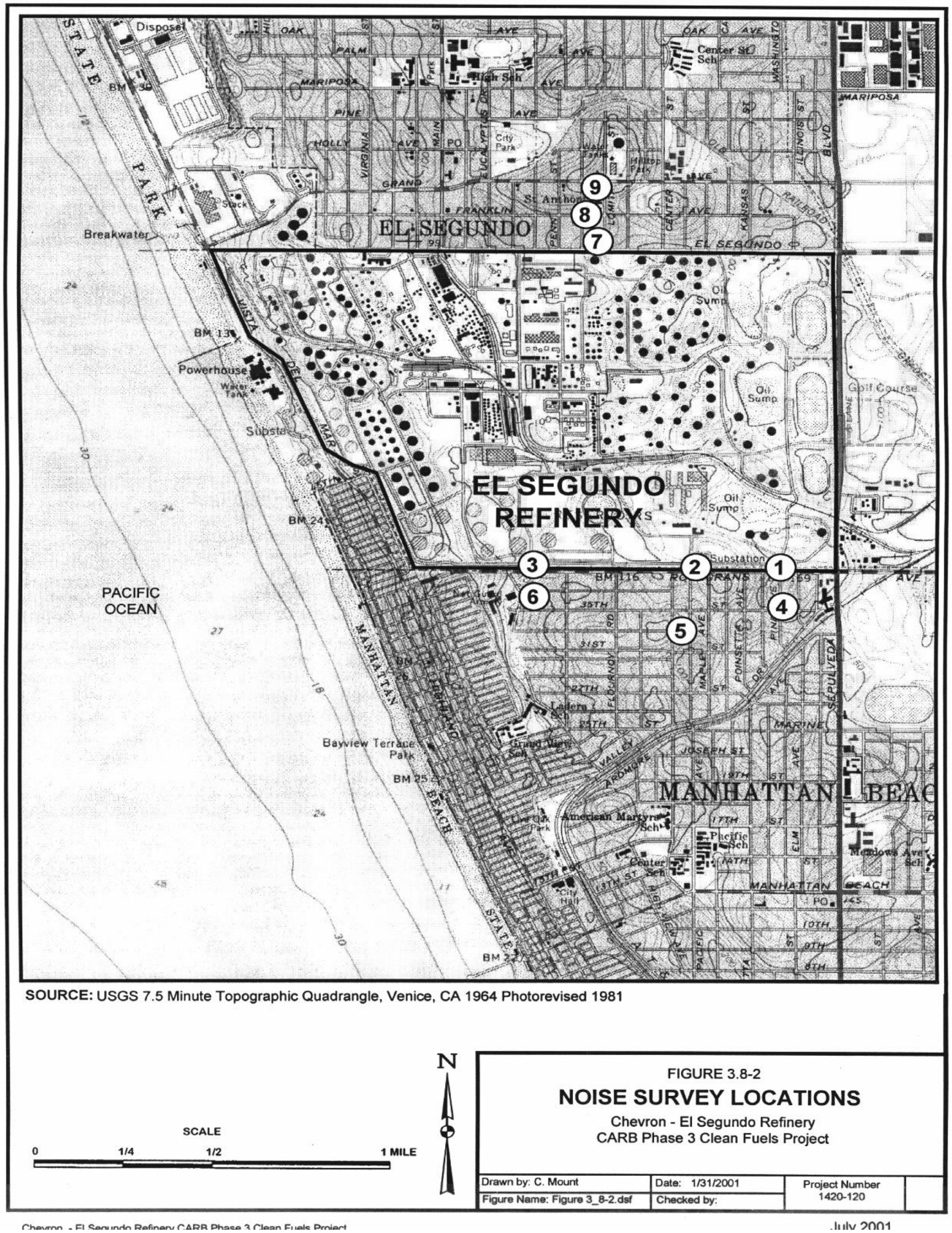


Figure 3.4-2 Noise Survey Locations

The existing CNEL noise environment in the vicinity of commercial and park receptors to the west and east of the refinery are estimated to be 60 to 65 dBA based on the CNEL noise contours in the El Segundo General Plan. These values are in the "normally acceptable" range for their respective land use categories according to the State of California General Plan Guidelines.

3.5 Solid and Hazardous Waste

3.5.1 Non-hazardous Solid Waste

Chevron currently uses the Bradley Canyon Landfill located in Sun Valley, California, for the disposal of non-hazardous solid waste. This landfill is operated by Waste Management, Inc., and is permitted to receive a maximum of 10,000 tons of solid waste per day. The Bradley Canyon Landfill is expected to close in June 2007 (California Integrated Waste Management Board, 2005).

The Los Angeles County Sanitation District maintains three active Class III landfills that handle approximately 20,000 tons per day of non-hazardous solid waste. These landfills include Puente Hills Landfill, Scholl Canyon Landfill, and Calabasas Landfill. Projected closure dates for the three landfills range from 2013 at Puente Hills Landfill to 2028 at Calabasas. Permitted daily capacity ranges from 3,400 tons per day at Scholl Canyon to 13,200 tons per day at Puente Hills (California Integrated Waste Management Board, 2005).

Non-hazardous waste quantities generated at the refinery in 2004 are provided in Table 3.5-1. Table 3.5-1 presents the quantity of each type of non-hazardous waste generated, as well as the disposal method.

Table 3.5-1
Non-Hazardous Waste Generated by the Refinery in 2004

Waste Description	Quantity (1,000 lb)	Disposal Method
Brick, Asphalt, Concrete	9.3	Landfill
Carbon	229.5	Recycle
Carbon w/DEA	72.4	Recycle
Carbon w/KOH	33.3	Landfill
Carbon w/Catacarb	16.5	Landfill
Dirt /Soil	8,387.5	Landfill
Filters / Filter Material	488.8	Landfill
Insulation (Non-Asbestos)	179.3	Landfill
Other Catalyst	28.9	Landfill
Other Solids	2,137.0	Landfill
Refractory	463.2	Landfill
Sandblast Material	153.7	Landfill
Total	**12,199.4**	

3.5.2 Hazardous Waste

There are two Class I landfills in California that are approved to accept hazardous wastes. Chemical Waste Management Corporation in Kettleman City, California is a treatment, storage, and disposal facility that has a permitted capacity of approximately 10.7 million cubic yards (California Integrated Waste Management Board, 2005). Clean Harbors operates a Class I landfill in Buttonwillow, California that has a permitted capacity of 14.3 million cubic yards and an expected closure date of 2040 (California Integrated Waste Management Board, 2005).

Hazardous waste generated at the refinery in 2004 are provided in Table 3.5-2. Table 3.5-2 presents the quantity of each type of hazardous waste generated, as well as the disposal method and location.

Table 3.5-2
Hazardous Waste Generated by the Refinery in 2004

Waste Description	Quantity (1,000 lb)	Disposal Method
Alumina Catalyst	27.2	Recycle[a]
Asbestos	132.6	Landfill[b]
Brick, Asphalt, Concrete	10.8	Landfill[b]
Carbon w/DEA	81.7	Landfill[b]
Contaminated Pipe/Metal	11.9	Landfill[b]
Corrosive Liquid	2.0	Landfill[b]/Incinerator[c]
Debris/Trash	395.7	Landfill[b]
Dirt/Soil	2,156.5	Landfill[b]
F-Waste Listed	277.7	Incinerator[c]
F/K Sludge /Debris	602.1	Incinerator[c]
Filters/Filter Material	58.1	Landfill[b]
K-Waste, Listed	96.4	Incinerator[c]
Lab Pack Materials	15.3	Landfill[b]/Incinerator[c]
Metal Oxide Catalyst	179.7	Landfill[b]
Metal Oxide Catalyst	267.5	Recycle[a]
Oil Sorb/Dessicant	1.4	Landfill[b]/Incinerator[c]
Other Catalysts	10.6	Landfill[b]/Incinerator[c]
Other Sludge	26.8	Landfill[b]/Incinerator[c]
Other Solids	137.1	Landfill[b]/Incinerator[c]
Precious Metal Catalyst	561.7	Recycle[d]
Refractory	77.2	Landfill[b]
Resid Oil	6.6	Landfill[b]/Incinerator[c]
Sandblast Material	1,553.3	Landfill[b]
Used Oil	1.0	Landfill[b]/Incinerator[c]
Total	**6,690.8**	

[a] Recycled at Gulf Chemical and Metallurgical, Freeport, TX
[b] Landfilled at Waste Management, Kettleman City, CA
[c] Incinerated at Clean Harbors Aragonite, LLC, Aragonite, Utah
[d] Recycled at Sabin Metal West Corporation, Williston, ND

3.5.3 Waste Minimization

Chevron maintains a Source Reduction Evaluation Plan as required under the Hazardous Waste Source Reduction and Management Review Act of 1989 (Senate Bill 14). The waste minimization strategies used at the refinery include recycling, loss prevention, employee training programs, and waste segregation.

3.6 Transportation and Traffic

This section describes existing traffic and transportation conditions in the vicinity of the refinery.

3.6.1 Surrounding Highway Network

Regional transportation facilities in the vicinity of the project provide excellent accessibility to the entire southern California region. The San Diego Freeway (Interstate 405) lies approximately 1¼ miles east of the refinery and provides full ramp connections at El Segundo Boulevard and Rosecrans Avenue. In addition, the Glenn M. Anderson Freeway (I-105) and its related rail transit are approximately one mile north of the refinery. Freeway interchanges to the regional arterial highway network provide access at regular intervals.

3.6.2 Local Roadways and Circulation Routes

A traffic analysis was performed for the project by Austin-Foust Associates, Inc., in February 2006 and is included in Appendix E. Existing conditions at the following 14 intersections were evaluated in the traffic analysis:

1. Sepulveda Blvd./State Route 1 (SR-1) & El Segundo Blvd.
2. Sepulveda/Blvd./SR-1 & Rosecrans Ave.
3. Sepulveda Blvd./SR-1 & Imperial Hwy.
4. Aviation Blvd. & El Segundo Blvd.
5. Aviation Blvd. & Rosecrans Ave.
6. La Cienega Blvd. & I-405 SB on/off
7. La Cienega Blvd. & El Segundo Blvd.
8. I-405 SB on & El Segundo Blvd.
9. I-405 NB on/off & El Segundo Blvd.
10. I-405 SB off & Rosecrans Ave.
11. I-405 NB on/off & Rosecrans Ave.
12. I-405 NB on/off & Rosecrans Ave.
13. California Ave. & Imperial Hwy.
14. Main Street & Imperial Hwy.

The first 12 of these intersections are the major intersections in the vicinity of the refinery. The 13^{th} and 14^{th} intersections (California Avenue/Imperial Highway and Main Street/Imperial Highway) were chosen because all construction workers commuting to and from the off-site parking facility during construction of the proposed project will travel on Imperial Highway and pass through these intersections (see Section 2.8).

Traffic count information to establish existing conditions at these 14 intersections was obtained from several sources. To maintain consistency between various traffic studies in the area, the morning (AM) and afternoon (PM) peak-hour volume data were based on manual traffic counts at the intersections conducted by Traffic Data Services, Inc., in late 2005 and early 2006 (see Appendix E), as well as traffic data included in the Final EIR for the Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development (City of El Segundo 2005), which is the most recent available relevant traffic study in the City of El Segundo. Traffic count data from the Plaza El Segundo EIR were compared with the 2005 and 2006 count data to verify consistency in baseline data. Traffic count information in the Plaza El Segundo EIR from the year 2004 was then increased with an annual growth rate of one-half percent per year to account for increases in traffic volume from 2004 to the present year (2006). The resulting AM and PM peak hour intersection turn movement volumes are illustrated in Figures 3.6-1 and 3.6-2.

Intersection volume to capacity ratios (V/C) are presented in Table 3.6-1. The V/C ratio is the fraction of an hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches to the intersection operate at capacity. If an intersection is operating at 80 percent of capacity (V/C of 0.8), then 20 percent of the signal cycle is not used. The signal could show red on all indications 20 percent of the time and the signal would just accommodate approaching traffic. Intersections are categorized by level of service (LOS), from A (best) through F (worst), which correspond to ranges of V/C, as indicated at the bottom of Table 3.6-1.

The traffic count data showed that five of the 14 intersections are presently operating at an unacceptable level of service (LOS E or F) during the AM or PM peak hour. This is consistent with the characterization of traffic conditions included in the City of El Segundo General Plan Circulation Element (City of El Segundo, 2004). These intersections are:

1. Sepulveda Blvd./SR-1 & Rosecrans Ave. (LOS F during PM peak hour);
2. Sepulveda Blvd./SR-1 & Imperial Hwy. (LOS E during AM peak and LOS F during PM peak);
3. Aviation Blvd. & El Segundo Blvd. (LOS E during PM peak);
4. Aviation Blvd. & Rosecrans Ave. (LOS F during PM peak hour); and
5. Sepulveda Blvd./SR-1 & El Segundo Blvd. (LOS E in PM peak hour)

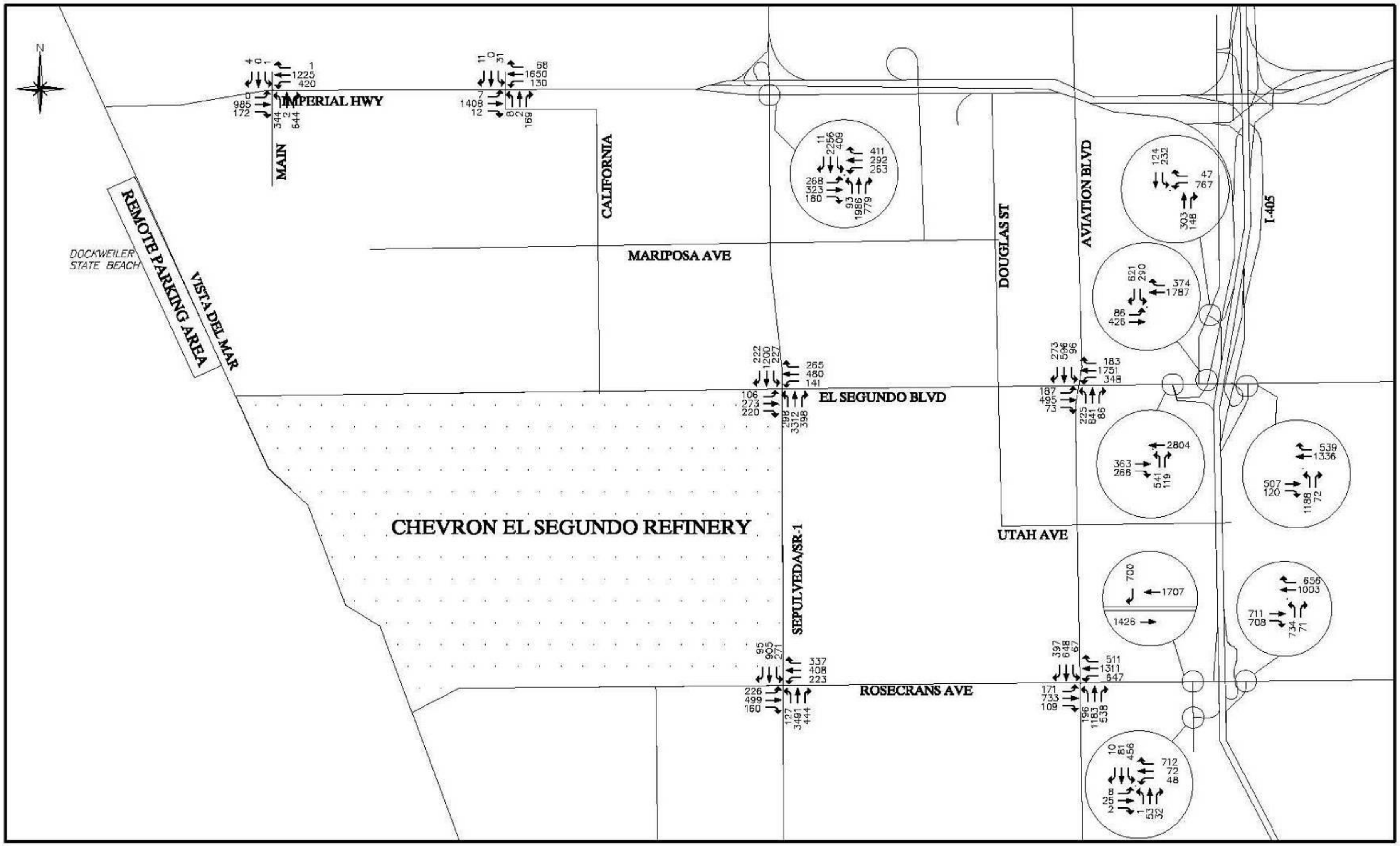


Figure 3.6-1 Existing AM Peak Hour Turn Volumes

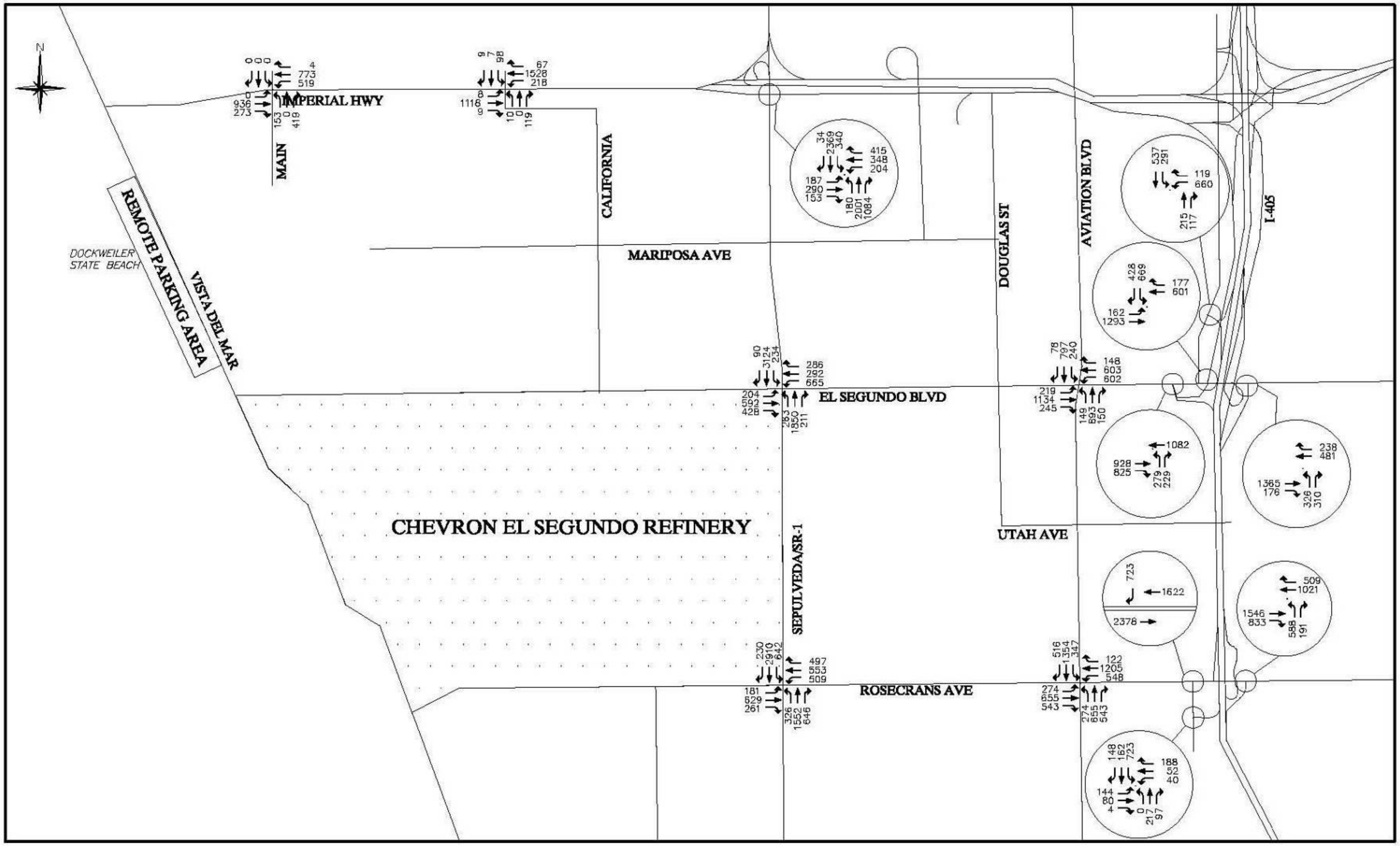


Figure 3.6-2 Existing PM Peak Hour Turn Volumes

Table 3.6-1
Existing Intersection Volume to Capacity Ratio Summary

Intersection	Existing AM Peak Hour		Existing PM Peak Hour	
	V/C Ratio	LOS	V/C Ratio	LOS
1. Sepulveda/SR-1 and El Segundo Blvd.	1.013*	F	1.105*	F
2. Sepulveda/SR-1 and Rosecrans Ave.	.978	E	1.175*	F
3. Sepulveda/SR-1 and Imperial Hwy.	1.075*	F	1.199*	F
4. Aviation Blvd. and El Segundo	.868	D	.971*	E
5. Aviation Blvd. and Rosecrans	.868	D	1.140*	F
6. La Cienega and I-405 SB on/off	.544	A	.544	A
7. La Cienega and El Segundo	.748	C	.686	B
8. I-405 SB on and El Segundo	.840	D	.725	C
9. I-405 NB on/off and El Segundo	.756	C	.526	A
10. I-405 SB off and Rosecrans	.625	B	.648	B
11. I-405 NB on/off and Rosecrans	.845	D	.775	C
12. Hindry Avenue and I-405 SB on/off	.463	A	.548	A
13. California Avenue and Imperial Highway	.491	A	.482	A
14. Main Street and Imperial Highway	.725	C	.617	B

* Exceeds acceptable LOS (see V/C ratios and associated LOS definitions 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 Above 1.0 = LOS F Forced flow (above maximum capacity; unacceptable delay)

Conditions on the two regional freeways within the project vicinity, I-105 and I-405, were also examined. Four freeway segments that are anticipated to be impacted by construction worker commuting during construction of the proposed project were selected for this analysis:

1. I-105 between Sepulveda Boulevard and Douglas Street;
2. I-105 between Douglas Street and I-405 interchange;
3. I-405 between Rosecrans Avenue and El Segundo Boulevard; and
4. I-405 between El Segundo Boulevard and I-105.

Current traffic volumes on these freeway segments were obtained from the most recent published Caltrans data. The freeway traffic volumes from 2002 were increased to account for growth by one percent per year to 2006, consistent with the procedures outlined in the Los Angeles County Congestion Management Program (CMP) Transportation Impact Analysis. Existing freeway geometrics (e.g., number of mainline travel lanes) for each of the segments analyzed were determined from CMP data, aerial photographs, and field surveys. Segment peak hour traffic capacities were computed for each direction using established Highway Capacity Manual (HCM) methodology. In accordance with this methodology, each mainline travel lane was assumed to have a capacity of 2,000 vehicles per hour (vph). High-Occupancy Vehicle lanes were assumed to add 1,600 vph to the mainline capacity. The total directional capacities were then computed and used in conjunction with the peak hour directional freeway segment volumes to calculate 2006 freeway levels of services in the project vicinity.

Table 3.6-2 summarizes the 2006 freeway segment volumes, with the corresponding levels of service. As shown in Table 3.6-2, I-405, between Rosecrans Avenue and El Segundo Boulevard, performs at adverse conditions (LOS F) in the northbound and southbound directions during both peak hours. I-405, between El Segundo Boulevard and the I-105 interchange, performs at LOS E in the southbound direction during the PM peak hour. The remaining freeway study segments are operating at acceptable levels of service during both peak hours.

Table 3.6-2
Existing Freeway Conditions

#	Freeway Segment	Direction	Peak Hour	Freeway Capacity	Daily Volume	Peak Hour Volume	D/C Ratio**	LOS
1	I-105 between Sepulveda Boulevard & Douglas Street	E/B	AM PM	8,000 8,000	85,300	3,540 3,400	0.44 0.43	B B
		W/B	AM PM	8,000 8,000		3,360 4,080	0.42 0.51	B B
2	I-105 between Douglas Street & I-405 interchange	E/B	AM PM	8,000 8,000	127,000	5,050 4,880	0.63 0.61	C C
		W/B	AM PM	8,000 8,000		4,790 5,830	0.60 0.73	C C
3	I-405 between Rosecrans Avenue & El Segundo Boulevard	N/B	AM PM	9,600* 9,600*	305,900	10,460 10,090	1.08 1.05	F(0) F(0)
		S/B	AM PM	9,600* 9,600*		9,920 12,080	1.03 1.26	F(0) F(1)

Table 3.6-2 (concluded)
Existing Freeway Conditions

#	Freeway Segment	Direction	Peak Hour	Freeway Capacity	Daily Volume	Peak Hour Volume	D/C Ratio**	LOS
4	I-405 between El Segundo Boulevard & I-105 interchange	N/B	AM PM	9,600* 9,600*	242,500	8,200 7,900	0.85 0.82	D D
		S/B	AM PM	9,600* 9,600*		7,780 9,470	0.81 0.99	D E

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		

* Includes High Occupancy Vehicle (HOV) Lane
** Demand to Capacity Ratio
Note: LOS F(1) through F(3) represent severe congestion (travel speeds less than 25 mph for more than one hour.
Source: Los Angeles County Metropolitan Transportation Authority, Congestion Management Program, 2002.

This page intentionally left blank

CHAPTER 4

POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This page intentionally left blank

4.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This chapter provides an analysis of potential adverse environmental impacts associated with the Chevron El Segundo Refinery Heavy Crude Project. Project construction and operation impacts to the affected environment of each resource discussed in Chapter 3 are analyzed in this chapter.

Pursuant to CEQA Guidelines §15126.2(a), this section focuses on those impacts that are considered potentially significant. An impact has been considered significant if it leads to a "substantial, or potentially substantial, adverse change in the environment." Impacts from the project fall within one of the following areas:

No impact - There would be no impact to the identified resource resulting from this project. For example, a project constructed at an existing facility, which has previously been surveyed and found to contain no cultural resources, would produce no impact to that resource.

Adverse but not significant - Some impacts may result from the project; however, they are judged not to be significant. 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. For example, the addition of an industrial structure within an existing industrial facility complex would probably not produce a significant impact on visual resources.

Potentially significant but mitigable to insignificance - Significant impacts may occur; however, with proper and feasible mitigation, the impacts can be reduced to insignificance. For example, a project affecting traffic flow during construction may require temporary traffic controls that will mitigate and lessen the impacts to less than significant levels.

Potentially significant and not mitigable to insignificance - Impacts may occur that would be significant even after mitigation measures have been applied to lessen their severity. For example, a project could require a considerable amount of water during construction. If the additional water required the commitment of all the reserves of a water district even after requiring the project to include all water conservation practices, the impact to this resource could be significant and not mitigable to insignificance. Under CEQA, a significant impact would require the preparation of a Statement of Findings and a Statement of Overriding Considerations, i.e., the project benefits outweigh the significant damage to the environment, in order for the project to be approved.

Beneficial - Impacts would have a positive effect on the environment. For example, a project may produce a less polluting form of gasoline, which would benefit air quality.

Potential impacts from the proposed project were evaluated by analyzing the effects of increases in activities above the baseline activities that could cause impacts. Consistent with the court in *Fairview Neighbors v. Ventura* (1999) 70 Cal. App. 4th 238, the baseline is established at the maximum allowable level of activities that has been achieved previously.

Feasible mitigation measures for significant adverse impacts are also provided in this chapter. Mitigation measures are methods for minimizing or eliminating the effect of a project on the environment. This chapter also provides suggested mitigation for effects that are temporary in duration and will not have a long-term adverse impact on the environment.

4.1 Air Quality

Air quality impacts of the proposed project will be considered significant if the thresholds in Table 4.1-1 are exceeded.

Subsequent to the adoption of the SCAQMD CEQA Air Quality Handbook (SCAQMD, 1993), the SCAQMD adopted the Regional Clean Air Incentive Market (RECLAIM) program, fundamentally changing the framework of air quality rules and permits that apply to the largest NO_x and SO_x emission sources within the district. The RECLAIM program is a pollution cap and credit trading program for large sources of NO_x and SO_x emissions within the jurisdiction of the SCAQMD. Companies within the program are given an emissions allocation that reflects historical usage, but that declines yearly to reduce total emissions from affected facilities in the program. Facility operators are allowed to sell excess credits from reducing emissions more than required by the program and purchase emission credits to comply with annual allocations. The emissions from the universe of RECLAIM sources were capped in 1994. The emissions cap declined each year from 1995 to 2003, to a level of approximately 78 percent below the initial levels. RECLAIM was amended in 2005 to further reduce annual NO_x allocations, in part, to comply with state BACT requirements. The district established CEQA significance thresholds for RECLAIM facilities, recognizing that CEQA case law directs that the existing environmental setting includes permits and approvals that entitle operators to conduct or continue certain activities. The SCAQMD determined that the baseline should be the RECLAIM initial allocation plus non-tradeables for each RECLAIM facility, and that a project would be considered significant if the proposed project would cause the facility's emissions to exceed the baseline plus the adopted significance threshold. This is consistent with the *Fairview Neighbors* baseline of permitted achieved emissions and RECLAIM rules (Rule 2005(c)(4)) that only considers emission increases that exceed initial allocations to be modifications.

Table 4.1-1
SCAQMD Air Quality Significance Thresholds

Mass Daily Thresholds		
Pollutant	**Construction**	**Operation**
NO_x	100 lb/day	55 lb/day
VOC	75 lb/day	55 lb/day
PM10	150 lb/day	150 lb/day
SO_x	150 lb/day	150 lb/day
CO	550 lb/day	550 lb/day
Lead	3 lb/day	3 lb/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) Hazard Index ≥ 3.0 (facility-wide)	
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	District is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 0.25 ppm (state) 0.053 ppm (federal)	
PM10 24-hour average annual geometric average annual arithmetic mean	10.4 μg/m^3 (recommended for construction) [b] 2.5 μg/m^3 (operation) 1.0 μg/m^3 20 μg/m^3	
Sulfate 24-hour average	1 μg/m^3	
CO 1-hour average 8-hour average	Although not designated attainment, the District meets the definition of attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 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.
KEY: lbs/day = pounds per day; ppm = parts per million; μg/m^3 = microgram per cubic meter; ≥ greater than or equal to

Under the RECLAIM program, the SCAQMD issues facility-wide permits to sources. The facility permits specify an initial allocation and declining annual emission allocations for NO_x and SO_x. The initial allocations were based on historical reported emissions for the years immediately prior to implementation of the RECLAIM program. Annual allocations represent the number of RECLAIM Trading Credits (RTCs) the facilities begin with each year. The allocations generally declined each year from 1994 through 2003. In 2005 the RECLAIM program was amended to require further reductions in a facility's annual allocation commencing in the year 2007 through the year 2011. Operators of RECLAIM sources must not emit more than the total number of RECLAIM credits they possess, which include the annual allocation plus any credits bought and minus any credits sold. In this way, the RECLAIM permit process operates to reduce on an annual basis the overall emissions of NO_x and SO_x in the Basin, while providing flexibility at individual facilities to vary emissions up to the levels of the actual emissions as determined in 1994. Facilities reduce emissions through a variety of ways, including curtailing production, purchasing RTCs and installing pollution control equipment, to remain below annual allocations. Facilities in the program can generate RTCs to sell by reducing facility emissions beyond the annual allocation. Although the allocations for RECLAIM facilities have declined each year since 1994, the maximum annual emissions of NO_x and SO_x permitted from each facility remain at the 1994 limits - so long as that facility acquires additional allocations (“trading credits”) from another RECLAIM facility that has reduced its emissions below its current-year allocation.

Air quality impacts for a RECLAIM facility are considered to be significant if the incremental mass daily emissions for NO_x or SO_x from sources regulated under the RECLAIM permit, when added to the allocation for the year in which the project will commence operations, will be greater than the facility’s 1994 allocation (including non-tradable credits) plus the increase established in the SCAQMD Air Quality Handbook for that pollutant (55 pounds per day [lb/day] for NO_x and 150 lb/day for SO_x). In order to make this calculation, annual allocations as well as the project’s incremental annual emissions are converted to a daily average by dividing by 365. Thus, the proposed project is considered significant if:

$$(A_1/365) + I < (P + A_2)/365$$

Where:

P = the annual emissions increase associated with the proposed project.

A_1 = 1994 initial annual allocation (including non-tradable credits).

A_2 = Annual allocation in the year the proposed project will commence operations.

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

The above analysis provides a way of applying the standard CEQA significance thresholds to the facilities that have CEQA baselines that are determined by the unique permitting program of RECLAIM. The analysis ensures that the CEQA significance criteria are applied properly and fairly, taking into account the unique aspects of the RECLAIM permit program. For localized impacts associated with a physical modification, the RECLAIM regulations require modeling and establish thresholds that cannot be exceeded.

The determination of CEQA significance for RECLAIM facilities applies only to operational emissions of NO_x and/or SO_x that would be included in the RECLAIM allocation and subject to the RECLAIM regulations. The RECLAIM CEQA significance determination does not apply to sources that would not be regulated by the RECLAIM regulations (i.e., indirect sources of emissions such as trucks, rail cars, and marine vessels), construction emission sources, and to non-RECLAIM pollutants (i.e., VOC, CO, and PM10) for which the SCAQMD has established significance thresholds. The level of emissions at which CEQA significance is triggered for RECLAIM pollutants NO_x and SO_x for the refinery ((A_1/365) + I) is calculated in Table 4.1-2.

Table 4.1-2
Determining Significance for RECLAIM Pollutants at the Chevron El Segundo Refinery

Pollutant	A_1 Initial Allocation (lb/yr)[a]	A_1/365 Initial Allocation (lb/day)	I Significance Threshold (lb/day)	A_1/365 + I (lb/day)	2007/2008 Allocation/ 365 (lb/day)	Maximum Allowable Emission Increase
NO_x	5,897,515	16,158	55	16,213	4,136	12,077
SO_x	1,836,164	5,031	150	5,181	1,723	3,458
[a] Includes non-tradable credits						

The use of the RECLAIM CEQA NO_x and SO_x significance criteria to determine the significance of air quality impacts from stationary sources subject to RECLAIM at the refinery is appropriate because the refinery is a RECLAIM facility.

The proposed modifications will be completed between February 2007, when the proposed modifications to the No. 6 H_2S Plant are completed, and March 2008, when the proposed modifications to the Coker are completed. RECLAIM allocations generally apply to 12-month periods. For the refinery, this 12-month period is from July 1 through June 30. Therefore, NO_x and SO_x RECLAIM allocations for the period from July 2007 through June 2008 for the Chevron refinery were used in determining the significance of operational air quality impacts from RECLAIM sources for the proposed project. The 2007/2008 allocations for NO_x and SO_x are 1,509,772 lb/yr (4,136 lb/day) and 628,804 lb/yr (1,723 lb/day), respectively. Therefore, emission increases up to $[(A_1 / 365 + I)_{NOx} - A_{2,NOx} / 365]$ = (16,213 lb/day - 4,136 lb/day) = 12,077 lb/day of NO_x or $[(A_1 / 365 + I)_{SOx} - A_{2,SOx} / 365]$ = (5,181 lb/day - 1,723 lb/day) = 3,458 lb/day of SO_x for the proposed project would be less than significant.

4.1.1 Construction Criteria Pollutant Emissions

Construction emissions can be distinguished as either on-site or off-site. On-site emissions generated during construction will consist of:

- Exhaust emissions (CO, VOC, NO_X, SO_X, and PM10) from off-road construction equipment engines, generated by combustion of diesel fuel or gasoline;

- Combustion emissions (CO, VOC, NO_X, SO_X, and PM10) from a natural-gas fired portable heater that Chevron proposes to operate to heat-treat the proposed replacement Coker Main Fractionator column to relieve stress in the column after assembling it on-site;

- Exhaust emissions (CO, VOC, NO_X, SO_X, and PM10) and entrained road dust PM10 emissions from on-road motor vehicles operating at the site;

- Fugitive dust (PM10) from grading and excavation, generated by soil handling and wind erosion of temporary storage piles;

- VOC from architectural coating (painting), generated when organic solvents in the paints evaporate ; and

- VOC from asphaltic paving, generated when organic compounds in the asphalt evaporate during curing.

Off-site emissions during the construction phase will consist of exhaust emissions and entrained paved road dust from worker commute trips, bus trips to transport workers between the off-site parking facility and the refinery, and material delivery trips.

Emissions from the construction activities were estimated using anticipated construction equipment and manpower requirements along with the following emission estimating techniques:

- California Air Resources Board OFF-ROAD off-road mobile source emission factor model;

- U.S. EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition;

- U.S. EPA Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, 1992;

- California Air Resources Board EMFAC 2002 on-road motor vehicle emission factor model;

- California Air Resources Board Emission Inventory Methodology 7.9, Entrained Paved Road Dust, 1997; and

- URBEMIS 2002 model for estimating emissions from land use development projects, User's Guide (CARB, 2005).

Emissions from the sources listed above were calculated by multiplying a measure of the operating rate of the emission source by an emission factor, which is the emission rate per source operating rate. Chevron's engineering contractors provided estimates of the maximum daily operating rates of the construction emission sources for each project component (No. 4 Crude Unit, Coker and No. 6 H_2S Plant) during each construction month. These operating rates were multiplied by the emission factors to calculate maximum daily emissions from each source during each construction month. As presented in the Project Description in Chapter 2, subsequent to release of the Draft EIR for public review and comment, it was determined that an emission control system for emissions from coke drum venting will also need to be constructed. Chevron's engineering contractor also provided estimates of the maximum daily operating rates of the construction emission sources for construction of the control device, which will occur between December 2007 and March 2008. These data have been included in the calculation of emissions during construction of the proposed Coker modifications in this Final EIR.

The types of emission factors used to calculate emissions from the sources and the construction data provided by Chevron's engineering contractors are listed in Table 4.1-3. Diesel fuel used in construction equipment with diesel engines will contain no more than 15 parts-per-million sulfur, as required by SCAQMD Rule 431.2 – Sulfur Content of Liquid Fuels. The details of the emission calculation methodologies are provided in Appendix B, and the emission calculations are provided in Attachment B.1 to Appendix B. The construction activity would accomplish the installation, replacement and modifications listed in the Project Description (Chapter 2).

Table 4.1-3
Summary of Emission Factors and Construction Data Used to Calculate Construction Emissions

Emission Source	Emission Factor	Construction Data Provided by Chevron's Engineering Contractor (maximum daily by construction month)
Construction Equipment Exhaust[a]	Pounds/hour by equipment type and horsepower from CARB OFF-ROAD model	Construction equipment type, horsepower rating and daily operating hours
Portable Heater	Pounds/hour (CO and NO_x) from source tests and Pounds/Million BTU heat input (other pollutants) from AP-42	Operating hours and maximum heat input
On-site Motor Vehicles		Motor vehicle type, number and miles
Exhaust	Pounds/mile by vehicle type from EMFAC 2002	
Entrained Road Dust	Pounds/mile from ARB Emission Inventory Methodology 7.9	
Grading and Excavation[b]		
Soil Handling	Pounds/ton soil handled from AP-42	Amount handled
Storage Pile Wind Erosion	Pounds/acre-day from EPA fugitive dust background document	Storage pile surface area

Table 4.1-3 (concluded)
Summary of Emission Factors and Construction Data Used to Calculate Construction Emissions

Painting	Pounds VOC/gallon paint from SCAQMD Rule 1113 - Architectural Coating	Gallons used
Emission Source	**Emission Source**	**Emission Source**
Asphaltic Paving	Pounds VOC/acre paved from URBEMIS 2002 User's Guide	Acres paved
Off-site Motor Vehicles Exhaust Entrained Road Dust	 Pounds/mile by vehicle type from EMFAC 2002 (exhaust) Pounds/mile from ARB Emission Inventory Methodology 7.9 (entrained road dust PM10)	Motor vehicle type, number and miles for worker commuting, parking facility buses and material deliveries. Each construction worker was assumed to commute in a separate vehicle.

[a] Diesel fuel will contain no more than 15 parts-per-million sulfur, as required by SCAQMD Rule 431.2 – Sulfur Content of Liquid Fuels
[b] Fugitive PM10 emissions from soil handling and storage pile wind erosion assume that construction activities will comply with SCAQMD Rule 403 - Fugitive Dust, by watering active sites two times per day, which reduces fugitive dust emissions approximately 50 percent.

Maximum daily emissions of each criteria pollutant (CO, VOC, NO_x, SO_x and PM10) from each emission source during each month were totaled to calculate the maximum daily emissions of each pollutant during each month. These daily maximum emission estimates represent a "worst-case" because they incorporate the assumptions that all construction activities will occur continuously throughout each construction shift and that they will all occur at the monthly maximum level on the same day during the month (see Attachment B.1, Appendix B). However, it is unlikely that all construction activities would occur continuously throughout every construction shift or that they would all occur at the monthly maximum level at the same time.

Maximum daily construction emissions during each month of the construction period are listed in Table 4.1-4. Peak daily construction emissions of each criteria pollutant, which are the highest emissions in Table 4.1-4, are summarized in Table 4.1-5 by emission source along with the CEQA significance levels for each pollutant. Peak daily CO, VOC, NO_x SO_x and PM10 construction emissions are anticipated to occur during October 2007, when the Coker turnaround is scheduled to occur. Because construction of the proposed coke drum depressurization control device will occur between December 2007 and March 2008, after the month with the peak daily construction emissions (October 2007), the emissions from its construction do not contribute to the peak daily emissions. Therefore, the peak daily construction emissions are the same in this Final EIR as in the Draft EIR. As shown in the table, the CEQA significance levels are exceeded for all pollutants except SO_x, and mitigation measures are required. Specific mitigation measures to be imposed during the construction phase and the resulting mitigated emissions from construction are provided later in this section.

Table 4.1-4a
Maximum Daily Construction Emissions by Month (Unmitigated) (June '06 - March '07)

Pollutant	Jun 06	Jul 06	Aug 06	Sep 06	Oct 06	Nov 06	Dec 06	Jan 07	Feb 07	Mar 07
CO	42.8	185.6	303.5	334.9	491.9	549.0	499.1	497.7	397.8	652.8
VOC	9.7	32.5	55.9	62.8	96.4	108.3	149.2	151.7	96.3	143.7
NO_x	79.0	246.1	416.5	448.4	675.7	751.2	698.8	670.3	566.4	1,060.8
SO_x	0.2	1.0	1.6	1.8	1.9	2.2	2.0	1.7	1.5	1.8
PM10	9.5	53.6	87.9	89.7	122.8	135.7	128.7	126.1	102.5	166.9

Table 4.1-4b
Maximum Daily Construction Emissions by Month (Unmitigated) (April '07 - March '08)

Pollutant	Apr 07	May 07	Jun 07	Jul 07	Aug 07	Sep 07	Oct 07	Nov 07	Dec 07	Jan 08	Feb 08	Mar 08
CO	778.4	629.2	363.9	260.1	122.0	671.4	**927.8**	629.1	109.2	77.8	60.6	38.2
VOC	187.6	173.5	72.3	89.5	32.0	217.8	**273.2**	163.8	21.9	18.8	19.9	15.2
NO_x	1,259.3	1,086.1	474.3	323.0	192.3	1,361.7	**1,526.8**	1,180.7	173.1	139.6	92.3	54.5
SO_x	2.0	1.7	1.3	1.0	0.3	1.9	**2.4**	1.7	0.6	0.4	0.2	0.1
PM10	173.0	157.0	72.9	45.7	28.8	161.9	**185.3**	153.0	28.7	18.7	11.4	8.9
Note: Peak emissions are listed in **bold**.												

Table 4.1-5
Peak Daily Construction Emissions Summary (Unmitigated)

Source	CO (lb/day)	VOC (lb/day)	NO_x (lb/day)	SO_x (lb/day)	PM10 (lb/day)
On-Site Diesel Construction Equipment	511.4	140.2	1,384.3	1.3	75.4
On-Site Gasoline Construction Equipment	11.2	0.3	22.3	0.0	1.7
On-Site Motor Vehicle Exhaust	57.3	6.4	20.1	0.2	0.6
On-Site Motor Vehicle Entrained PM10	--	--	--	--	78.0
On-Site Excavation Fugitive PM10[a]	--	--	--	--	0.0
On-Site Architectural Coating	--	87.8	--	--	--
On-Site Asphaltic Paving[b]	--	0.0	--	--	--
On-Site Portable Heater[c]	0.0	0.0	0.0	0.0	0.0
Total On-Site	**579.8**	**234.7**	**1,426.7**	**1.5**	**155.6**
Off-Site Motor Vehicle Exhaust	348.0	38.5	100.1	0.9	3.1
Off-Site Motor Vehicle Entrained PM10	--	--	--	--	26.5
Total Off-site	**348.0**	**38.5**	**100.1**	**0.9**	**29.6**
Total	**927.8**	**273.2**	**1,526.8**	**2.4**	**185.3**
CEQA Significance Level	*550*	*75*	*100*	*150*	*150*
Significant? (Yes/No)	**Yes**	**Yes**	**Yes**	No	**Yes**
Peak Month	Oct-07	Oct-07	Oct-07	Oct-07	Oct-07

[a] Excavation will not occur during the months when the peak daily PM10 emissions occur.
[b] Asphaltic paving will not occur during the months when the peak daily VOC emissions occur.
[c] The portable heater will not be operated during the months when the peak daily emissions occur.

4.1.2 Localized Construction Air Quality Impacts

The SCAQMD (2003b) staff has developed a localized significance threshold (LST) methodology and mass rate look-up tables by source receptor area (SRA) that can be used to determine whether or not a project may generate significant adverse localized air quality impacts. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard, and are developed based on the ambient concentrations of that pollutant for each source receptor area.

LSTs are derived using one of three methodologies depending upon the attainment status of the pollutant. For attainment pollutants, NO_2 and CO_2, the mass rate LSTs are derived using an air quality dispersion model to back-calculate the emissions per day that would cause or contribute to a violation of any AAQS for a particular SRA. The most stringent standard for NO_2 is the 1-hour state standard of 25 parts per hundred million (pphm); and for CO it is the 1-hour and 8-hour state standards of nine parts per million (ppm) and 20 ppm, respectively.

LSTs were developed based upon the size or total area of the emissions source, the ambient air quality in each source receptor area (SRA) in which the emission source is located, and the distance to the sensitive receptor. LSTs for NO_2 and CO are derived by adding the incremental emission impacts from the project activity to the peak background NO_2 and CO concentrations and comparing the total concentration to the most stringent ambient air quality standards. Background criteria pollutant concentrations are represented by the highest measured pollutant concentration in the last three years at the air quality monitoring station nearest to the proposed project site.

Construction PM10 LSTs are developed using a dispersion model to back-calculate the emissions necessary to exceed a concentration equivalent to 50 micrograms per cubic meter (µg/m3) averaged over five hours, which is the control requirement in Rule 403. The equivalent concentration for developing PM10 LSTs is 10.4 $\mu g/m^3$, which is a 24-hour average.

Peak daily construction emissions were compared with the LSTs to evaluate the potential for emissions during construction of the proposed project to cause significant localized CO, NO_2 or PM10 impacts. Because the No. 4 Crude Unit is close to the No. 6 H_2S Plant (see Figure 2-3 for the locations of the proposed modifications), emissions from construction of the proposed modifications to these two units were combined for a more conservative analysis of the localized impacts. Because the Coker is approximately 500 meters from the No. 6 H_2S Plant and the No. 4 Crude Unit, the localized impact was analyzed separately.

Maximum daily emissions and the LSTs are summarized in Table 4.1-6. Table 4.1-6 shows that the CO and PM10 LSTs are not exceeded, but the maximum daily NO_x LSTs are exceeded. Therefore, emissions during construction of the proposed project are not expected to cause significant localized impacts to CO or PM10 air quality, but they may cause significant impacts to localized NO_2 air quality.

Table 4.1-6
Summary of Localized Construction Air Quality Impacts Analysis
(Unmitigated)

	CO	**NO_x**	**PM10**
No. 4 Crude Unit and No. 6 H_2S Plant Modifications			
Maximum Daily On-Site Emissions (lb/day)[a]	320	721	80
Localized Significance Threshold (lb/day)	1,400	234	102
Threshold Exceeded?	No	**Yes**	No
Coker Modifications			
Maximum Daily On-Site Emissions (lb/day)[a]	580	1,427	156
Localized Significance Threshold (lb/day)	6,370	377	221
Threshold Exceeded?	No	**Yes**	No

[a] From Table B.1-46 of Appendix B, Attachment B.1. Maximum daily on-site emissions occur during April 2007 for the No. 4 Crude Unit and No. 6 H_2S Plant and October 2007 for the Coker.

4.1.3 Operational Criteria Pollutant Emissions

After construction of the proposed project is completed, changes in direct operational emissions of criteria pollutants will be caused by the modifications to refinery equipment. Additionally, changes in indirect operational criteria pollutant emissions will be caused by increased truck trips to export petroleum coke and sulfur from the refinery and by increased marine tanker deliveries of crude oil to the Chevron El Segundo Marine Terminal. The details of the operational criteria pollutant emission calculation methodologies are provided in Appendix B, and the emission calculations are provided in Attachment B.2 to Appendix B.

4.1.3.1 Direct Operational Criteria Pollutant Emissions

Potential changes in direct operational criteria pollutant emissions include changes in fugitive VOC emissions resulting from changes in the number and types of components, such as valves, pumps and flanges, in refinery equipment process streams; changes in emissions from the Coker feed heaters resulting from an increase in the fuel combustion rate by the heaters; changes in emissions from the coke drums resulting from the increased petroleum coke production, an increase in PM10 emissions from Cooling Tower No. 9 caused by an increase in the circulating water flow rate; and an increase in SO_2 emissions from the refinery Sulfur Recovery Units resulting from an increase in the amount of sulfur removed from the crude oil processed by the refinery.

<u>Fugitive VOC Emissions from Process Stream Components</u>

Most elements of the proposed project, such as the proposed modified and replacement heat exchangers in the No. 4 Crude Unit and the Coker, the proposed replacement Depropanizer and Coker Main Fractionator columns, and the proposed new DEA Regenerator, Emergency Caustic Scrubber and Jet Wash columns in the No. 6 H_2S Plant, function as sealed systems. However, leaks through pump seals and through fittings, such as valves and flanges, in process streams containing organic compounds that enter and leave sealed systems generate fugitive VOC emissions. Fugitive emission rates depend on the type of component and on the type of stream. For example, the fugitive emission rate for a flange in a light-liquid process stream with a relatively high vapor pressure is higher than the emission rate for a flange in a heavy-liquid process stream with a relatively low vapor pressure.

The proposed modifications to the No. 4 Crude Unit and the Coker will include removal of some existing components and the addition of new components. The decreases in fugitive VOC emissions that will result from the removal of existing components and the increases that will result from the installation of new components were both calculated. The net change in fugitive VOC emissions from the No. 4 Crude Unit and the Coker was calculated by subtracting the decreases from the increases. The proposed modifications to the No. 6 H_2S plant include the addition of new components but not the removal of existing components. Therefore, the net change in fugitive VOC emissions from the No. 6 H_2S Plant is equal to the emissions from the proposed new components. Subsequent to release of the Draft EIR for public review, Chevron determined that the net change in fugitive VOC emissions resulting from the proposed replacement of the Depropanizer were not included in the calculations of fugitive VOC emissions in the Draft EIR. The decreases in fugitive VOC emissions that will result from the removal of existing components and the increases that will result from the installation of new components for the proposed replacement of the Depropanizer have been calculated, and the net change in fugitive emissions is included in this Final EIR.

The net change in peak daily fugitive VOC emissions from the No. 4 Crude Unit, the Coker and the No. 6 H_2S Plant were calculated to be increases of 0.9 lb/day, 10.9 lb/day and 4.4 lb/day, respectively. The net change in peak daily fugitive VOC emissions from the Depropanizer was calculated to be a decrease of -5.3 lb/day. Operational criteria pollutant emissions are summarized in Table 4.1-7.

<u>Emissions from Coker Feed Heaters</u>

Chevron is not proposing modifications to the three Coker feed heater furnaces (F-501 A, B and C) or changes to the permit conditions for the furnaces. Although the increase in vacuum residuum feed rate to the Coker will lead to an increase in the annual average firing rate (quantity of fuel burned per year) of the furnaces, the peak daily firing rates (maximum quantity of fuel burned per day) for the three furnaces are not anticipated to increase beyond the maximum allowable daily firing rates achieved in the past (baseline). The maximum allowable that was achieved by the three furnaces during the two years before publication of the IS was 11.8 million standard cubic feet per day (MMscf/day), and the anticipated firing rate from the proposed project is 10.2 MMscf/day. Because emissions from the furnaces are proportional to the amount of fuel burned in the furnaces, the anticipated peak daily emissions from the furnaces will not increase beyond the current peak levels that are allowed within the current permit conditions and that have occurred in the past.

<u>Emissions from Coke Drums</u>

The Coker coke drums are vented to the atmosphere when they are depressurized. Currently, the refinery depressurizes a maximum of three coke drums every 15 hours, which corresponds to 4.8 depressurization operations in a 24-hour period (3 operations / 15 hours x 24 hours). Proposed modifications to the coke drums will decrease the coke drum cycle time to 12 hours, which will increase the maximum number of depressurization operations during a 24-hour period to six (3 operations / 12 hours x 24 hours). Thus, the proposed project will increase the maximum number of daily depressurization cycles by 1.2 (6 cycles / 24 hours – 4.8 cycles / 24 hours).

The SCAQMD measured emissions during a coke drum depressurization operation in January 2003 (SCAQMD, 2004). SCAQMD Method 5.1 was used to measure PM10 emissions. A footnote to Table 2 in the source test report indicated that the condensable "organic portion of the SCAQMD Method 5.1 sample meets both the SCAQMD Rule 102 definitions for PM and VOC." Because the condensable organic portion met the definition for VOC, the analysis of emissions during coke drum depressurization in the Draft EIR included these emissions in the calculation of VOC emissions, rather than in the calculation of PM10 emissions. During the permitting process for the proposed modifications to the coke drums, subsequent to release of the Draft EIR, the SCAQMD concluded that the condensable portion of the SCAQMD Method 5.1 sample should be included in the calculation of PM10 emissions. The calculation of the increase in PM10 emissions from the increase in daily coke drum depressurization operations in the Draft EIR has been modified in this Final EIR to reflect this change. This modification does not change the conclusion in the Draft EIR that operation of the proposed project will not cause significant adverse air quality impacts.

Adding the 12.5 pounds per event of condensable emissions from the SCAQMD Method 5.1 sample to the 1.25 pounds per event of solid PM10 emissions from the Method 5.1 sample gives a total of 13.75 pounds per event of PM10 emissions. Thus, the peak daily increase in uncontrolled PM10 emissions associated with the increase of 1.2 coke drum depressurization operations per day during operation of the proposed project is 16.5 pounds per day (13.75 pounds per depressurization x 1.2 depressurizations per day).

Additionally, the analysis of VOC emissions from coke drum depressurization has been modified in this Final EIR from the Draft EIR, because the condensable organic portion of the Method 5.1 source test sample is no longer considered to contribute to VOC emissions. The VOC emissions during a coke drum depressurization operation were reduced from 23.66 pounds per depressurization, as provided in the Draft EIR, to 11.16 pounds per depressurization, as listed in Table 2 of the January 2003 source test report for gaseous VOC. The increase in peak daily uncontrolled VOC emissions from the increase in coke drum depressurization operations decreased from 28.4 pounds per day, as listed in Table 4.1-7 of the Draft EIR, to 13.4 pounds per day (11.16 pounds per depressurization x 1.2 depressurizations per day).

The installation of a control device for emissions during coke drum depressurization to comply with the requirement to apply BACT will reduce total coke drum emissions. However, source tests to measure emissions after the control device is installed are needed to determine the reduction in emissions. Therefore, the analysis is based on uncontrolled emissions, daily represents a "worst-case," analysis because actual emission increases in daily coke drum depressurization operations will be less.

Operational criteria pollutant emissions are summarized in Table 4.1-7.

PM10 Emissions from Cooling Tower No. 9

A portion of the circulating water in cooling towers is released to the atmosphere as droplets, which is called cooling tower drift. These droplets contain solid materials, such as minerals, that are dissolved in the circulating water. Solid particles remain in the atmosphere when the droplets evaporate. Chevron proposes to increase the Cooling Tower No. 9 circulating water rate by 13,500 gallons per minute (gpm), from 14,000 gpm to 27,500 gpm. The proposed increase in the circulating water flow rate in Cooling Tower No. 9 will cause an increase in drift from the cooling tower, which will generate an increase in PM10 emissions. It should be noted that SCAQMD Rule 219 - Equipment Not Requiring a Written Permit Pursuant to Regulation II, exempts water cooling towers not used for evaporative cooling of process water from requiring a written permit. Therefore, a permit is not required for Cooling Tower No. 9, and the anticipated increase in the circulating water flow rate and PM10 emissions could occur regardless of approval of the proposed project.

The fraction of the circulating water that is released to the atmosphere as droplets is called the drift fraction. The increase in cooling tower PM10 emissions from Cooling Tower No. 9 was calculated by first multiplying the increase in circulating water flow rate, in pounds per day, by the drift fraction to determine the mass of water, in pounds per day, released to the atmosphere as droplets. The daily mass of water released to the atmosphere was then multiplied by the weight fraction of dissolved solid materials in the circulating water to calculate the increase in peak daily PM10 emissions, in pounds per day. This calculation incorporated the assumption that all of the solid particles remaining after evaporation of the cooling tower drift are smaller than 10 microns in diameter. Since some of the solid particles may be larger than 10 microns in diameter, this assumption resulted in a conservatively high estimate of the increase in PM10 emissions.

The drift fraction depends on the cooling tower design. Chevron plans to modify the upper section of the cooling tower, which will reduce the drift fraction. However, the reduction in the drift fraction that will occur has not been quantified, so it has been conservatively assumed that the drift fraction will not change from the current rate. Chevron will operate Cooling Tower No. 9 to maintain the concentration of dissolved materials in the circulating water at existing levels.

The increase in peak daily PM10 emissions from Cooling Tower No. 9 were calculated to be 126.4 lb/day. Operational criteria pollutant emissions are summarized in Table 4.1-7.

SO_2 Emissions from Refinery Sulfur Recovery Units

Most of the sulfur contained in crude oil entering the refinery is removed at various places in the refining process to control the sulfur content of the motor fuels and other products produced by the refinery. Ultimately, more than 99.9 percent of the sulfur that enters the Sulfur Recovery Units is converted to elemental sulfur and exported for sale. Because the refinery Sulfur Recovery

Units do not remove all of the sulfur that enters them, a portion of the sulfur is converted to SO_2 and emitted.

Chevron has developed a detailed mathematical model of the refinery that is used to predict the yields of various products and intermediate streams from the properties of the crude oil and the capabilities of the various process plants in the refinery. This model also predicts the amount of sulfur that will be produced from a given quantity of a particular crude oil. Using this model, Chevron has estimated that the proposed project will increase average sulfur production by approximately 19 tons per day, based on the quantities of the various crude oils that are anticipated to be processed. While the actual sulfur production will vary, depending upon the type of crude oils processed, the projected increase of 19 tons per day represents a realistic estimate of the average increase in sulfur production due to the proposed project.

Chevron is not proposing modifications to the Sulfur Recovery Units or changes to their permit conditions that will increase capacity. Although the proposed project will increase the annual quantity of sulfur produced by the Sulfur Recovery Units, the peak daily sulfur production by the Sulfur Recovery Units is not anticipated to increase beyond the maximum allowable daily sulfur production achieved in the past (baseline), because the Sulfur Recovery Units have operated at their maximum daily capacity on several occasions during the past two years. Because emissions from the Sulfur Recovery Units are proportional to the amount of sulfur produced, the anticipated peak daily emissions from the Sulfur Recovery Units will not increase beyond the current peak levels that are allowed within the current permit conditions and that have occurred in the past.

4.1.3.2 Indirect Operational Criteria Pollutant Emissions

Potential changes in indirect operational criteria pollutant emissions include emissions from additional daily truck trips to export petroleum coke and sulfur from the refinery and emissions from additional marine tankers delivering crude oil to the El Segundo Marine Terminal (ESMT). Operation of the proposed project will not require additional refinery employees. Therefore, there will not be additional operational indirect emissions from an increase in employee commuting trips.

<u>Petroleum Coke and Sulfur Export Truck Criteria Pollutant Emissions</u>

As presented in Section 2.6.2.2, the proposed increase in petroleum coke production resulting from the increased Coker throughput will require a maximum of 20 additional truck trips per day to export the petroleum coke from the refinery. Exhaust emissions and fugitive PM10 emissions from entrained road dust from these additional truck trips were calculated using the same methodologies that were used to calculate emissions from off-site motor vehicles during the construction phase for the proposed project (see Table 4.1-3). Exhaust emission factors for calendar year 2006 were originally used to calculate emissions from the additional petroleum coke export truck trips in the Draft EIR. However, operation of the proposed project, including the additional export truck trips, will begin in 2008. Therefore, the calculations in the Draft EIR have been revised in this Final EIR to use exhaust emission factors for calendar year 2008 to calculate the increase in emissions from the additional petroleum coke export truck trips.

Subsequent to release of the Draft EIR, Chevron modified the project description to include as part of its contractual agreement with the coke purchasers one of the following options: the new trips will be made by trucks that meet the year 2007 heavy heavy-duty on-road diesel engine standards, or are retrofitted with particulate traps and lean NO_x catalysts, or use emulsified diesel fuel. Alternatively, Chevron may apply for Carl Moyer funding to reduce NO_x and particulate emissions. The emission reductions anticipated from this change in the project description have not been quantified, because the specific option has not yet been chosen.

The majority of the petroleum coke exported from the refinery currently goes to the Port of Los Angeles. However, the Los Angeles Terminal may close in the future, and all of the petroleum coke from the refinery export would then be exported to the Port of Long Beach Terminal. The one-way travel distance to either location from the refinery is approximately 20 miles.

Although the proposed project will increase average daily sulfur production by 19 tons per day, the daily quantity of sulfur exported from the refinery is determined by market demand for the sulfur, rather than by daily production. The proposed project is not expected to alter market demand for elemental sulfur on a daily basis. Therefore, the proposed project is not anticipated to change the maximum daily number of trips to export sulfur from the refinery.

The increases in peak daily CO, VOC, NO_x, SO_x and PM10 emissions from the petroleum coke export trucks were calculated to be 4.1 lb/day, 0.9 lb/day, 26.0 lb/day, 0.0 lb/day and 1.3 lb/day, respectively. Operational criteria pollutant emissions are summarized in Table 4.1-7.

<u>Crude Oil Marine Tanker Emissions</u>

As described in the Project Description in Section 2.6.4, the proposed project is anticipated to change the sources of crude oil imported through the ESMT. Chevron anticipates that the heavy crude oil that will be imported through the ESMT in the future will replace Arab Crudes, which are transported in Very Large Crude Carriers (VLCCs) with capacities in excess of one million barrels. The use of VLCCs is more cost-effective than the use of smaller marine tankers when the transport distance is long. The heavy crude oils that are anticipated to replace the Arab Crudes are generally produced in locations closer to the ESMT, such as South America. The use of

VLCCs to transport crude oil is not as cost-effective as the use of smaller marine tankers, with capacities of 350,000 to 700,000 barrels, when the transport distances are shorter. Therefore, Chevron anticipates that importing more heavy crude oil may increase the number of smaller marine tankers calling at the ESMT and decrease the number of larger marine tankers. For the purpose of this analysis, the worst-case net increase in marine tankers calling at the ESMT is up to nine additional ship calls per year by smaller marine tankers as a result of the proposed project.

As discussed in Section 2.6.4 of the Project Description, subsequent to release of the Draft EIR, Chevron provided more detailed information on the overall effects of the proposed project, which allows a more refined analysis of the information contained in the Draft EIR regarding marine vessel emissions. The Draft EIR was based on a worst-case analysis which analyzed only increases in ship calls associated with the increase in imports of heavy crude oil. In fact, the additional ship calls associated with the increase in imports of heavy crude oil will be offset to some extent by a reduction in ship calls associated with the import and export of other materials. In addition to increasing marine crude oil tanker calls at the ESMT, operation of the proposed project will also reduce the quantities of some products that are imported into and exported from the ESMT as explained in the following paragraphs.

The analysis in the Draft EIR assumed that the crude oil marine tankers would have capacities between 350,000 and 500,000 barrels and that 15 additional annual heavy crude oil deliveries would occur during operation of the proposed project. Chevron currently anticipates that the capacities of the crude oil marine tankers will be approximately 700,000 barrels, and that nine additional crude oil marine tanker deliveries will occur during operation of the proposed project.

Additionally, as described in the Project Description in Section 2.6.4, the proposed increase in Coker capacity is also anticipated to lead to an annual decrease of nine ship calls and 13 barge calls to export high-sulfur fuel oil and Bunker Fuel, an annual decrease of seven ship calls to import vacuum gas oil, and an annual increase of seven ship calls to export light gas oil.

Changes in annual emissions anticipated to be generated within California Coastal Waters (as defined in the California Code of Regulations (CCR), Title 17, Section 70500(b)(1)) by these changes in marine tanker trips were calculated. Marine vessel emission rates (pounds per hour) depend on the type of propulsion system (primarily motorships, with diesel engines, and steamships with diesel-fueled boilers), engine size (i.e., power rating) and engine load (i.e., engine power output as a percent of rated power). Engine size varies with the size of the vessel, and engine load varies with ship speed. Thus, marine vessel emissions while in transit to and from the ESMT during a ship call depend on the tanker size and on the amount of time spent during operations at different speeds.

Marine vessel sizes are expressed in terms of deadweight tons (DWT), which is approximately the same as the vessel cargo capacity. The anticipated crude oil capacity of the additional crude oil import marine tankers and the capacity of the tankers that currently import vacuum gas oil is 700,000 barrels (see Section 2.6.4). The capacity in DWT for a 700,000 barrel tanker is approximately 107,310 DWT. The capacities of the tankers that currently export HSFO and Bunker Fuel from the refinery and that are anticipated to export light gas oil from the refinery during operation of the proposed project are approximately 150,000 barrels, or approximately 23,000 DWT.

The times spent by the additional crude oil tankers while in transit to and from the ESMT were calculated from vessel speeds and distances. The route followed by the tankers from the boundary of California Coastal Waters to the ESMT is shown in Figure 4.1-1. For the purpose of this analysis, the additional marine tanker trips were assumed to originate to the south of California and to enter California Coastal Waters offshore from the California-Mexico border. The tankers enter the California Coastal Waters at cruise speed. They maintain cruise speed until they slow to 12 knots (kts) when they enter an Air Quality Compliance Zone that extends in an arc 40 nautical miles (nm) from Point Fermin Light. (Since the release of the Draft EIR, Chevron has modified the proposed project to require reducing the marine vessel speed to 12 kts an additional 20 nm from Point Fermin Light for a total of 40 nm from Point Fermin Light.) They maintain the 12 kts speed until they reach the Pilot Boarding Area, approximately 3 nm from the ESMT. They then maneuver at a speed of 3 kts or less, usually with tug boat assistance, from the Pilot Boarding Area to the berth at the ESMT. They reverse this routing when leaving the ESMT. For the purpose of the revised analysis in this Final EIR it was assumed that the other types of import and export marine tankers affected by the proposed project will spend approximately the same amount of time at these various speeds as the crude oil marine tankers.

Barges that currently export HSFO and Bunker Fuel from the ESMT were assumed to travel at 3 kts for 3 nm between the ESMT and the Pilot Boarding Area, at 12 kts for 30 nm from the Pilot Boarding Area to the Precautionary Area outside the Port of Los Angeles, and at 3 kts for 4 nm to berth in the Port of Los Angeles.

While moored at the ESMT, motorships operate auxiliary engines and boilers to provide power for lights, ventilation, etc., and steam for hot water and to keep fuel from solidifying. Motorship tankers also use auxiliary engines to power cargo offloading pumps. Steamships use their main boilers while moored at the ESMT, rather than auxiliary engines. These activities that occur while moored are called “hoteling.” Total emissions from hoteling activities during a ship call depend on the total amount of time that the tanker is moored at the ESMT. Vessels remain at the ESMT for 12 to 60 hours, with an average of 30 hours. Therefore, the 15 additional crude tankers were assumed to hotel at the ESMT an average of 30 hours each.

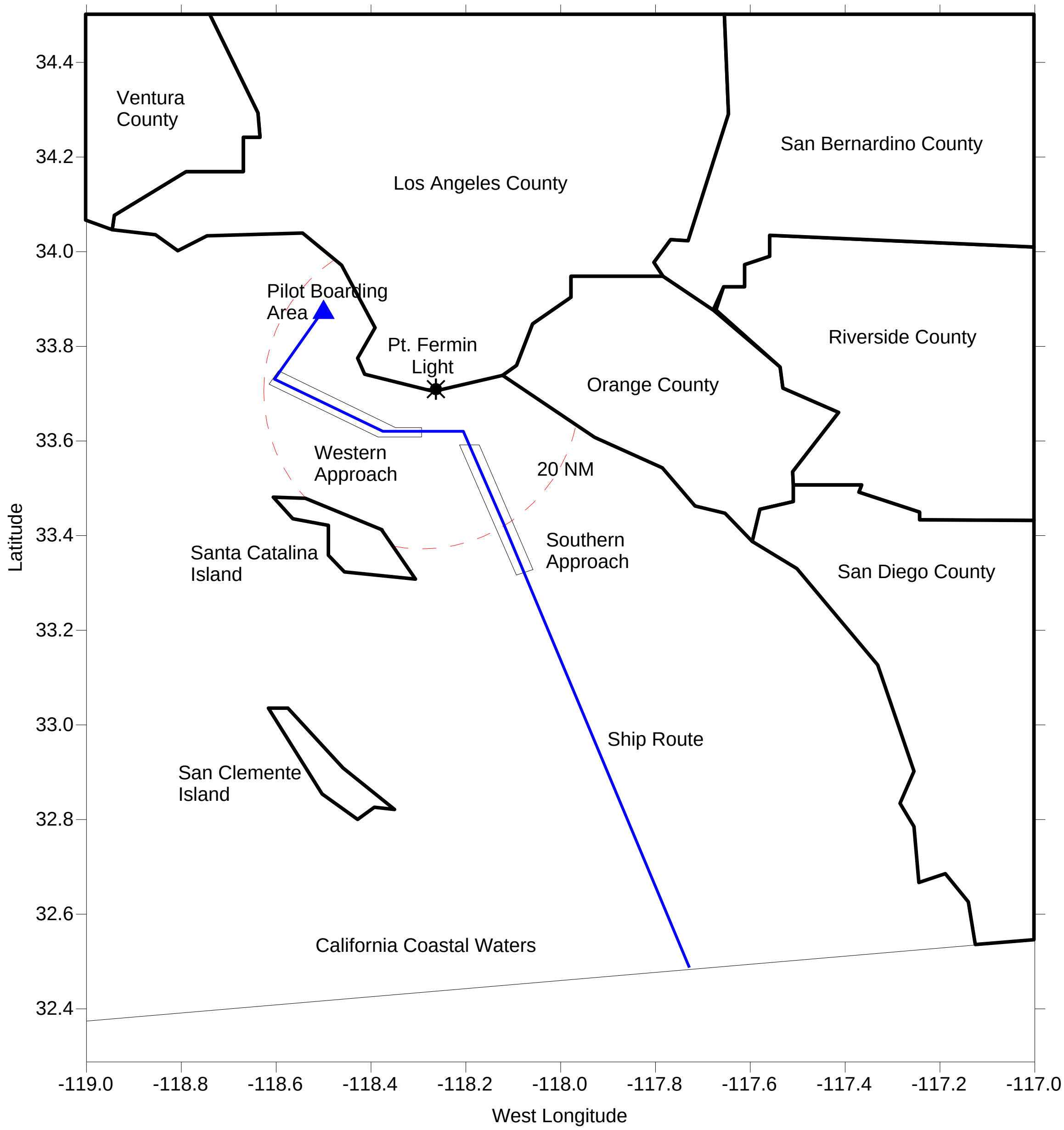


Figure 4.1-1 Crude Oil Tanker Route from Southern Border of California Coastal Waters to the ESMT

Ship lightering associated with crude oil delivered to the ESMT occurs when crude oil is offloaded from VLCCs, which are too large to dock at the ESMT, to smaller vessels that subsequently deliver it to the ESMT. The smaller tankers that are anticipated to deliver heavy crude oil during operation of the proposed project can moor at the ESMT, and, therefore, lightering of their crude oil cargoes will not be required. As a result, the proposed project will not increase ship lightering operations. Light crude oil will continue to be imported by VLCCs during operation of the proposed project, and lightering of the cargoes carried by the VLCCs will continue. Although the import of light crude oil by VLCCs is anticipated to decrease during operation of the proposed project as compared to current conditions, the decrease cannot be quantified, and the potential decrease in lightering activities cannot be estimated.

Marine tanker emissions during a ship call were calculated for motorships. (Subsequent to release of the Draft EIR, Chevron determined that all of the ships that will be affected by the proposed project are motorships.).

Tug boat emissions during each ship call were also estimated by assuming that two tugboats would assist each crude oil marine tanker while maneuvering to and from the ESMT.

The net changes in total annual emissions, including both marine tanker and tugboat emissions, during operation of the proposed project are shown in Table 25-A of Attachment B.2 to Appendix B and were calculated to be -2,055 pounds per year (lb/yr) of CO, 27 lb/yr of VOC, 1,955 lb/yr of NO_x, 1,162 lb/yr of SO_x, and -157 lb/yr of PM10.

Although the proposed project may increase the annual number of ship calls and associated emissions from marine tankers calling at the ESMT, peak daily emissions will not increase for the following reasons:

1. The ESMT has two berths and can only accommodate two marine tankers at one time;

2. Offloading crude oil from each of the smaller marine tankers that are anticipated to call at the ESMT to deliver heavy crude oil after implementation of the proposed project will require more than 24 hours. Thus, no more than two of these smaller marine tankers can call at the ESMT during a 24 hour period, and

3. Both berths have been occupied at the same time in the past by vessels that are larger and that generate more emissions per ship call than these marine tankers. Therefore, neither the maximum daily number of ship calls at the ESMT nor the maximum daily emissions will increase.

4.1.3.3 Operational Criteria Pollutant Emissions Summary

Peak daily operational criteria pollutant emissions are summarized in Table 4.1-7. Table 4.1-7 shows that the net increases in operational emissions are below the SCAQMD's significance thresholds. Additionally, Chevron will obtain offsets for the direct VOC emission increases and the PM10 emission increase from coke drum depressurization operations, as required by SCAQMD Rule 1303(b)(2)(A). Because VOC is a precursor to O_3, which is a regional pollutant, the VOC offsets will reduce the proposed project's net contribution to VOC emissions to the 0.9 pounds per day emitted by the additional petroleum coke export truck trips.

4.1.4 Operational Toxic Air Contaminant Emissions

Changes in direct operational TAC emissions include changes in fugitive TAC emissions resulting from changes in the number and types of components in refinery equipment process streams that contain TACs and an increase in TAC emissions from Cooling Tower No. 9 caused by an increase in the circulating water flow rate. Changes in indirect TAC emissions include diesel exhaust particulate matter (DPM), which has been classified as a carcinogenic TAC by the California Air Resources Board, generated by the additional annual truck trips to export petroleum coke and sulfur and the additional annual crude oil marine tanker deliveries of crude oil. Although peak daily emissions from sulfur export truck trips and from crude oil marine tankers will not increase, health risks from DPM are caused by long-term exposures. Therefore, annual DPM emissions from the increased sulfur export truck trips and crude oil marine tanker calls were calculated. The details of the operational TAC emission calculation methodologies are provided in Appendix B, and the emission calculations are provided in Attachment B.2 to Appendix B.

4.1.4.1 Direct Operational Toxic Air Contaminant Emissions

<u>TAC Emissions from Process Components</u>

Changes in TAC emissions resulting from changes in the number and types of components in process streams composed of organic compounds were calculated by multiplying the net change in fugitive VOC emissions from process components by the weight fraction of the TACs in the VOC emissions. Concentrations of TACs in fugitive VOC emissions from the No. 4 Crude Unit and the Coker from the 1999 AB2588 health risk assessment from the refinery (Radian, 2000) were used to calculate changes in TAC emissions from the proposed modifications to those units. TACs in the proposed new processes streams at the No. 6 H_2S Plant include H_2S, ammonia (NH_3) and DEA. Chevron determined concentrations of these TACs in the proposed new processes streams from the design parameters of the proposed new equipment.

Table 4.1-7
Peak Daily Project Operational Criteria Pollutant Emissions Summary

Source	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	PM10 (lb/day)
Direct Emissions					
No. 4 Crude Unit Fugitive VOC	--	0.9	--	--	--

Coker Fugitive VOC	--	10.9	--	--	--
Depropanizer Fugitive VOC	--	-5.3	--	--	--
No. 6 H_2S Plant Fugitive VOC		4.4			
Coke Drum Depressurization	--	13.4			16.5
Cooling Tower No. 9 PM10	--	--	--	--	126.4
Total Direct Emissions	**0.0 NR**	**24.3 NR**	**0.0 R**	**0.0 R**	**142.9 NR**
Total Subject to RECLAIM			**0.0**	**0.0**	
Indirect Emissions					
Petroleum Coke Export Trucks	4.1	0.9	26.0	0.30.0	1.3
Total Indirect Emissions	**4.1 NR**	**0.9 NR**	**26.0 NR**	**0.0 NR**	**1.3 NR**
Significance Determination					
Non-RECLAIM Pollutants					
Total Not Subject to RECLAIM	**4.14**	**25.2**	**26.0**	**0.0**	**144.2**
CEQA Significance Level	*550*	*55*	*55*	*150*	*150*
Significant? (Yes/No)	No	No	No	No	No
RECLAIM Pollutants					
Total Subject to RECLAIM			**0.0**	**0.0**	
Maximum Allowable Increase[a]			*12,077*	*3,458*	
Significant? (Yes/No)			No	No	
Note: Totals may not match sums of individual values due to rounding NR = Non-RECLAIM pollutant; R = RECLAIM Pollutant [a] From Table 4.1-2					

The proposed modifications to the No. 6 H_2S Plant include new components in acid gas and sour water process streams. Acid gas contains H_2S and sour water contains H_2S and ammonia (NH_3), which are TACs, but they only contain negligible concentrations of organic compounds. Fugitive H_2S and NH_3 emissions from the proposed new components in acid gas and sour water service were calculated by multiplying the component leak rates by the H_2S and NH_3 concentrations in the process streams. For components in acid gas service, the leak rates were assumed to be equal to the fugitive VOC emission factors for components in hydrocarbon gas or vapor service. Leak rates for components in sour water service were assumed to be equal to the fugitive VOC emission factors for components in light-liquid service.

Fugitive TAC emissions are listed Table 4.1-8.

TAC Emissions from Cooling Tower No. 9

Some of the metals dissolved in the Cooling Tower No. 9 circulating water are TACs and will be contained in the PM10 emitted by the cooling tower. The change in emissions of these TACs resulting from the proposed increase in circulating water flow rate was calculated by multiplying the increase in PM10 emissions from the cooling tower by the mass fraction of TAC metals in the dissolved in the cooling tower circulating water. The results of an August 25, 2005, analysis of the chemical composition of the cooling tower circulating water were used to calculate the weight fractions of TACs in the total dissolved solids.

Additionally, chloroform will be formed from the chlorine that Chevron adds to the cooling tower circulating water, in the form of sodium hypochlorite, as a biocide. Chevron will increase the amount of sodium hypochlorite used to treat the proposed increase in cooling water circulating flow rate. The increase in chloroform emissions was calculated by multiplying the additional amount of sodium hypochlorite to be used by a chloroform emission factor developed by Rogozen et al. (1988) in a study of chloroform emissions and concentrations in the South Coast Air Basin conducted for the California Air Resources Board. The TAC emissions from Cooling Tower No. 9 can be found in Table 4.1-8.

4.1.4.2 Indirect Operational Toxic Air Contaminant Emissions

All PM10 emissions from diesel combustion are assumed to be toxic DPM emissions. Therefore, the increase in annual DPM emissions from the additional petroleum coke and sulfur export truck trips and the additional crude oil marine tanker calls at the ESMT were assumed to be equal to the exhaust PM10 emissions.

The calculation of peak daily exhaust PM10 emissions from petroleum coke export truck trips was described previously in 4.1.2.2. The peak daily emissions were multiplied by 365 days per year to calculate annual emissions, which are listed in Table 4.1-7. The calculation of annual exhaust PM10 emissions from the additional crude oil marine tanker calls was also described in Section 4.1.2.2, and these emissions are also listed in Table 4.1-9.

The proposed project is anticipated to increase average daily sulfur production by 19 tons per day, which corresponds to an increase of 6,935 tons per year. The capacity of a sulfur export truck is approximately 26 tons. Therefore, the proposed project will lead to an additional 267 trips per year to export sulfur from the refinery. Sulfur exported from the refinery is currently sold to chemical manufacturing facilities located in the vicinity of the Port of Los Angeles, and the one-way travel distance for sulfur-export truck trips is approximately the same as the distance for petroleum coke export truck trips (20 miles). Exhaust emissions from these additional truck trips were calculated using the same methodologies that were used to calculate emissions from petroleum coke export trucks and from off-site motor vehicles during the construction phase for the proposed project (see Table 4.1-3) and are listed in Table 4.1-9.

4.1.4.3 Operational Toxic Air Contaminant Emissions Summary

Increases in direct operational TAC emissions generated by the proposed project are summarized in Table 4.1-8, and increases in indirect diesel exhaust particulate matter emissions are listed in Table 4.1-9. It is important to note that potential impacts from proposed operational TAC emissions cannot be assessed solely from the emissions rates listed in these tables. A health risk assessment was conducted, as discussed in Section 4.1.4, to evaluate the potential significance of health risks from the TAC emissions.

Table 4.1-8
Net Increases in Direct Operational Toxic Air Contaminant Emissions

	Source					
Species	**No. 4 Crude Unit Fugitives**	**Coker Fugitives**	**Depropanizer Fugitives**	**No. 6 H_2S Plant Fugitives**	**Cooling Tower No. 9 PM10**	**Total**
1,3 Butadiene	0.00E+00	7.67E-02	-3.48E-01	0.00E+00	0.00E+00	-2.71E-01
Ammonia	0.00E+00	0.00E+00	-5.80E-01	5.63E+00	0.00E+00	5.05E+00
Benzene	1.18E-01	1.09E+00	-4.83E-05	0.00E+00	0.00E+00	1.21E+00
Chlorine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E+00	5.91E+00
Chloroform	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E+01	4.20E+01
Chromium (Hex)	0.00E+00	1.08E-03	0.00E+00	0.00E+00	0.00E+00	1.08E-03
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.73E-01	4.73E-01
Diethanolamine	0.00E+00	0.00E+00	0.00E+00	1.86E+02	0.00E+00	1.86E+02
Hydrogen Sulfide	0.00E+00	0.00E+00	0.00E+00	3.19E+02	0.00E+00	3.19E+02
Manganese	0.00E+00	1.58E-01	0.00E+00	0.00E+00	1.77E+00	1.93E+00
Naphthalene	9.00E-04	3.65E-02	-2.71E-04	0.00E+00	0.00E+00	3.72E-02
Nickel	0.00E+00	1.00E-02	0.00E+00	0.00E+00	0.00E+00	1.00E-02
Sulfate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	1.30E+04
Toluene	7.82E-02	9.92E-01	-9.18E-04	0.00E+00	0.00E+00	1.07E+00
Xylene (Mixed Isomers)	1.19E-01	2.46E+00	-1.50E-03	0.00E+00	0.00E+00	2.58E+00
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E+00	1.06E+00

Table 4.1-9
Increases in Indirect Diesel Exhaust Particulate Matter Emissions

Source	Emissions (lb/yr)
Petroleum Coke Export Trucks	175
Sulfur Export Trucks	6
Crude Oil Marine Tankers in Transit and Tug Boats	-157
Crude Oil Marine Tankers Hoteling	0
Total	**24**

4.1.5 Health Risk Assessments

Separate health risk assessments (HRAs) were performed for stationary sources at the refinery, the on-road heavy-duty trucks exporting petroleum coke and sulfur from the refinery, and the additional crude oil marine tankers calling at the ESMT. Because these sources are located in different geographic areas, they will expose different sensitive receptors to TACs. Therefore, the risks from these different sources are presented separately and are not added together.

4.1.5.1 Health Risks from Net Increases in Direct Toxic Air Contaminant Emissions

HRA procedures for SCAQMD Rule 1401 were followed to evaluate potential health risks from the proposed increases in direct TAC emissions from the refinery. Because the proposed replacement of the Depropanizer will decrease TAC emissions from the Depropanizer, changes in TAC emissions from the proposed Depropanizer replacement were not included in the HRA because cancer and non-cancer health risks were already determined to be less than significant. The HRA for the increases in direct TAC emissions from the refinery evaluated potential health risks from increased emissions of both carcinogenic and non-carcinogenic TACs. Health risks from carcinogenic TACs were evaluated by calculating the maximum individual cancer risk (MICR), which is the increased probability of contracting cancer from exposure to the maximum off-site concentrations of carcinogenic TACs.

Health risks from non-carcinogenic TACs were evaluated by calculating chronic hazard indices (HIs) for TACs that can cause adverse health effects through long-term (i.e., lifetime) exposure and acute hazard indices for TACs that can cause adverse health effects through short-term (i.e., one hour) exposure. Hazard indices are calculated by first dividing the estimated off-site concentration of individual TACs by a reference exposure level (REL) for the TAC to calculate a hazard quotient (HQ) for each TAC. The REL is a concentration that has been determined not to cause adverse health effects. The HI is calculated as the sum of the HQs for the individual TACs. Because different TACs can cause adverse effects on different target organs, such as the nervous system, the liver, etc., the HIs are calculated for each target organ by summing the HQs for the TACs that can affect each organ. If the HI for a target organ is less than one, the TAC emissions are not expected to cause adverse health effects for that target organ. The evaluation of the significance of the impact is based on the target organ system with the largest HI.

The methodology used in the HRA prepared for the proposed project followed the *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2003), as specified in the SCAQMD guidance for conducting a Tier 4 HRA to comply with Rule 1401 (SCAQMD, 2005b). The HRA was performed using the CARB HARP model (version 1.2a) that implements the OEHHA guidance (CARB, 2005b) following guidance in the HARP User's Guide (CARB, 2003).

Four project sources of TAC emissions were modeled in HARP. TAC emissions from the Coker, the No. 4 Crude Unit, and the No. 6 H_2S plant were modeled as area sources, since the fugitive emissions are generated by components such as valves and flanges that are located throughout the units. TAC emissions from Cooling Tower No. 9 were modeled as a point source because the emissions emanate from a specific location. HARP was run with default parameters. Given the urban, industrial location of the refinery, the only exposure routes considered in the risk assessment were inhalation, dermal exposure, and soil ingestion. The ISCST3 model integral to HARP (version 99155) (U.S. EPA, 1995) was used for the air dispersion modeling, with the SCAQMD Lennox 1981 meteorological data file. The ISCST3 modeling options followed SCAQMD modeling guidance. Details of the HRA are provided in Appendix B, and modeling input and output files are in Attachment B.3.

The use of the OEHHA guidelines results in a worst-case analysis for cancer risks, because the theoretical incremental cancer risk estimated in the HRA using HARP for nearby residents is based on the assumption that these individuals are being continuously exposed to air pollutants emitted from routine operations for 24 hours per day, 365 days per year, for 70 years at the same location. Actual risks are likely to be substantially lower than the calculated risks estimated using the OEHHA guidelines.

The overall results of the HARP modeling from all four project sources are presented in Table 4.1-10. The significance of the chronic and acute HIs is based on the HIs for the target organ systems with the highest values; the HIs for different target organ systems are not added together. The chronic HI listed in Table 4.1-10 was from the cardiovascular and central nervous systems, which had the same HI. The acute HI in Table 4.1-10 was from the central nervous system. All modeled health risks are well below the significance criteria.

Table 4.1-10
Summary of Health Risks

Health Risk	Result from HRA	Significance Threshold	Significant?
Maximum Individual Cancer Risk	0.00652 in one million	10 in one million	No
Chronic Non-Cancer HI	0.0109	1.0	No
Acute Non-Cancer HI	0.0657	1.0	No

Table 4.1-11 presents individual cancer risk by source and exposure pathway, and Table 4.1-12 presents individual cancer risk by pollutant and exposure pathway. The entries for the dermal exposure and soil ingestion pathways are not applicable in Tables 4.1-11 and 4.1-12 because exposure by these pathways does not occur for the cancer-causing TACs emitted from the proposed modifications. The toxic air contaminant contributing most to the off-site cancer risk is fugitive hexavalent chromium emissions from the proposed modifications to the Coker.

Table 4.1-11
Maximum Individual Cancer Risk by Source and Exposure Pathway

Source	Exposure Pathway			
	Inhalation	Dermal Exposure	Soil Ingestion	Total
Coker Fugitives	4.34E-09	N/A	N/A	**4.34E-09**
No. 4 Crude Unit Fugitives	3.23E-11	N/A	N/A	**3.23E-11**
Cooling Tower No. 9	2.15E-09	N/A	N/A	**2.15E-09**
No. 6 H_2S Plant Fugitives	0.00E+00	N/A	N/A	
Total	**6.52E-09**	N/A	N/A	**6.52E-09**

Table 4.1-12
Maximum Individual Cancer Risk by Pollutant and Exposure Pathway

Pollutant	Exposure Pathway			
	Inhalation	Dermal Exposure	Soil Ingestion	Total
Benzene	6.90E-10	N/A	N/A	**6.90E-10**
Naphthalene	2.68E-11	N/A	N/A	**2.68E-11**
1,3-Butadiene	2.78E-10	N/A	N/A	**2.78E-10**
Nickel	5.52E-11	N/A	N/A	**5.52E-11**
Cr(VI)	3.32E-09	N/A	N/A	**3.32E-09**
Chloroform	2.15E-09	N/A	N/A	**2.15E-09**
Total	**6.52E-09**	N/A	N/A	**6.52E-09**

Table 4.1-13 presents acute hazard indices by emission source and target organ, and Table 4.1-14 presents acute hazard indices by pollutant and target organ. The toxic air contaminant contributing most to the off-site acute exposure is fugitive H_2S emissions from the No. 6 H_2S Plant. Note that target organs for which there were no computed acute hazard indices, because they are not affected by the TACs included in the HRA, are not listed in Tables 4.1-13 and 4.1-14.

Table 4.1-13
Acute Hazard Index by Source and Target Organ for Peak Receptor

	Target Organ						
Source	**CNS**	**DEVEL**	**EYE**	**IMMUN**	**REPRO**	**RESP**	**BLOOD**
Coker Fugitives	2.95E-08	4.09E-07	1.53E-07	2.22E-06	4.09E-07	1.99E-06	3.79E-07
No. 4 Crude Unit Fugitives	1.09E-08	2.35E-07	3.88E-08	2.24E-07	2.35E-07	3.88E-08	2.24E-07
Cooling Tower No. 9	1.86E-05	1.86E-05	4.76E-06		1.86E-05	1.83E-02	
No. 6 H_2S Plant Fugitives	6.57E-02		1.52E-05			1.52E-05	
Total	**6.57E-02**	**1.92E-05**	**2.02E-05**	**2.44E-06**	**1.92E-05**	**1.83E-02**	**6.03E-07**
Definitions of Target Organ Systems: CNS – Central Nervous System; DEVEL – Developmental System; EYE – Eyes; IMMUN – Immunological System; REPRO – Reproductive System; RESP – Respiratory System; BLOOD – Circulatory System							

Table 4.1-14
Acute Hazard Index by Pollutant and Target Organ for Peak Receptor

	Target Organ						
Pollutant	**CNS**	**DEVEL**	**EYE**	**IMMUN**	**REPRO**	**RESP**	**BLOOD**
Xylenes			1.51E-07			1.51E-07	
Benzene		6.03E-07		6.03E-07	6.03E-07		6.03E-07
Toluene	4.04E-08	4.04E-08	4.04E-08		4.04E-08	4.04E-08	
Nickel				1.84E-06		1.84E-06	
Sulfates						1.83E-02	
Chloroform	1.86E-05	1.86E-05			1.86E-05		
Copper						8.00E-07	
Chlorine			4.76E-06			4.76E-06	
m-Xylene							
NH_3			1.52E-05			1.52E-05	
H_2S	6.57E-02						
Total	**6.57E-02**	**1.92E-05**	**2.02E-05**	**2.44E-06**	**1.92E-05**	**1.83E-02**	**6.03E-07**
Definitions of Target Organ Systems: CNS – Central Nervous System; DEVEL – Developmental System; EYE – Eyes; IMMUN – Immunological System; REPRO – Reproductive System; RESP – Respiratory System; BLOOD – Circulatory System							

Table 4.1-15 presents chronic hazard indices by source and target organ, and Table 4.1-16 presents chronic hazard indices by pollutant and target organ. The toxic air contaminant contributing most to the off-site chronic exposure is fugitive hydrogen sulfide from the Number 6 H_2S Plant.

Table 4.1-15
Chronic Hazard Index by Source and Target Organ for Peak Receptor

Source	Target Organ							
	CV	**CNS**	**DEVEL**	**GILV**	**KIDN**	**REPRO**	**RESP**	**BLOOD**
Coker Fugitives		1.34E-05	3.51E-07	3.12E-08		6.28E-08	3.55E-06	3.59E-06
No. 4 Crude Unit Fugitives		3.16E-07	2.94E-07				7.02E-08	2.60E-07
Cooling Tower No. 9	7.66E-08	2.23E-05	3.53E-07	3.53E-07	3.53E-07		1.39E-03	7.66E-08
No. 6 H_2S Plant Fugitives	1.09E-02	1.09E-02					5.63E-03	
Total	**1.09E-02**	**1.09E-02**	**9.98E-07**	**3.84E-07**	**3.53E-07**	**6.28E-08**	**7.02E-03**	**3.93E-06**

Definitions of Target Organ Systems:
CV – Cardiovascular System; CNS – Central Nervous System; DEVEL – Developmental System; EYE – Eyes;
GILV – Gastrointestinal-Liver; IMMUN – Immunological System; KIDN - Kidney; REPRO – Reproductive System;
RESP – Respiratory System; BLOOD – Circulatory System

Table 4.1-16
Chronic Hazard Index by Pollutant and Target Organ for Peak Receptor

Pollutant	Target Organ							
	CV	**CNS**	**DEVEL**	**GILV**	**KIDN**	**REPRO**	**RESP**	**BLOOD**
Xylenes		8.01E-08					8.01E-08	
Benzene		5.57E-07	5.57E-07					5.57E-07
Naphthalene							7.97E-08	
1,3-Butadiene						6.28E-08		
Toluene		8.87E-08	8.87E-08				8.87E-08	
Manganese		3.53E-05						
Nickel				3.12E-08			3.29E-06	3.29E-06
Cr(VI)							8.82E-08	6.75E-09
Sulfates							1.31E-03	
Chloroform			3.53E-07	3.53E-07	3.53E-07			
Copper							4.97E-07	
Zinc	7.66E-08						7.66E-08	7.66E-08
Chlorine							7.45E-05	
NH_3							4.97E-06	
H_2S							5.62E-03	
Diethanolamine	1.09E-02	1.09E-02						
Total	**1.09E-02**	**1.09E-02**	**9.98E-07**	**3.84E-07**	**3.53E-07**	**6.28E-08**	**7.02E-03**	**3.93E-06**

Definitions of Target Organ Systems:
CV – Cardiovascular System; CNS – Central Nervous System; DEVEL – Developmental System; EYE – Eyes;
GILV – Gastrointestinal-Liver; IMMUN – Immunological System; KIDN – Kidney; REPRO – Reproductive System
RESP – Respiratory System; BLOOD – Circulatory System

4.1.5.2 Health Risks from Export Truck Diesel Exhaust Particulate Matter Emissions

A health risk assessment of the potential incremental cancer risk to residential populations along the petroleum coke and sulfur export truck transport routes from DPM emitted by the trucks was performed. Details of the health risk assessment procedures are provided in Appendix B.

Sulfur will be exported to chemical manufacturing companies located in the vicinity of the Port of Los Angeles. Currently, the majority of the petroleum coke is exported from the refinery to the Port of Los Angeles. However, when the Los Angeles Terminal closes in the future, all petroleum coke export will then be transported to the Long Beach Terminal. Consequently, for the purpose of assessing potential long-term cancer risk due to the increase in petroleum coke export truck DPM emissions, all petroleum coke export trucks were assumed to transport petroleum coke from the refinery to the Port of Long Beach.

The route taken by individual petroleum coke and sulfur export trucks is assumed to be from refinery Gate 2 on El Segundo Boulevard east to Interstate 405, then south on Interstate 405 to Interstate 110. At the intersection of Interstate 405 and Interstate 110, petroleum coke export trucks will continue south on Interstate 405 to Interstate 710 and then to Pico Drive at the Port of Long Beach. Sulfur export trucks will head south on Interstate 110 to the Port of Los Angeles. The modeled truck route for petroleum coke transport is approximately 19 miles (31 kilometers) long while that for sulfur transport is approximately 18 miles (29 kilometers) long.

The export truck emissions were modeled as volume sources using the ISCST3 model (version 02035) (U.S. EPA, 1995) following SCAQMD-approved methodology. A total of 440 volume sources were modeled. Receptors with a spacing of 100 m were place along the entire truck route. The grid was placed around the transport route beginning approximately 50 meters from the centerline of the roadway out to 350 m (i.e., three rows of receptors following the roadway, beginning approximately 50 m from the centerline). A total of 2,689 receptors were modeled.

Model runs were conducted using both the SCAQMD 1981 Lennox and Long Beach meteorological data sets. The maximum annual DPM concentration occurred with the Long Beach meteorological data set in the first row of receptors, approximately 50 m from the highway centerline, on the east side of the Interstate 110 / Interstate 405 intersection. The peak receptor is not a residential location. The maximum annual concentration of DPM was 0.00183 $\mu g/m^3$.

The inhalation unit risk factor for DPM established by the State of California (ARB, 2003) is 3.00 x 10^{-4} $(\mu g/m^3)^{-1}$. This inhalation risk factor represents the potential for contracting cancer due to continuous inhalation of air containing a 1.0 $\mu g/m^3$ DPM concentration over a 70-year lifetime. Applying this inhalation unit risk factor to the modeled maximum DPM concentration from the export trucks yields a peak 70-year residential cancer risk of 0.55 x 10^{-6} (0.55 in a million), which is below SCAQMD's significance threshold of 10 in a million. Therefore, DPM emissions from the proposed additional petroleum coke and sulfur export trucks will not create significant adverse cancer risk impacts.

Subsequent to release of the Draft EIR, the calculations of emissions from trucks exporting petroleum coke and sulfur from the refinery during operation of the proposed project were revised to use exhaust emission factors for calendar year 2008, the year operation of the proposed project will begin, instead of exhaust emission factors for calendar year 2006. The use of the 2008 emission factors reduced the exhaust PM10 emissions from the trucks somewhat, which will lead to lower health risks than the risks presented in the previous paragraph. Because the Draft EIR concluded that DPM emissions from the proposed additional petroleum coke and sulfur export trucks will not create significant adverse cancer risk impacts, the HRA analysis has not been modified.

4.1.5.3 Marine Crude Oil Tanker Health Risk Assessment

As discussed in Section 4.1.3.2, Chevron has provided more detailed information on the overall effects of the proposed project on ship calls at the ESMT, which allowed a more refined analysis of the information contained in the Draft EIR regarding marine vessel emissions. This refined analysis resulted in a smaller anticipated increase in DPM emissions from marine vessels during operation of the proposed project than was presented in the Draft EIR. Because the health risks from marine vessel DPM emissions during operation of the proposed project will be lower than presented in the following discussion from the Draft EIR and because marine vessel cancer risks were concluded to be less than significant, the HRA analysis has not been modified.

The proposed project will result in up to 15 additional crude oil marine tanker deliveries per year to the off-shore ESMT. These marine tankers will be diesel fueled and will emit PM10 and all PM10 emitted is assumed to be DPM. Therefore, a health risk assessment of the potential incremental cancer risk to on-shore residential populations from the increase in crude oil marine tanker deliveries was performed.

The marine tankers emit particulate matter while in transit to and from the ESMT and while moored at the terminal. The distance traveled by the marine tankers within California Coastal Waters while in transit to the ESMT is more than 100 nm. Therefore, DPM emissions from the tankers while in transit will be dispersed over an extensive area. However, the tankers will be at a single location while moored at the ESMT. Therefore, the health risk assessment evaluated potential impacts from DPM emissions during hoteling at the ESMT.

Modeling of emissions from the marine tankers was conducted using the Offshore and Coastal Dispersion Model (OCD), version 5, which is specifically designed to account for the potential differences between over-water and over-land dispersion characteristics, which are not incorporated into the ISCST3 model. The OCD model was run with one year of meteorological data from 1996. Receptors for the modeling were located from the shoreline to approximately five kilometers inland. Details of the modeling are provided in Appendix B.

The maximum annual average on-shore PM10 concentration resulting from hoteling emissions from the additional crude oil tankers was 5.2 x 10^{-3} µg/m^3. Multiplying this annual-average concentration by the DPM unit risk factor of 3.0 x 10^{-4} (µg/m^3)$^{-1}$ results in an incremental cancer risk of 1.6 x 10^{-6} (1.6 in a million), which is below SCAQMD's significance threshold of 10 in a million. Therefore, DPM emissions from the proposed additional crude oil marine tanker hoteling activities will not create significant cancer risk impacts.

4.1.6 PM10 Ambient Air Quality Impacts Modeling

Atmospheric dispersion modeling was conducted to determine the localized ambient air quality impacts from increases in direct PM10 emissions due to the proposed project at the refinery. PM10 emissions from coke drum depressurization and from Cooling Tower No. 9 are the only direct criteria pollutant emissions that will increase and that require modeling to determine impacts on ambient air quality.

Atmospheric dispersion modeling of the increased PM10 emissions from coke drum depressurization and from Cooling Tower No. 9 was conducted following SCAQMD guidance. The ISCST3 model (U.S. EPA, 1995) was used for the modeling, with the SCAQMD Lennox 1981 meteorological data file. Details of the modeling procedures are provided in Appendix B.

The ambient air significance thresholds for PM10 project impacts are 2.5 µg/m^3 and 1.0 µg/m^3 for the 24-hour and annual impacts, respectively, as indicated in Table 4.1-1. The modeling indicates that the 24-hour impact at the property boundary is 2.2 µg/m^3 and the annual impact is 0.37 µg/m^3. These predicted impacts are below the SCAQMD CEQA significance criteria. Therefore, the proposed project will not have significant adverse impacts on ambient air concentrations.

4.1.7 Carbon Monoxide Ambient Air Quality Impacts Modeling

Increases in traffic from a project might lead to impacts of CO emissions on sensitive receptors if the traffic increase worsens congestion on roadways or at intersections. A CO hot spots analysis of these impacts is required if:

- The project is anticipated to reduce the level of service (LOS) of an intersection rated C or worse by one level, or
- The project is anticipated to increase the volume-to-capacity ratio of an intersection rated D or worse by 0.02.

As indicated in the transportation and traffic impacts analysis (Section 4.6), traffic during construction and operation of the proposed project is not anticipated to reduce the level of service of intersections rated C or worse or to increase the volume-to-capacity ratio of intersections rated D or worse. Therefore, the proposed project is not anticipated to cause significant adverse impacts on ambient CO concentrations by creating potential CO hot spots.

4.1.8 Odors

Sulfur compounds, such as H_2S, are the most noticeable odor source in refinery operations. The proposed modifications to the No. 6 H_2S Plant may generate fugitive H_2S emissions during operation of the proposed project, primarily from components such as flanges in acid gas service. Air dispersion modeling to calculate maximum one-hour average off-site concentrations of TACs with acute health effects, including H_2S, was conducted as part of the HRA. The maximum one-hour average off-site H_2S concentration from this air dispersion modeling is 2.76 $\mu g/m^3$, which is equivalent to 0.0020 parts per million (ppm). This concentration is approximately 25 percent of the H_2S odor threshold concentration of 0.0081 ppm (OEHHA, 1999). Therefore, the proposed project will not cause significant adverse odor impacts.

4.1.9 Mitigation Measures

This section discusses measures during to mitigate potentially significant adverse air quality impacts generated by construction and operation of the proposed project. As shown below, mitigation measures are required and identified for various pollutants during construction. Because no significant adverse air quality impacts have been identified during project operation, no mitigation measures are required and none are identified.

4.1.9.1 Construction Mitigation Measures

As indicated in Table 4.1-5, peak daily CO, VOC, NO_X, and PM10 emissions during construction exceed the SCAQMD significance thresholds. Additionally, as indicated in Table 4.1-6, on-site NO_x emissions during construction may cause localized impacts to NO_2 air quality. Construction emissions are primarily from: 1) on-site exhaust emissions (CO, VOC, NO_X, and PM10) from construction equipment; 2) on-site fugitive PM10 emissions from excavation and from; 3) fugitive road dust PM10 emissions emissions from vehicle travel on paved roads inside the refinery; 4) on-site VOC emissions from asphaltic paving and painting; 5) off-site exhaust emissions (CO, VOC, NO_X, and PM10) from truck traffic and worker commute trips; and 5) off-site road dust PM10 associated with traffic to and from the off-site parking facility and the refinery. The following mitigation measures, which are summarized in Table 4.1-17, will be imposed during construction of the proposed project:

<u>On-site Construction Equipment Mitigation Measures</u>

AQ-1) Diesel-powered construction equipment will be fueled with emulsified diesel fuel throughout construction of the proposed project.

The California Air Resources Board has established an interim procedure for verification of emission reductions for alternative diesel fuels. This procedure has been used to verify emission reductions from the use of four alternative diesel fuels: PuriNOx diesel fuel developed by Lubrizol Corporation, Aquazole fuel developed by TotalFinaElf, Clean Fuels Technology's emulsified diesel fuel, and O_2 Diesel Fuel developed by O_2 Diesel, Inc. Specifically, Lubrizol's water-emulsified PuriNOx diesel fuel has been verified to reduce NO_x emissions by 14 percent and PM10 emissions by 62.9 percent (ARB, 2001).

Chevron supplies PuriNOx to customers in the South Coast Air Basin from its Montebello distribution terminal. Chevron will ensure that the quantities of PuriNOx required for construction equipment for the proposed project will be available.

Prior to the start of construction for the proposed project, Chevron will verify that the construction equipment operates properly when fueled with PuriNOx diesel fuel. Minor modifications to the equipment will be made, if necessary, to enable it to operate properly using PuriNOx diesel fuel.

AQ-2) All construction equipment diesel engines shall meet, at a minimum, the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines as specified in California Code of Regulations, Title 13, §2423(b)(1) unless such engine is not available for a particular item of equipment within the southern California area for use for the needed construction equipment for the proposed project. Construction equipment engines will be required to meet Tier 1 California standards if equipment with engines that meet Tier 2 standards are not available, unless such engine is not available for a particular item of equipment. Potential emission reductions from this mitigation measure cannot be quantified, because the specific equipment that will be equipped with engines certified to meet the Tier 1 standards is not known.

AQ-3) In the event a Tier 2 or Tier 1 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a diesel particulate filter (soot filter), unless certified by engine manufacturers that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is "not practical" if, among other reasons:

(1) There is no available soot filter that has been certified by either the California Air Resources Board or U.S. Environmental Protection Agency for the engine in question; or

(2) The construction equipment is intended to be on-site for ten (10) days or less.

The use of a soot filter may be terminated immediately if one of the following conditions exists:

(1) The use of the soot filter is excessively reducing normal availability of the construction equipment due to increased downtime for maintenance, and/or reduced power output due to an excessive increase in backpressure;

(2) The soot filter is causing or is reasonably expected to cause significant engine damage; or

(3) The soot filter is causing or is reasonably expected to cause a significant risk to workers or the public.

Potential emission reductions from this mitigation measure cannot be quantified, because the specific equipment that will be equipped with soot filters is not known.

AQ-4) All construction equipment shall be properly maintained and the engines tuned to the engine manufacturer's specifications. Potential emission reductions from this mitigation measure are unknown.

AQ-5) Heavy construction equipment shall not remain running at idle for more than five minutes, to the extent for safe and practical operation. Potential emission reductions from this mitigation measure are unknown.

AQ-6) The engine size of construction equipment shall be the minimum practical size to support the required scope of work for the equipment. Potential emission reductions from this mitigation measure have not been quantified.

AQ-7) If feasible, apply retrofit technologies to the large off-road construction equipment that will be operating for significant periods. Retrofit technologies such as selective catalytic reduction (SCR), oxidation catalysts, air enhancement technologies, etc. will be evaluated. These technologies will be required if they are commercially available and can feasibly be retrofitted onto the construction equipment. Potential emission reductions from this mitigation measure have not been quantified.

AQ-8) Use electric welders instead of gas or diesel welders in portions of the refinery where electricity is available. Potential emission reductions from this mitigation measure have not been quantified.

AQ-9) Use on-site electricity rather than temporary power generators in portions of the refinery where electricity is available. Potential emission reductions from this mitigation measure have not been quantified.

On-Site Paved Road Fugitive PM10 Mitigation Measures

AQ-10) Sweep principal paved on-site motor vehicle routes inside of the facility to reduce surface silt loading. Potential emission reductions from this mitigation measure have not been quantified.

Excavation Mitigation Measures

AQ-11) Water as needed to prevent visible emissions from soil excavation activities at the refinery boundary. At a minimum, the frequency of watering of active excavation sites will be increased from two to three times per day. This mitigation measure will reduce fugitive PM10 emissions from soil handling and from wind erosion of temporary stockpiles by an additional 18 percent beyond the 50 percent reduction resulting from compliance with SCAQMD Rule 403 - Fugitive Dust, which has been accounted for in the unmitigated emissions from construction of the proposed project.

Surface Coating Mitigation Measures

AQ-12) Use surface coatings that comply with a VOC content limit of 0.84 pounds per gallon (100 grams per liter) as required by SCAQMD Rule 1113 - Architectural Coatings for industrial maintenance coatings manufactured after June 30, 2006. The calculation of unmitigated VOC emissions from on-site surface coating assumed the coatings would meet the current limit of 2.09 pounds per gallon (250 grams per liter), because Rule 1113 allows a coating that is manufactured prior to the effective date of an applicable limit to be sold, supplied, offered for sale, or applied for up to three years after the specified effective date. The use of coatings with a VOC content of 100 grams per liter instead of 250 grams per liter will reduce VOC emissions from surface coating by 60 percent.

On-Road Motor Vehicle Mitigation Measures

No feasible mitigation has been identified for the emissions from on-road vehicle trips. CEQA Guidelines §15364 defines feasible as ". . . capable of being accomplished in a successful manner." No feasible mitigation measures for off-site motor vehicles have been identified. Health and Safety Code §40929 prohibits the air districts and other public agencies from requiring an employee trip reduction program making such mitigation infeasible.

Other mitigation measures were considered but were rejected because they would not further mitigate the potential significant impacts. These mitigation measures included: 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 paved).

Table 4.1-17
Construction Emissions Mitigation Measures Summary

Mitigation Measure Number	Mitigation	Source	Pollutants	Control Efficiency (%)
AQ-1	Diesel powered construction equipment will be fueled with emulsified diesel fuel throughout construction of the proposed project.	On-site Construction Equipment Exhaust	NO_x PM10	14 63
AQ-2	All construction equipment diesel engines shall meet, at a minimum, the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines as specified in California Code of Regulations, Title 13, section 2423(b)(1) unless such engine is not available for a particular item of equipment within the southern California area for use for the needed construction equipment for the proposed project. Construction equipment engines will be required to meet Tier 1 California standards if equipment with engines that meet Tier 2 standards are not available, unless such engine is not available for a particular item of equipment.	On-site Construction Equipment Exhaust	CO VOC NO_x PM10	Not Quantified

Table 4.1-17 (continued)
Construction Emissions Mitigation Measures Summary

Mitigation Measure Number	Mitigation	Source	Pollutants	Control Efficiency (%)
AQ-3	In the event a Tier 1 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a diesel particulate filter (soot filter), unless certified by engine manufacturers that the use of such devices is not practical for specific engine types.	On-site Construction Equipment Exhaust	PM10	Not Quantified
AQ-4	All construction equipment shall be properly maintained and the engines tuned to the engine manufacturer's specifications.	On-site Construction Equipment Exhaust	CO VOC NO_x SO_x PM10	Not Quantified
AQ-5	Heavy construction equipment shall not remain running at idle for more than five minutes, to the extent for safe and practical operation.	On-site Construction Equipment Exhaust	CO VOC NO_x SO_x PM10	Not Quantified
AQ-6	The engine size of construction equipment shall be the minimum practical size to support the required scope of work for the equipment.	On-site Construction Equipment Exhaust	CO VOC NO_x SO_x PM10	Not Quantified
AQ-7	If feasible, apply retrofit technologies to the large off-road construction equipment that will be operating for significant periods. Retrofit technologies such as selective catalytic reduction (SCR), oxidation catalysts, air enhancement technologies, alternative fueled equipment, etc. will be evaluated. These technologies will be required if they are commercially available and can feasibly be retrofitted onto the construction equipment.	On-site Construction Equipment Exhaust	CO VOC NO_x SO_x PM10	Not Quantified
AQ-8	Use electric welders instead of gas or diesel welders in portions of the refinery where electricity is available.	On-site Construction Equipment Exhaust	CO VOC NO_x SO_x PM10	Not Quantified
AQ-9	Use on-site electricity rather than temporary power generators in portions of the refinery where electricity is available.	On-site Construction Equipment Exhaust	CO VOC NO_x SO_x PM10	Not Quantified

Table 4.1-17 (concluded)
Construction Emissions Mitigation Measures Summary

Mitigation Measure Number	Mitigation	Source	Pollutants	Control Efficiency (%)
AQ-10	Sweep principal paved on-site motor vehicle routes inside of the facility to reduce surface silt loading.	On-site Motor Vehicle Fugitive PM10 Emissions	PM10	Not Quantified
AQ-11	Water as needed to prevent visible emissions from soil excavation activities at the refinery boundary. At a minimum, the frequency of watering of active excavation sites will be increased from two to three times per day.[a]	Excavation	PM10	18
AQ-12	Use surface coatings that comply with a VOC content limit of 0.84 pound per gallon (100 grams per literl) as required by SCAQMD Rule 1113 - Architectural Coatings for industrial maintenance coatings manufactured after June 30, 2006.	Surface Coating	VOC	60

[a] It is assumed that construction activities will comply with SCAQMD Rule 403 – Fugitive Dust, by watering the site two times per day, reducing fugitive dust by 50 percent. This mitigation measure assumes an incremental increase in the number of times per day the site is watered (i.e., from two to three times per day).

Mitigated construction emissions were calculated by applying the quantified emission reductions from these mitigation measures to emissions during each construction month. Peak daily mitigated construction emissions, which are anticipated to occur in October 2007, are summarized in Table 4.1-18. This table shows that implementation of the mitigation measures will reduce PM10 emissions below the SCAQMD's CEQA significance threshold. However, mitigated CO, VOC and NO_x construction emissions exceed the SCAQMD's CEQA significance level and may cause significant adverse air quality impacts.

Table 4.1-18
Peak Daily Mitigated Construction Emissions

Source	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	PM10 (lb/day)
Unmitigated Emissions[a]	**927.8**	**273.2**	**1,526.8**	**2.4**	**185.3**
CEQA Significance Level	*550*	*75*	*100*	*150*	*150*
Significant? (Yes/No)	**Yes**	**Yes**	**Yes**	No	**Yes**
Mitigation Measures					
Use PuriNOx emulsified diesel fuel[b]			-193.8		-47.5
Use architectural coatings with 100 g/l VOC[c]	--	-52.7	--	--	--
Increase watering to three times per day[d]	--	--	--	--	-0
Total Reductions	0	-52.7	-193.8	0	-47.5
Mitigated Emissions	**927.8**	**220.5**	**1,333.0**	**2.4**	**137.8**
CEQA Significance Level	*550*	*75*	*100*	*150*	*150*
Significant after Mitigation? (Yes/No)	**Yes**	**Yes**	**Yes**	No	No

[a] From Table 4.1-5
[b] Reductions of 14 percent for NOx and 63 percent for PM10 are based on January 31, 2001, verification letter from Dean C. Simeroth, California Air Resources Board, to Thomas J. Sheahan, Lubrizol Corp.
[c] Reduction from 250 g/l to 100 g/l reduces emissions by 60 percent.
[d] Excavation does not occur during construction period with peak daily PM10 emissions. Therefore, increasing watering does not reduce peak daily PM10 emissions.

Maximum daily mitigated emissions are compared with the LSTs in Table 4.1-19. Table 4.1-19 shows that the mitigated CO and PM10 emissions do not exceed the LSTs, but the LSTs for NO_x emissions are exceeded. Therefore, mitigated emissions during construction of the proposed project are not expected to cause significant localized impacts to CO or PM10 air quality, but they may cause significant impacts to localized NO_2 air quality.

4.1.9.2 Operational Mitigation Measures

As indicated in the preceding section, operation of the proposed project will not cause significant adverse air quality impacts. Therefore, air quality mitigation measures during operation of the proposed project are not required.

Table 4.1-19
Summary of Mitigated Localized Construction Air Quality Impacts Analysis

	CO	NO_x	PM10
No. 4 Crude Unit and No. 6 H_2S Plant Modifications			
Maximum Daily Emissions (lb/day)[a]	320	621	55
Localized Significance Threshold (lb/day)	1,400	234	102
Threshold Exceeded?	No	**Yes**	No
Coker Modifications			
Maximum Daily Emissions (lb/day)[a]	580	1,233	108
Localized Significance Threshold (lb/day)	6,370	377	221
Threshold Exceeded?	No	**Yes**	No

[a] From Table B.1-48 of Appendix B, Attachment B.1. Maximum daily on-site emissions occur during April 2007 for the No. 4 Crude Unit and No. 6 H_2S Plant and October 2007 for the Coker.

4.1.9.3 Air Quality Impacts Summary

Air quality impacts, mitigation measures, and impacts after mitigation are summarized in Table 4.1-20.

Table 4.1-20
Summary of Air Quality Impacts

Impact	Mitigation Measures	Residual Impact
Construction emissions of CO, VOC, NO_x and PM10 are significant.	Mitigation measures include fueling construction equipment with emulsified diesel; requiring construction equipment to meet Tier 2 or Tier 1 emission standards for off-road engines or, if equipment is rated at 100 hp or more and equipment meeting Tier 2 or Tier 1 standards is not available, to be equipped with diesel particulate filters, if feasible; maintaining and tuning construction equipment engines according to manufacturers' specifications; limiting engine idling to five minutes; applying retrofit technologies such as selective catalytic reduction, oxidation catalysts, air enhancement, etc. to construction equipment if technologies are commercially available; using electric welders instead of diesel or gas welders when electricity is available; using on-site electric power instead of diesel generators where electricity is available; sweeping paved roads used by on-site construction vehicles; watering active excavation and storage pile locations a minimum of three times per day; using coatings with no more than 100 g/l VOC	Mitigation measures will reduce construction emissions of PM10 to less than significant. Construction emissions of CO, VOC, and NO_x are expected to remain significant after mitigation.
On-site NO_x construction emissions may cause significant localized NO_2 ambient air quality impacts.	Same as above	On-site NO_x construction emissions may cause significant NO_2 ambient air quality impacts after mitigation.
Construction emissions of SO_x are less than significant.	None required	SO_x construction emissions are expected to be less than significant.

Table 4.1-20 (continued)
Summary of Air Quality Impacts

Impact	Mitigation Measures	Residual Impact
On-site CO and PM10 construction emissions are not expected to cause significant localized ambient air quality impacts.	No additional required	On-site CO and PM10 construction emissions are not expected to cause significant localized ambient air quality impacts.
Operational CO, VOC, NO_x SO_x and PM10 emissions are less than significant.	None required	Operational CO, VOC, NO_x SO_x and PM10 emissions are expected to be less than significant.
The estimated maximum individual cancer risk due to the operation of the proposed project at the refinery is expected to be less than the significance threshold of 10 per million so that the project impacts are less than significant.	None required	Cancer risk impacts from operation of the proposed project at the refinery are expected to be less than significant.
The acute hazard index and the chronic hazard index from exposure to non-carcinogenic compounds during operation of the proposed project are both less than the significance threshold of 1.0 so that the project impacts are less than significant.	None required	Non-cancer risk impacts from operation of the proposed project are expected to be less than significant.
The estimated maximum individual cancer risk due to diesel exhaust particulate matter emissions from refinery export trucks and from marine crude oil tanker hoteling during operation of the proposed project at the refinery are expected to be less than the significance threshold of 10 per million so that the project impacts are less than significant.	None required	Cancer risk impacts from refinery export truck and marine crude oil tanker emissions are expected to be less than significant.
Ambient air quality CO, NO_x and PM10 impacts during operation are less than significant.	None required	Ambient air quality CO, NO_x and PM10 impacts during operation are expected to be less than significant.
No significant traffic impacts were identified at local intersections so no significant increase in CO hot spots are expected.	None required	CO hot spot impacts are expected be less than significant.

Table 4.1-20 (concluded)
Summary of Air Quality Impacts

Impact	Mitigation Measures	Residual Impact
Potential odor impacts from the proposed project are expected to be less than significant.	None required	Odor impacts are expected to be less than significant.

4.2 Hazards and Hazardous Materials

The impacts associated with hazards would be considered significant if the project results in any of the following:

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

The first three conditions are concerned with design codes, fire standards, and generally accepted industry practices. The project will be designed, operated, and maintained to provide a safe work place, and to prevent significant adverse off-site impacts. Chevron incorporates modern industrial technology and design standards, regulatory health and safety codes, training, and operating, inspection, and maintenance procedures that will minimize the risk and severity of potential upset conditions.

Examples of regulations and standards governing equipment design include:

- California Code of Regulations, Title 8 contains minimum requirements for equipment design; and
- Industry Standards and Practices - codes for design of various equipment
  - ANSI - American National Standards Institute
  - API - American Petroleum Institute
  - ASME - American Society of Mechanical Engineers
  - NFPA - National Fire and Protection Association

The standards noted above and other applicable design standards will govern the design of mechanical equipment, such as pressure vessels, tanks, pumps, piping, and compressors, and do not need to be analyzed further in the hazard analysis. Adherence to codes will be verified by the City of El Segundo.

4.2.1 Overview of Approach

The hazard analysis addresses only processes that are being modified or whose operation is being substantially altered as a result of the proposed project. The analyses concentrated on potential upset scenarios that may result in risk of serious injury. The primary focus is on the change in potential impacts to the environment or the community outside of the facility that could result from the proposed project modifications to the No. 4 Crude Unit, the Coker and the No. 6 H_2S Plant. The potential change in impacts was evaluated by comparing impacts that could occur from the proposed project with impacts that could occur from existing processes. The range (distance) of the impact beyond the refinery's fence line was estimated for each scenario.

The selection of scenarios was based on previous experience in process engineering, process safety management, and refinery risk analysis. The likelihood of occurrence for the scenarios was based on reliability data available from the American Institute of Chemical Engineers and other published data.

4.2.1.1 Potential Hazards from Modifications to the No. 4 Crude Unit

The proposed modifications to the No. 4 Crude Unit will increase the unit's crude oil processing capacity and the production of vacuum residuum. As presented in Section 2.6.1.2, the modifications include internal modifications to the atmospheric and distillation columns, modifications to the vacuum system, the replacement of heat exchangers with more efficient units, replacement of pumps, and the addition of up to two new heat exchangers.

The proposed modifications do not include changing the types of potentially hazardous substances present in the unit or replacing or increasing the sizes of existing vessels that contain substantial quantities of hazardous substances. Thus, the proposed modifications will not substantially increase the quantities of hazardous substances present in the unit at any one time. As a result, the quantities of hazardous substances that would be released in the event of a catastrophic failure of a vessel will not change substantially. Therefore, the proposed modifications to the No. 4 Crude Unit will not change the potential impacts that could result from a potential upset in the No. 4 Crude Unit.

4.2.1.2 Potential Hazards from Modifications to the Coker

The proposed modifications to the Coker include the replacement of the existing C-73 Depropanizer and the Coker Main Fractionator column with larger units. The Depropanizer and the Coker Main Fractionator column both contain flammable materials. Therefore, the proposed Coker modifications will increase the quantities of flammable materials that could be released in the event of a catastrophic structural failure of the Depropanizer or the Coker Main Fractionator column. The hazards analysis evaluated potential impacts of releases and subsequent ignition of flammable substances from the existing Depropanizer and Coker Main Fractionator column to establish the baseline and from the proposed replacement Depropanizer and Coker Main Fractionator column to evaluate the potential changes in the consequences of releases.

The existing C-73 Depropanizer is located in the central refinery area approximately 510 meters south of the intersection of El Segundo Boulevard and Arena Street. The proposed replacement C-506 Depropanizer will be about 90 meters closer to the refinery boundary and will be located approximately 420 meters south of the El Segundo Boulevard and Arena Street intersection. The composition of feed to the Depropanizer will not change as a result of the proposed project. The steady-state amount of flammable substances within the Depropanizer will increase as a result of the proposed project, with the amount of flammable vapor increasing approximately 23 percent and the amount of flammable liquids increasing approximately 42 percent.

The existing Coker Main Fractionator column is located in the central refinery area approximately 900 meters south of the intersection of El Segundo Boulevard and Sheldon Street and 700 meters north of Rosecrans Avenue. The proposed replacement Coker Main Fractionator column will be in approximately the same area. The composition of feed to the Coker Main Fractionator is not changing as a result of the proposed project. The steady-state amount of flammable substances within the Main Fractionator column will increase as a result of the proposed project, with the amount of flammable vapor increasing approximately 145 percent, the amount of flammable tray liquids increasing approximately 100 percent, and the bottom liquids (residual) increasing by approximately 165 percent.

4.2.1.3 Potential Hazards from Modifications to the No. 6 H_2S Plant

The proposed modifications to the No. 6 H_2S Plant include construction of a new DEA Regenerator, a new Emergency Caustic Scrubber, and a new Jet Wash Column. The proposed new DEA Regenerator, Emergency Caustic Scrubber and other new associated vessels and heat exchangers will contain H_2S, which is a hazardous substance. Thus, H_2S could potentially be released in the event of a catastrophic failure of a vessel that contains H_2S.

The proposed new Jet Wash Column will utilize jet fuel and/or diesel to remove sulfur compounds from refinery fuel gas. Jet fuel and diesel are flammable liquids, and refinery fuel gas is a flammable vapor. Therefore, a catastrophic structural failure of the new column could release flammable substances.

The No. 6 H_2S Plant is located in the northern portion of the refinery, approximately 240 meters south of El Segundo Boulevard and between the intersections of El Segundo Boulevard and Penn and Sierra Streets.

4.2.2 Impacts of Releases

Impacts from the following release scenarios were analyzed:

- Loss of containment resulting in a flammable vapor explosion for the existing and replacement Depropanizers;
- Loss of containment producing a liquid pool and resulting in a liquid pool fire for the existing and replacement Depropanizers;
- Loss of containment resulting in a flammable vapor explosion for the existing and replacement Coker Main Fractionator columns;
- Loss of containment producing a liquid pool and resulting in a liquid pool fire for the existing and replacement Main Coker Fractionator columns;
- Loss of containment and release of H_2S from a proposed new vessel; and
- Loss of containment resulting in a flammable vapor explosion and pool fire for the proposed No. 6 H_2S Plant Jet Wash Column.

The risk to an off-site individual from a hazardous material release is a function of both the consequence of the release and the probability of that consequence occurring. The consequence of each release scenario was evaluated by calculating the distances to the ERPG 2 level for the type of hazard (eg. explosion, fire, etc.) and determining if the ERPG 2 levels would be exceeded beyond the refinery boundary. The probability of the release occurring was evaluated based on historical statistical data.

4.2.2.1 Loss of Containment Resulting in a Flammable Vapor Explosion for the Existing (C-73) and Replacement (C-506) Depropanizers

The greatest potential hazards to the public from the existing Depropanizer (C-73) and its proposed replacement (C-506) are due to the potential for loss of containment of the pressure shell, allowing the release of a cloud of flammable vapor inside the refinery, where there are potential ignition sources. If the flammable vapor encountered an ignition source, a vapor explosion could result, producing a blast wave that could cause personnel and structural damage if the blast were large enough. The primary means to limit the potential size of the vapor explosion is to prevent it from happening in the first place by preventing a breach in containment that would allow the flammable vapors to escape containment.

The methodology used for estimating the potential risk from a vapor explosion is that developed for off-site consequence analysis for the Risk Management Program (RMP) under 40CFR68 (EPA, 1999). For an RMP off-site consequence analysis, a gaseous release is assumed to produce a vapor explosion that results in a blast impact. For a vapor explosion, the significance level is a pressure wave (blast) of one pound per square inch (psi), and the metric examined is the modeled distance to the significant overpressure level. Following the RMP methodology, the distance-to-threshold impact for the existing and proposed replacement Depropanizers were computed and are presented below and documented in Appendix C.

Assuming a flammable mixture of 30 percent propane, 45 percent butane, and 25 percent pentane in the Depropanizers and the vapor masses presented in Table 4.2-1, the distance to the one psi overpressure threshold for the existing C-73 Depropanizer is 190 meters. For the proposed replacement C-506 Depropanizer, the impact distance to the one psi threshold is 200 meters. Thus, the proposed project will increase the potential impact distance by 10 meters. Neither impact distance extends beyond the boundary of the refinery and does not produce an impact to an off-site receptor. These results are summarized in Table 4.2-2.

Table 4.2-1
Steady-State Quantities of Flammable Vapors and Liquids in Existing C-73 and Proposed Replacement C-506 Depropanizers

Parameter	Existing C-73 Depropanizer (lb)	Proposed Replacement C-506 Depropanizer (lb)
Depropanizer Vapor Phase	2,944	3,668
Depropanizer Liquid Phase	4,905	6,697

Table 4.2-2
Distance to Impact Threshold for Vapor Explosion Release Scenario at the Existing and Proposed Replacement Depropanizers

Parameter	Existing C-73 Depropanizer	Proposed Replacement C-506 Depropanizer
Vapor Explosion – Distance to Blast Impact (meters)[a]	190	200
Distance to Closest Property Line (meters)	510	420
Off-site Impact Distance (meters)	0	0
[a] Distance to overpressure impact of 1 pound per square inch (psi)		

There are other refinery process vessels and tanks within the potential blast distance for the Depropanizers. However, because the impact distance for a vapor explosion caused by a release from the proposed replacement C-506 Depropanizer is only slightly larger than the impact distance for the existing Depropanizer, the risk to other refinery equipment will be essentially the same with the proposed replacement Depropanizer as with the existing Depropanizer.

For a metallic pressurized tank or vessel, the catastrophic failure rate is 0.0109 per million hours, based on historical statistical data (one failure per approximately 10,500 years, AIChE, 1989), where a catastrophic failure is defined as a breach of ¼-inch or greater. The proposed new Depropanizer will replace an older vessel of similar function. Because it will be a newer vessel, in the near-term the probability of a failure will be less than that of an older vessel. Initially, there will be a slight reduction in the probability of a catastrophic vessel failure due to the replacement of an older pressure vessel with a newer vessel.

Because the hazard of an off-site consequence posed by a vapor explosion due to a vapor release from the proposed replacement Depropanizer does not extend off the refinery, there is a less-than-significant risk to an off-site individual. This is unchanged from the existing Depropanizer. Overall, the risk of upset from the Depropanizer due to a vapor explosion does not increase due to implementation of the proposed project.

4.2.2.2 Loss of Containment Producing a Liquid Pool and Resulting in a Liquid Pool Fire for the Existing (C-73) and Replacement (C-506) Depropanizers

Upon a loss of containment of the existing or proposed replacement Depropanizers, the liquid phase in the columns could be released and form a liquid pool. If an ignition source is nearby, the liquid pool can ignite, resulting in a pool fire.

The methodology used for estimating the potential risk from a pool fire is that developed for off-site consequence analysis for the RMP. For an RMP off-site consequence analysis, the significance level for a pool fire is a thermal flux of 5.0 kiloWatts per square meter (kW/m^2), and the metric examined is the modeled distance to the significant thermal flux level. In the RMP methodology, the distance to the significant thermal flux level depends on the properties of the flammable liquid and on the surface area of the pool fire. To calculate the surface area, the RMP methodology assumes that the liquid spreads to a thickness of one centimeter, unless it is contained by a berm, process equipment, gutters, or other drainage features that prevent it from spreading to a one-centimeter thickness. Based on the locations of existing equipment surrounding both the existing and proposed replacement Depropanizer columns, the liquid contents would not be contained before they spread to a thickness of one centimeter. Therefore, the volumes of the liquids were divided by one centimeter to calculate the surface areas.

Following the RMP methodology, the distance-to-threshold impacts for the existing and proposed replacement Depropanizers were computed and are documented in Appendix C. Assuming 25 percent pentane in the Depropanizers and the liquid masses listed in Table 4.2-1, the distance-to-threshold for the existing C-73 Depropanizer is 120 meters. For the proposed replacement C-506 Depropanizer, the distance-to- threshold is 140 meters. Thus, the proposed project increases the potential impact distance by 20 meters from the existing conditions. Neither impact distance extends beyond the boundary of the refinery and does not produce an impact to an off-site receptor. These results are summarized in Table 4.2-3.

Table 4.2-3
Distance to Impact Threshold for Pool Fire Release Scenario at the Existing and Proposed Replacement Depropanizers

Parameter	Existing C-73 Depropanizer	Proposed Replacement C-506 Depropanizer
Pool Fire – Distance to Thermal Flux Impact[a]	120	140
Nearest Distance to Property Line (m)	510	420
Off-site Impact Distance (m)	0	0

[a] Distance to a thermal flux of 5 kiloWatt per square meter (kW/m^2)

There are other refinery process vessels and tanks within the potential pool-fire impact distances for the existing and proposed replacement Depropanizer columns. However, because the impact distance for a pool fire caused by a release from the proposed new C-506 Depropanizer column is only slightly larger than the impact distance for the existing Depropanizer column, the risk to other refinery equipment will be essentially the same with the proposed new Depropanizer as with the existing Depropanizer. Additionally, although automatic fire suppression systems are not located in the vicinity of the existing Deporpanizer column and are not proposed for the new Depropanizer column, the refinery fire department is trained to react to fires in the refinery and to ensure that fires in one unit do not cause or produce hazards in other units.

As presented previously, for a metallic pressurized tank or vessel, the catastrophic failure rate is 0.0109 per million hours, based on historical statistical data (one failure per approximately 10,500 years, AIChE, 1989), where a catastrophic failure is defined as a breach of ¼-inch or greater. Because the proposed new Depropanizer will be a newer vessel, initially, there will be a slight reduction in the probability of a catastrophic vessel failure due to the replacement of an older pressure vessel with a newer vessel. Overall, the risk of a catastrophic vessel failure due to the replacement of an older pressure vessel with a newer vessel will not increase.

Because the hazard of an off-site consequence posed by a liquid pool fire due to a flammable liquid release from the proposed new Depropanizer does not extend off the refinery, there is a-less-than-significant risk to an off-site individual. This is unchanged from the existing Depropanizer. Overall, the risk of upset from the Depropanizer due to a liquid pool fire does not increase due to implementation of the proposed project.

4.2.2.3 Loss of Containment Resulting in a Flammable Vapor Explosion for the Existing and Proposed New Coker Main Fractionator Columns

The proposed new Coker Main Fractionator column will replace an existing column with a new, larger, more modern column. The proposed replacement column will not result in a significant change in the type of hazardous substances in the Main Fractionator column, which consist of residual and fractionated liquid, predominately diesel. Vapors produced during fractionation include tail gas, LPG, gasoline, jet and diesel oil, and gasoil. The proposed new Main Fractionator column has a liquid and vapor capacity that is approximately 2.5 times greater than the existing Main Fractionator column. Therefore, the amount of potentially flammable liquids and gases within the proposed replacement Main Fractionator column will be greater than within the existing, smaller Main Fractionator column. The proposed replacement Main Fractionator will be more efficient and operate more reliably, safely and with less maintenance than the existing Main Fractionator column.

The same RMP methodology used for estimating the potential risks from a vapor explosion from the Depropanizers was used to estimate the risks from the existing and proposed replacement Main Fractionators columns Documentation of the computations of the off-site consequence analysis for the Coker Main Fractionator columns is given in Appendix C.

The vapors in the Coker Main Fractionator column include15 percent gasoline, 12 percent jet and diesel, and 35 percent gasoil. Assuming gasoil is similar to diesel in terms of heat content, approximately half the vapor mass can be approximated as diesel. Therefore, for the purpose of the vapor explosion modeling for the Coker Main Fractionator, the vapor was assumed to be diesel vapor. Using the vapor masses given in Table 4.2-4 and the RMP methodology, the distance to the one psi overpressure threshold for the existing Coker Main Fractionator column is 230 meters. For the proposed replacement Coker Main Fractionator column, the impact distance to threshold is 300 meters. Neither impact distance extends beyond the boundary of the refinery and does not produce an impact to an off-site receptor. These results are summarized in Table 4.2-5.

Table 4.2-4
Steady-State Quantities of Flammable Vapors and Liquids in Existing and Proposed Replacement Coker Main Fractionator Columns

Parameter	Existing Main Fractionator Column (lb)	Proposed Replacement Main Fractionator Column (lb)
Fractionator Vapor	5,065	12,340
Fractionator Tray Liquid	215,400	429,900
Fractionator Bottom Liquid	1,108,000	2,924,000

Table 4.2-5
Distance to Impact Threshold for Vapor Explosion Release Scenario at the Existing and Proposed Replacement Main Coker Fractionator Columns

Parameter	Existing Coker Main Fractionator Column	Proposed Replacement Coker Main Fractionator Column
Vapor Explosion – Distance to Blast Impact (meters)[a]	230	300
Nearest Distance to Property Line (meters)	695	695
Off-site Impact Distance (meters)	0	0
[a] Distance to overpressure impact of 1 pound per square inch (psi)		

There are other refinery process vessels and tanks within the potential blast distance for a failure of the Coker Main Fractionator column. Because it is larger, the proposed replacement Coker Main Fractionator column has a 30 percent larger blast radius than the existing vessel. Thus, there is the potential for an additional hazard due to a blast at tanks and vessels within the new blast radius for the proposed replacement Coker Main Fractionator column. However, there are numerous vessels and pipelines with flammable substances on a refinery that could pose a vapor explosion hazard if containment were lost. It is likely that the additional on-refinery risk posed by a blast from a loss of containment of the proposed replacement Coker Main Fractionator column is equivalent to an existing blast risk posed by other nearby piece of process equipment not involved in the proposed project.

As presented previously, the catastrophic failure rate for a metallic pressurized tank or vessel, based on historical statistical data, is 0.0109 per million hours (one failure per approximately 10,500 years, AIChE, 1989), where a catastrophic failure is defined as a breach of ¼-inch or greater. The proposed new Coker Main Fractionator column will replace an older vessel of similar function. Because it will be a newer vessel, initially the probability of a failure will be less than that of an older vessel. Overall, the risk of a catastrophic vessel failure due to the replacement of an older pressure vessel with a newer vessel will not increase.

Because the hazard of an off-site consequence posed by a vapor explosion due to a vapor release from the proposed replacement Coker Main Fractionator column does not extend off the refinery, there is a-less-than-significant risk to an off-site individual. This is unchanged from the existing Coker Main Fractionator column. Overall, the risk of upset from the Coke Main Fractionator column due to a vapor explosion does not increase due to implementation of the proposed project.

4.2.2.4 Loss of Containment Producing a Liquid Pool and Resulting in a Liquid Pool Fire for the Existing and Proposed Replacement Coker Main Fractionator Columns

The liquids in the proposed replacement Coker Main Fractionator column will be primarily diesel (approximately 15 percent) and residual (approximately 85 percent). A structural failure of the existing or proposed replacement Coker Main Fractionator columns would lead to a pool of diesel and residual. If an ignition source is nearby, the liquid pool can form a pool fire.

The same RMP methodology used for estimating the potential risk from a pool fire from the Depropanizers was used to estimate the risk from a pool fire for the existing and proposed replacement Coker Main Fractionator. columns. Documentation of the computations of the off-site consequence analysis is given in Appendix C.

The hazard analysis assumed that the diesel on the trays within the Main Fractionator column would be released by the failure of containment of the Main Fractionator vessel. A nearby ignition source was then assumed to allow the pool to catch fire. Being lighter and less viscous, the diesel is assumed to spread more readily than the heavier residual, which was assumed to remain inside the Coker Main Fractionator column.

In the RMP methodology, the distance to the significant thermal flux level depends on the properties of the flammable liquid and on the surface area of the pool fire. To calculate the surface area, the RMP methodology assumes that the liquid spreads to a thickness of one centimeter, unless it is contained by a berm, process equipment, gutters, or other features that prevent it from spreading to a one-centimeter thickness. Based on the liquid volumes and the locations of existing equipment, gutters, and other structures surrounding both the existing and proposed replacement Coker Main Fractionator columns, the liquid contents would be contained in a 100-foot by150-foot area before they spread to a thickness of one centimeter.

Using the diesel liquid masses given in Table 4.2-1 and the RMP methodology, the distances to the 5.0 kW/m^2 thermal flux threshold for failures of the existing and proposed new Main Fractionator columns are both 180 meters. As the liquid pool surface area is the same for both scenarios, because the spread of the liquid would be limited by the same surrounding equipment and structures, the distance to the significant thermal flux impact is the same for both scenarios. The impact distance does not extend beyond the boundary of the refinery and does not produce an impact to an off-site receptor. These results are summarized in Table 4.2-6.

Table 4.2-6
Distance to Impact Threshold for Pool Fire Release Scenario at the Existing and Proposed Replacement Coker Main Fractionator Columns

Parameter	Existing Coker Main Fractionator Column	Proposed Replacement Coker Main Fractionator Column
Pool Fire – Distance to Thermal Flux Impact (meters)[a]	180	180
Nearest Distance to Property Line (meters)	695	695
Off-site Impact Distance (meters)	0	0
[a] Distance to a thermal flux of 5 kiloWatt per square meter (kW/m^2)		

As presented previously, the catastrophic failure rate for a metallic pressurized tank or vessel, based on historical statistical data, is 0.0109 per million hours (one failure per approximately 10,500 years, AIChE, 1989), where a catastrophic failure is defined as a breach of ¼-inch or greater. The proposed new Main Fractionator column will replace an older vessel of similar function. Because it will be a newer vessel, initially the probability of a failure will be less than that of an older vessel. Overall, the risk of a catastrophic vessel failure due to the replacement of an older pressure vessel with a newer vessel will not increase.

Because the hazard of an off-site consequence posed by a liquid pool fire due to a flammable liquid release from the proposed replacement Coker Main Fractionator column does not extend off the refinery, there is a-less-than-significant risk to an off-site individual. This is unchanged from the existing Coker Main Fractionator column. Overall, the risk of upset from the Coke Main Fractionator column due to a liquid pool fire does not increase due to implementation of the proposed project.

4.2.2.5 Release of H_2S from the Proposed No. 6 H_2S Plant Vessels

The postulated worst-case H_2S release scenario at the No. 6 H_2S Plant is a failure of a new vessel and release of the H_2S contained inside it. Chevron has calculated the quantity of H_2S that will be contained in each proposed new vessel based on the vessel sizes and contents. These H_2S quantities are listed in Table 4.2-7. Table 4.2-7 shows that the proposed new lean/rich DEA heat exchanger (E-2168) will contain the largest amount of H_2S (201 pounds) of the proposed new vessels. Therefore, the consequences of a catastrophic failure of this heat exchanger and release of the H_2S inside it were evaluated.

Table 4.2-7
H_2S Quantities in Proposed New No.6 H_2S Plant Vessels

Vessel	H_2S Quantity in Vessel (lb)
Flash Drum (V-2155)	0
DEA Regenerator Column (C-2160)	1
Lean/Rich DEA Heat Exchanger (E-2168)	201
DEA Regenerator Overhead Condenser (E-2160)	15
Reflux Drum (V-2160)	30
Caustic Scrubber Column (C-2180)	191
Sulfur Recovery Unit Knockout Pot (V-602)	9

The methodology used for estimating the potential risk from an H_2S release is that developed for off-site consequence analysis for RMP. The RMP*COMP model was used to estimate the off-site consequences. As a worst-case, a nighttime release with stable air and little dispersion of the released H_2S (stability class F) and a wind speed of 1.5 meters per second were assumed. The RMP-required worst-case assumption of a 10-minute release was also assumed. The release from the proposed new heat exchanger would be 201 pounds H_2S over a 10-minute period. Documentation of the computations of the off-site consequence analysis is given in Appendix C.

The distance to the impact significance thresholds for the release scenario is listed in Table 4.2-8. The table shows that the release scenarios would cause the ERPG 2 H_2S concentration to be exceeded off-site. Therefore, the proposed new No. 6 H_2S Plant DEA Regenerator will potentially cause significant adverse off-site impacts.

As presented previously, the catastrophic failure rate for a metallic pressurized tank or vessel, based on historical statistical data, is 0.0109 per million hours (one failure per approximately 10,500 years, AIChE, 1989), where a catastrophic failure is defined as a breach of ¼-inch or greater. Thus, the probability of a catastrophic failure of a new vessel extremely low.

Table 4.2-8
Distance to Impact Threshold for H_2S Release from the No. 6 H_2S Plant

Scenario	H_2S Release Quantity (lb in 10 min.)	Distance to ERPG-2 Threshold[a] (meters)	Nearest Distance to Property Line (meters)	Off-Site Impact Distance (meters)
Release from No. 6 H_2S Plant	201	1,400	245	1,155

[a] Distance to H_2S concentration of 30 parts per million

It should be noted that H_2S is currently produced by the No. 2 H_2S Plant, the No. 4 H_2S Plant and the No. 5 H_2S Plant, and a catastrophic failure of a vessel containing H_2S in one of these existing units would also release H_2S. Chevron evaluated the potential consequences of H_2S releases from these H_2S plants previously for the refinery's existing RMP, and estimated that the worst-case scenario would be a release from the No. 5 H_2S Plant with an impact distance of approximately 1,700 meters. Thus, the impact distance from the proposed modifications to the No. 6 H_2S Plant (1,155 meters) is less than the worst-case impact distance for the No. 5 H_2S Plant. Although, the proposed new DEA Regenerator at the No. 6 H_2S Plant does not pose a type of hazard that does not currently exist at the refinery, it is likely that new or different receptors would be exposed to H_2S concentrations that exceed ERPG II levels.

4.2.2.6 Loss of Containment Resulting in a Flammable Vapor Explosion and Pool Fire for the Proposed No. 6 H_2S Plant Jet Wash Column

The greatest potential hazard to the public from the proposed new Jet Wash Column at the No. 6 H_2S Plant is from a catastrophic breach of containment of the pressure vessel, potentially forming a cloud of flammable vapor and releasing flammable liquid to form a liquid pool. The flammable vapor in the proposed Jet Wash Column is fuel gas, and the flammable liquid used as the wash solution is jet fuel and/or diesel. If the flammable vapor released during a breach of containment encounters an ignition source, a vapor explosion could result, producing a blast wave that could cause personnel and structural damage if the blast were large enough. Similarly, if a flammable liquid pool were subject to an ignition source, a pool fire could result. The primary means to limit the potential sizes of the vapor explosion and pool fire are to prevent them from happening in the first place by preventing a breach in containment that would allow the flammable vapors and liquid to escape containment.

The same RMP methodologies used for estimating the potential risks from a vapor explosion and from a pool fire from the Depropanizers was used to estimate the risks from the proposed new Jet Wash column. Documentation of the computations of the off-site consequence analysis for the proposed Jet Wash Column is given in Appendix C.

The wash solution used in the Jet Wash Column is jet fuel and/or diesel. To be conservative, the physical properties of the wash liquid were assumed to be the same as gasoline, which is a more volatile substance. For the purposes of estimating the liquid volume for the pool fire, the volume of the column, less the top vapor space and less 25 percent of the packing volume, was assumed to be liquid.

In the RMP methodology, the distance to the significant thermal flux level depends on the properties of the flammable liquid and on the surface area of the pool fire. To calculate the surface area, the RMP methodology assumes that the liquid spreads to a thickness of one centimeter, unless it is contained by a berm, process equipment, gutters, or other drainage features that prevent it from spreading to a one-centimeter thickness. Based on the locations of existing equipment surrounding both the proposed new Jet Wash Column, the liquid contents would not be contained before it spread to a thickness of one centimeter. Therefore, the liquid volume was divided by one centimeter to calculate the surface area.

The fuel gas washed in the Jet Wash column is composed predominantly of methane and ethane with trace quantities of higher-carbon gases. For the purpose of this analysis, the fuel gas was assumed to be 90 percent methane and 10 percent ethane. The limiting pressure in the column is 200 psig, as determined by a pressure relief valve (PRV). The operating temperature is 450 °F. The accident scenario assumes the PRV fails, allowing the pressure to rise to 300 psig, and the temperature to 900 °F, at which time the vessel fails. The vapor volume of the column was assumed to be the column volume, less 25 percent of the packing volume. This is a conservative assumption, since it does not include the volume taken up by the wash liquid. It is assumed that only the fuel gas within the vessel contributes to the vapor explosion.

Using the RMP methodology and the above assumptions, the analysis shows that the distance to the one psi overpressure threshold for a vapor explosion is 160 meters. Similarly, the pool fire analysis shows that the distance to a thermal impact of 5.0 kW/m^2 is 180 meters. Neither the blast impact nor the pool fire impact extends off the refinery property. These results are summarized in Table 4.2-9.

As presented previously, the catastrophic failure rate for a metallic pressurized tank or vessel, based on historical statistical data, is 0.0109 per million hours (one failure per approximately

10,500 years, AIChE, 1989), where a catastrophic failure is defined as a breach of ¼-inch or greater. Because the hazards of off-site consequences posed by a vapor explosion due to a vapor release or a liquid pool fire due to a flammable liquid release from the proposed new Jet Wash Column do not extend off the refinery, there is a-less-than-significant risk to an off-site individual.

Table 4.2-9
Distance to Impact Threshold for Pool Fire and Vapor Release Scenarios for Proposed No. 6 H_2S Plant Jet Wash Column

Parameter	Pool Fire [a]	Vapor Explosion [a]
Distance to Thermal Flux Impact (meters)[a]	180	160
Nearest Distance to Property Line (meters)	245	245
Off-site Impact Distance (meters)	0	0

[a] Distance to a thermal flux of 5 kiloWatt per square meter (kW/m^2) for a pool fire and to an overpressure of 1 pounds per square inch gauge (psig) for a vapor explosion

4.2.3 Mitigation Measures

The potential incremental change in risk that would result from the proposed project will not substantially change the overall expected risk from the refinery. This determination is based primarily on the low probability of the occurrence of a catastrophic event, the very conservative assumptions used to estimate the "worst cases," and the implementation by Chevron of inspection programs, safety systems, and mitigation measures to reduce risk.

Due to the materials used and stored, and the industrial processes that occur onsite, the risk of large-scale upset conditions is always present to some degree. The proposed new DEA Regenerator in the No. 6 H_2S Plant is the only component of the proposed project that could cause off-site consequences if a catastrophic failure were to occur.

Compliance by Chevron with RMP and PSM requirements will help reduce the likelihood of occurrence of significant hazards posed by the proposed project; however, RMP and PSM requirements would not likely affect the consequences of a release. Thus, compliance with RMP and PSM requirements would likely reduce hazard impacts but would not mitigate project hazards to insignificance, as explained in the following paragraphs.

RMPs are required under California Health and Safety Code §25534 and 40 CFR Part 68, §112r. The RMP/CalARP must be completed before a regulated process becomes operational.

Federal OSHA regulations require refineries to prepare and implement a PSM Program. The federal requirement is identified under Title 29 of the CFR Part 1910, §119 (29 CFR 1910.119) and the California regulation is found under Title 8 of the California CCR, Section 5189 (8 CCR 5189).

A PSM 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. The primary components of a PSM include the following:

- Compilation of written process safety information to enable the employer and employees operating the process to identify and understand the hazards posed by the process;
- Performance of a process safety analysis to determine and evaluate the hazard of the process being analyzed;
- Development of operating procedures that provide clear instructions for safely conducting activities involved in each process identified for analysis;
- Training in the overview of the process and in the operating procedures for both refinery personnel and contractors is required. The training should also emphasize the specific safety and health hazards, procedures, and safe practices; and
- A pre-startup up safety review for new facilities and for modified facilities where a change is made in the process safety information.

The following mitigation measure will reduce the likelihood of the occurrence of an upset condition:

H-1) A pre-startup safety review will be performed for those additions and modifications proposed under the project where the change is substantial enough to require a change in the process safety information and/or where an acutely hazardous and/or flammable material would be used. The review will be performed by personnel with expertise in process operations and engineering. The review will verify the following:

- Construction and modifications are in accordance with design specifications and applicable codes;
- Safety, operating, maintenance, and emergency procedures are in place and are adequate;

- Process hazard analysis recommendations have been addressed and actions necessary for start-up have been completed; and
- Training of each operating employee and maintenance worker has been completed.

If it is determined during the pre-startup safety review that design and construction techniques alone cannot reduce the risk, further measures will be evaluated.

4.3 Hydrology and Water Quality

Potential impacts on water resources would be considered significant if any of the following conditions are met:

<u>Water Quality:</u>

- The project will cause degradation or depletion of ground water resources 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 National Pollutant Discharge Elimination System (NPDES) permit requirements;
- The project would exceed the capacities of existing or proposed wastewater treatment facilities and the sanitary sewer system;
- The project results in substantial increases in the area of impervious surfaces, such that interference with groundwater recharge efforts occurs; or
- The project results in alterations to the course or flow of floodwaters.

<u>Water Demand:</u>

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

4.3.1 Construction Impacts

This section discusses the potential impacts of construction of the proposed project on water supply and water quality.

4.3.1.1 Water Supply Impacts

Water will be required during the construction phase for hydrotesting new equipment and piping, watering for dust control pursuant to SCAQMD Rule 403 - Fugitive Dust, personnel washing, cleaning construction areas, mixing small quantities of concrete, and for compacting soil.

The maximum daily water use would occur during hydrotesting of the proposed replacement Coker Main Fractionator column. Approximately 400,000 gallons of water will be required over a period of approximately one week for this hydrotesting. Daily water usage for this hydrotesting would be approximately one-fifth of the total usage, or 80,000 gallons.

Water will be used for dust control during approximately nine months of the construction phase for the proposed project. Based on Chevron's anticipated excavation schedule for the proposed project construction, a maximum of approximately 1,200 square yards of soil would be disturbed in any one day. Using the assumption that 0.2 gallon per square yard per hour is required for adequate dust suppression, the worst-case water demand can be estimated by the following equation (EPA, 1992):

$$\text{Daily Water Usage} = 0.2\ (\text{gal/yd}^2\text{-hr}) \times 1{,}200\ \text{yd}^2 \times 10\ \text{hrs/day} = 2{,}490\ \text{gal/day}$$

Thus, dust suppression activities would require a maximum of 2,490 gallons of water per day.

Water use for the other activities listed above during construction is anticipated to be substantially less than the water required for hydrotesting the replacement Coker Main Fractionator column and for dust control. The maximum daily water use of 80,000 gallons per day for hydrotesting the replacement Coker Main Fractionator column and the maximum daily use of 2,490 gallons/day for dust control are considered minor and will cease following the construction phase. Accordingly, water supply impacts from the construction phase of the proposed project are not significant since the total daily estimated construction-related water demand does not exceed the SCAQMD's significance criterion of 5,000,000 gallons per day.

4.3.1.2 Water Quality Impacts

Wastewater created from the pressure-testing of vessels and pipelines to ensure integrity at project sites may contain minor amounts of oil, scale, and rust. Wastewater resulting from this hydrostatic testing process at the refinery will be routed to the existing process wastewater treatment systems and recycled or discharged after treatment along with the process wastewater. Therefore, wastewater generated during hydrostatic testing will not affect groundwater quality. The volume of wastewater that will be treated can be accommodated within the capacity of the refinery's wastewater treatment systems.

Excavation during construction is not expected to disrupt soils at depths sufficient to require dewatering. However, if dewatering is required, the wastewater will be treated, if necessary, and discharged under an existing general NPDES permit for construction dewatering. Dewatering would not affect groundwater resources in the project area.

Construction workers will be required to use portable sanitary facilities maintained by the contractor. Sanitary wastes at staging areas will be collected in portable chemical toilets and removed by a private contractor and disposed of off-site.

The proposed construction is anticipated to disturb a total of approximately 0.75 acre. As the area to be disturbed is less than one acre, a NPDES General Permit for Storm Water Discharges Associated with Construction Activity (Storm Water Construction Permit) is not required. However, a construction management plan will be developed and implemented that will address storm water runoff and sediment control. Because the proposed project disturbs such a small area (0.75 acre), storm water discharges are expected to be approximately the same as the current discharges; therefore, no significant adverse impacts are expected from storm water discharges during construction.

4.3.2 Operational Impacts

This section discusses the potential impacts of operation of the proposed project on water supply and water quality.

4.3.2.1 Water Supply Impacts

The refinery currently uses approximately 2.6 million gallons per day of fresh/potable water and 7.4 million gallons per day of reclaimed water. The proposed increase in coke drum cycles will require approximately 50,000 gallons per day of additional fresh water for coke drum cooling. Additionally, the proposed increase in the Cooling Tower No. 9 circulating water flow rate will require approximately 100,000 gallons per day of additional reclaimed water to replace the increased water evaporation rate from the cooling tower. Operation of the steam ejectors to reduce the pressure in the coke drums prior to venting is anticipated to require approximately 28,000 gallons per day of additional reclaimed water. Thus, operation of the proposed project will increase water requirements by approximately 178,000 gallons per day.

As the expected incremental increase in water use does not exceed the SCAQMD's significance threshold of 5,000,000 gallons per day, the water supply impacts for the proposed project are not considered significant.

4.3.2.2 Wastewater Discharges

The refinery currently discharges approximately seven million gallons per day of treated wastewater to the Santa Monica Bay. It is expected that approximately 178,000 gallons per day of additional wastewater per day will be discharged as a result of the proposed project. This additional 178,000 gallons per day consists of approximately 50,000 gallons per day of additional wastewater generated by the proposed additional coke drum cooling cycles, 28,000 gallons per day generated by operation of the steam ejectors to reduce the pressure in the coke drums prior to venting, and approximately 100,000 gallons per day of additional water removed from Cooling Tower No. 9 to prevent mineral buildup in the circulating water. Under the refinery's NPDES permit, the refinery is authorized to discharge up to 8.8 million gallons per day of treated wastewater during dry weather and up to 23 million gallons per day during wet weather. Therefore, the wastewater discharge volume after project implementation is expected to be well within the existing limits of the NPDES permit so NPDES permit modifications will not be required. As a result, significant adverse impacts associated with wastewater discharges at the refinery are not expected.

4.3.2.3 Storm Water Quality

The refinery has an existing NPDES permit for the discharge of storm water. The existing Storm Water Pollution Prevention Plan will be updated to reflect operational modifications to the refinery and include additional Best Management Practices, if required. Accordingly, since storm water discharge or runoff to local storm water systems is not expected to change significantly in either volume or water quality, no significant adverse storm water quality impacts are expected to result from the operation of the proposed project.

4.3.2.4 Groundwater Quality

The proposed new and replacement equipment will be constructed on concrete pads or asphalt, which will allow materials to be contained and recovered in the event of equipment leaks. The proposed modifications to the Coker include installation of approximately 500 feet of new underground piping. The proposed new piping will be leak tested prior to operation of the Coker modifications, which will ensure that contaminants will not be released by leaks from the piping. The proposed project does not require construction of new storage tanks, which would have the potential to leak and release contaminants into groundwater. Therefore, the proposed project will not cause significant adverse impacts to groundwater quality.

4.3.3 Mitigation Measures

Based on the above analyses, no significant adverse impacts to water quality and supply during construction or operation are expected as a result of the activities associated with the proposed project. Therefore, no specific mitigation measures are required.

4.4 Noise

Noise impacts will be considered significant if any of the following conditions are met:

- 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'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; or
- The project causes construction noise levels that exceed federal Occupational Safety and Health Administration (OSHA) noise standards for workers.

4.4.1 Incremental Increase Criteria

In addition to the absolute noise level that might occur when a new noise source is introduced into an area, it is also important to consider the level of the existing noise environment. If the existing noise environment in a noise-sensitive residential area is quite low and a new noise source greatly increases the noise exposure (even though a criterion level might not be exceeded), some impact may occur. A general rule of thumb for real-life noise-sensitive residential environments is that a change of over five dBA is readily noticeable and would be considered a significant increase at noise-sensitive residential receptors. Also, changes from three to five dBA may be noticed by some individuals and would be considered a substantial increase, possibly resulting in sporadic complaints; and changes of less than three dBA are normally not noticeable and are considered "insignificant" (Bolt, Beranek and Newman 1973).

As presented in Section 3.4.1.1, the City of El Segundo's Municipal Code 7-2-4 limits noise based on increases to the ambient sound level. Noise increases are limited to five dBA above the ambient (existing) sound level in residential areas and to eight dBA above the ambient sound level in commercial or industrial areas.

4.4.2 Construction Impacts

The maximum construction noise levels and increases in ambient sound levels during construction are described in the following subsections.

Because of the nature of activities during the construction phase, the types, numbers, and loudness of equipment will vary throughout the construction period. Construction is anticipated to occur over a 22-month period. During 16 of the 22 months, construction activities are planned to occur 10 hours per day, from 6:30 a.m. until 5:00 p.m., Monday through Friday and, possibly, but not generally, on weekends. Allowing for startup, some downtime, and breaks, the analysis assumes that equipment would be operating and potentially generating noise eight hours per day during the entire length of the construction phase of the project, starting at approximately 7:00 a.m. Construction will occur 20 hours per day, from 6:30 a.m. until 5:00 p.m. and, in addition, from 6:30 p.m. until 5:00 a.m., during a six-week period from late-March through early-May 2007 at the No. 4 Crude Unit, and during a 2-1/2 month period from mid-September through the end of November 2007 at the Coker.

The anticipated equipment usage for construction of the proposed modifications is listed by month and construction location in Appendix D.2. As presented in the Project Description in Chapter 2, subsequent to release of the Draft EIR for public review and comment, it was determined that an emission control system for emissions from coke drum venting will also need to be constructed. The construction noise impacts analysis in the Draft EIR has been revised in this Final EIR to include the equipment anticipated to be used for construction of the proposed control device. Table 4.4-1 presents ranges of noise levels for the types of construction-related machinery that are expected to be used. Noise levels associated with construction equipment were taken from Noise Control for Buildings and Manufacturing Plants (Hoover and Keith, 1994).

Table 4.4-1
Noise Levels of Construction Equipment

Equipment Type	Typical Sound Pressure Levels (dBA@50 Feet)[a]
Backhoes (70- to 125 HP)	72 to 77
Boom Trucks (250 TO 300 HP)	80 to 81
Compressors (20 to 200 HP)	80 to 84 @ Rated HP
Concrete Finisher/Grinder/Mixer/Saw (5 to 15 HP)	63 to 68
Concrete Pumps (45 to 300 HP)	78 to 86 @ Rated HP
Cranes (152 to 700 HP)	83 to 89
Excavator (125 HP)	77
Forklifts (35 to 102 HP)	71 to 76
Generators (11 to 375 HP)	66 to 82
Golf Cart (25 HP)	70
Light Plants (14 HP)	62
Loaders (36 to 234 HP)	72 to 80
Manlifts (32 to 76 HP)	71 to 75

Table 4.4-1 (concluded)
Noise Levels of Construction Equipment

Equipment Type	Typical Sound Pressure Levels (dBA@50 ft)[a]
Compactors/Tampers/Sheepsfoots (5 to 15 HP)	63 to 68
Wash and Trash Pumps (15 to 20 HP)	68 to 69
Vibratory Rollers (62 to 120 HP)	74 to 77
Scissorlifts (18 to 28 HP)	69 to 70
Super Sucker (330 HP)	81
Tackhoe (135 HP)	77
Vacuum Trucks (250 to 450 HP)	80 to 83
Welders (35 to 250 HP)	71 to 80
Yard Goats (75 HP)	75

[a] Predicted sound level, except for compressors and concrete pumps, is based on average equipment sound level ("off maximum"), assumed 5 dBA below rated (maximum) horsepower (HP).

Sources: Hoover and Keith, 1994. *Noise Control for Buildings, Manufacturing Plants, Equipment and Products.*

Light plant sound pressure level based on manufacturer advertisement of similar equipment (Higher Power, 2006)

The refinery will continue normal operations during construction of the proposed project. For the purpose of this evaluation, it was assumed that current major sources of noise within the refinery will continue throughout the construction period. Noise from local street traffic will also continue during construction of the proposed project.

Estimates of construction noise levels assume that approximately half of the construction equipment would be in operation at any one time. Equipment sound levels were extrapolated to receptor distances using standard free-field hemispheric sound propagation (six dBA of reduction per doubling of distance). Predicted maximum construction sound levels are conservatively estimated in that estimates do not include additional sound level reductions due to molecular absorption and anomalous atmospheric absorption. Predicted construction sound levels also conservatively assume only a minimal line-of-sight sound reduction from existing barriers to sound propagation (-5 dBA) instead of actual sound level reductions that can range up to more than -20 dBA depending on barrier height. These existing barriers include an existing berm along the south property line and buildings along the north side of El Segundo Blvd., between the refinery and the nearest residential locations to the north. Construction noise impact calculations are contained in Appendix D.2.

The existing and predicted increase in sound levels during refinery construction are presented in Table 4.4-2. Existing L_{eq} sound levels are based on measurements conducted at locations near the refinery in the vicinity of the nearest residential receptors. These measurements were originally conducted for the Chevron - El Segundo Refinery CARB Phase 3 Clean Fuels Project (SCAQMD 2001) and are discussed in detail in the noise study that can be found in Appendix D.1.

Table 4.4-2
Existing Noise Levels and Estimated Project Construction Noise Impacts

Receptor Location	Time	Existing Ambient Sound Level (L_{eq} dBA)	Estimated Construction Sound Level (L_{eq} - dBA)[a]	Total Sound Level During Construction (L_{eq} - dBA)	Total Increase in Sound Level During Construction (L_{eq} - dBA)[a]
Nearest El Segundo Site Boundary (El Segundo Blvd.)	Day	65	73	74	**9**
	Evening /Night	66	73	74	8
Nearest Manhattan Beach Site Boundary (Gate 22)	Day	64	56	65	1
	Evening /Night	59	56	61	2
Nearest El Segundo Residential Receptor (Grand Ave and Lomita Ave.; School behind St. Anthony's Church 1,000 ft. north of refinery)	Day	59	57	61	2
	Evening /Night	52	57	58	**6**
Nearest Manhattan Beach Residential Receptor (Armory Ave. ~200 ft. south of Gate 22)	Day	55	55	58	3
	Evening /Night	51	55	56	5

[a] City of El Segundo noise ordinance limits increase to 8 dBA at commercial receptors and 5 dBA at residential receptors. City of Manhattan Beach does not limit construction noise. Values in **bold** exceed City of El Segundo limits.

As presented in Section 3.4, the City of El Segundo's noise ordinance limits increases in ambient sound levels to eight dBA at commercial receptors and five dBA at residential receptors during construction. Construction sound levels are predicted to increase ambient sound levels at the northern refinery boundary by nine dBA during the day, which exceeds the City of El Segundo's noise ordinance limit for commercial receptors. Construction sound levels are also predicted to increase ambient sound levels at the nearest residential receptor to the north by six dBA during the night, which exceeds the City's noise ordinance limit for residential receptors. Thus, unmitigated construction noise will cause a significant adverse impact in the City of El Segundo.

The City of Manhattan Beach, which borders the refinery to the south, has no sound level limits imposed on construction noise.

4.4.3 Operational Impacts

The proposed project includes the addition of new equipment that will generate noise and the replacement of some existing equipment with larger equipment that may generate more noise than the replaced equipment. The proposed new and modified mechanical and process equipment will operate 24 hours per day, seven days per week. Chevron will limit noise of new equipment to 85 dBA at a distance of three feet to minimize potential on-site and off-site operational noise impacts.

Proposed project operational noise levels at the nearest off-site noise receptors were estimated from the proposed new project equipment specified for new or replaced operational equipment at the refinery. As was done to estimate noise impacts from construction of the proposed project, operational sound levels were extrapolated to receptor distances using standard free-field hemispheric sound propagation (six dBA of reduction per doubling of distance). Predicted maximum operational sound levels are conservatively estimated in that estimates do not include additional sound level reductions due to molecular absorption and anomalous atmospheric absorption. Predicted operational sound levels also conservatively assume only a minimal line-of-sight sound reduction from existing barriers to sound propagation (-5 dBA) instead of actual sound level reductions that can range up to more than -20 dBA depending on barrier height. Operational noise impact calculations are contained in Appendix D.3.

Additional noise from operation of the proposed project is expected to be due to the addition of new and modified equipment. For the most part, proposed modifications to or replacements of existing operational equipment are not expected to cause noise audible over the existing noise at refinery. The proposed modifications will not increase on-site or off-site rail activity, and additional truck traffic will be minor (approximately 22 additional daily truck trips distributed throughout the day to export petroleum coke and sulfur). Therefore, there is expected to be no measurable noise increase from traffic. Noise levels at the residences along El Segundo Boulevard and Rosecrans Avenue will continue to be dominated by existing traffic noise.

Proposed new and replacement operational noise sources at the refinery are presented in Table 4.4-3. Replacement equipment is not listed if the noise level of the new equipment is less than or the same as the replaced equipment. Sound levels listed in the table were estimated by Chevron or were estimated from equipment horsepower rating (Hoover and Keith, 1994). When sound levels estimated from equipment horsepower rating exceeded 85 dBA at three feet, they were set to the 85 dBA-limit that will be achieved by Chevron. The total sound levels listed in the last column are totals for multiple pieces of equipment when more than one new piece of equipment is proposed. For example, the sound level from each of the two proposed Coker cooling water pump motors in the first row is 85 dBA at three feet (not shown in the table), and the combined sound level from the two proposed pump motors is 88 dBA at three feet.

Table 4.4-3
Refinery Operational Noise Sources

Location	Equipment	New or Replacement	Number	New Size (hp)	Net Change in Size (hp)[a]	Total Sound Level at 3 Feet (dBA)[b]
Coker	Cooling Water Pump Motor	New	2	1000	1000	88
	Heater Charge Pump	Replacement	1	1750	750	85
	HGO Pumparound Pump	New	1	250	250	85
	LGO Pumparound Pump	Replacement	2	400	150	88
	Fractionator Reflux Pump	Replacement	1	125	65	85
	Interstage Knockout Pump	Replacement	2	40	15	87
	Stripper Feed Pumps	Replacement	2	100	25	88
	Blowdown Water Pump	Replacement	2	40	10	85
	Slop Oil Pump	New	2	10	10	85
	C-501A Overhead Water Circ. Pump	New	2	50	50	88
	Miscellaneous Pump	New	2	5	5	82
	Compressor Suct. KO Drum Pump	New	2	1	1	75
	Depropanizer Reflux Pump	New	2	25	25	88
	Condensate Pump	New	2	5	5	82
	Cooling Tower Fans	Replacement	6	150	75	93
	Fin Fan Cooler Motor	New	17	15	15	97
	Wet Gas Compressor	Replacement	1	12000	2000	85
	Spare lube oil pump	New	1	25	25	85
	Refrigeration package	New	1	400	400	85
	Spare refrigeration package	New	1	400	400	85
	Chilled water circ pump	New	1	20	20	85
	Spare chilled water circ pump	New	1	20	20	85
No. 4 Crude Unit	1st Stage Injector	Replacement	1	NA	-	85
	Crude Feed	Replacement	3	1750	500	90
	#1 Sidecut Stripper Pump	Replacement	1	150	50	85
No. 6 H_2S Plant	P-2165 Motor Driven Pump	New	1	250	250	85
	P-2186 Motor Driven Pump	New	1	30	30	80
	P-2160 Small Motor Driven Pump	New	1	7.5	7.5	50
	P-2164 Motor Driven Pump	New	1	7.5	7.5	25
	E-2155 Fin Fan Cooler	New	1	NA	-	85
	E-2160 Fin Fan Cooler	New	1	NA	-	85
	P-2169 Small Pump	New	1	0.3	0.3	25

Table 4.4-3 (concluded)
Refinery Operational Noise Sources

Location	Equipment	New or Replacement	Number	New Size (hp)	Net Change in Size (hp)[a]	Total Sound Level at 3 Feet (dBA)[b]
No. 6 H_2S Plant	P-2170 Small Pump	New	1	0.3	0.3	25
	P-602 Small Pump	New	1	5	5	50

[a]Increase in horsepower over existing unit. Replacement units with same or lower power specifications assumed to result in no added sound and are not listed.
[b]Estimated sound levels were based on Chevron estimates or on empirical data from equipment of similar hp and type such as pump, compressor (Hoover and Keith, 1994) up to maximum sound level of 85 dBA at 3 feet as specified by Chevron. Total sound level is for total number of each item.

The existing and predicted increases in sound levels during refinery operation are presented in Table 4.4-4. Operational sound levels are predicted to cause no increase in ambient sound levels at the northern refinery boundary during the day or night, which is below the City of El Segundo's noise ordinance limit of an eight dBA increase for commercial receptors. Operational sound levels are predicted to cause no increase in ambient sound levels at the nearest residential receptor to the north during the day and to cause a one dBA increase in sound levels at the residential receptor during the night. These increases are below the City of El Segundo's noise ordinance limit of a five dBA increase at residential receptors. Thus, operational noise will not cause the City of El Segundo's noise standards to be exceeded. Therefore, operation of the proposed project will not cause significant adverse noise impacts in the City of El Segundo.

Table 4.4-4
Existing Noise Levels and Estimated Project Operational Noise Impacts

Receptor Location	Time	Existing Ambient Sound Level (L_{eq} dBA)[a]	Estimated Operational Sound Level (L_{eq} - dBA)	Total Sound Level During Operation (L_{eq} - dBA)[a]	Total Increase in Sound Level During Operation (L_{eq} - dBA)[b]
Nearest El Segundo Site Boundary (El Segundo Blvd.)	Day	65	51	65	0
	Evening /Night	66	51	66	0
Nearest Manhattan Beach Site Boundary (Gate 22)	Day	64	44	64	0
	Evening /Night	59	44	59	0

Table 4.4-4 (concluded)
Existing Noise Levels and Estimated Project Operational Noise Impacts

Receptor Location	Time	Existing Ambient Sound Level (L_{eq} dBA)[a]	Estimated Operational Sound Level (L_{eq} - dBA)	Total Sound Level During Operation (L_{eq} - dBA)[a]	Total Increase in Sound Level During Operation (L_{eq} - dBA)[b]
Nearest El Segundo Residential Receptor (Grand Ave and Lomita Ave.; School behind St. Anthony's Church 1,000 ft. north of refinery)	Day	59	43	59	0
	Evening /Night	52	43	53	1
Nearest Manhattan Beach Residential Receptor (Armory Ave. ~200 ft. south of Gate 22)	Day	55	44	55	0
	Evening /Night	**51**	44	**52**	1

[a] City of Manhattan Beach Municipal Code limits are 70 dBA day and 65 dBA night at commercial receptors and 55 dBA day and 50 dBA night at residential receptors. The values in **bold** exceed the standards.
[b] City of El Segundo noise ordinance limits increase to 8 dBA at commercial receptors and 5 dBA at residential receptors.

As presented in Section 3.4, the City of Manhattan Beach's noise standards limit operational noise at commercial receptors to 70 dBA during the day and 65 dBA during the night. The predicted operational sound levels at the southern refinery boundary, which borders the City of Manhattan Beach, are below the City's noise standards for commercial receptors. Thus, operation of the proposed project will not cause the City of Manhattan Beach's noise standards for commercial receptors to be exceeded.

The City of Manhattan Beach's noise standards also limit operational noise at residential receptors to 55 dBA during the day and 50 dBA during the night. The predicted operational noise levels at the nearest City of Manhattan Beach residential receptor, to the south of the refinery, are below the City's noise standards during the day. However, as shown in Table 4.4-4, the existing noise level at the residential receptor during the night is 51 dBA, which currently exceeds the residential noise standard by one dBA, and operation of the proposed project is predicted to increase the noise levels by one additional dBA. Because the noise standard is currently exceeded, the impacts from the proposed project would be considered significant if the proposed project increased the noise level by more than three dBA. Since the proposed project increases the noise level by one dBA, operation of the proposed project will not cause adverse significant noise impacts at the nearest City of Manhattan Beach residential receptor during the night. Furthermore, a one dBA increase in sound levels is not anticipated to be audible. Therefore, operation of the proposed project will not cause significant adverse noise impacts in the City of Manhattan Beach.

4.4.4 Mitigation Measures

This section describes mitigation measures for potential significant adverse construction and operation noise impacts.

4.4.4.1 Construction Mitigation Measures

Unmitigated temporary noise impacts north of the refinery from construction of the proposed project are expected to exceed limits specified in the City of El Segundo's noise ordinance. Noise impacts that exceed the City's noise ordinance limits are caused primarily by construction of the proposed modifications at the No. 4 Crude Unit, which is approximately 400 feet from the northern refinery boundary, during the six-week period from late March through early-April 2007.

Mitigation measure N-1, listed in Table 4.4-5, will be implemented to reduce construction noise impacts. This mitigation measure will reduce the sound level from each of the compressors used during construction of the proposed modifications for the No. 4 Crude Unit by 5 dBA at 50 feet. Table 4.4-6 presents the resultant sound levels after mitigation measure N-1 is implemented to achieve these reductions in the sound levels from the compressors. Table 4.4-6 shows that increases in the ambient noise level at the northern refinery boundary will not exceed the City of El Segundo's eight dBA limit for commercial receptors, and that increases at the nearest residential receptor to the north of the refinery will not exceed the City's five dBA limit for residential receptors. Therefore, mitigated noise impacts during construction of the proposed project will not be significant.

Table 4.4-5
Construction Noise Mitigation Measure

Measure		Noise Reduction
N-1	Locate compressors used during construction of the proposed No. 4 Crude Unit modifications south of existing process equipment or shield them with 3/4-inch thick plywood shrouds located on the north side of the compressors	5 dBA reduction at 50 feet in noise from compressors

Table 4.4-6
Existing Noise Levels and Estimated Mitigated Project Construction Noise Impacts

Receptor Location	Time	Existing Ambient Sound Level (L_{eq} dBA)	Estimated Construction Sound Level (L_{eq} - dBA)[a]	Total Sound Level During Construction (L_{eq} - dBA)	Total Increase in Sound Level During Construction (L_{eq} - dBA)
Nearest North Site Boundary (El Segundo Blvd.)	Day	65	72	73	8
	Evening /Night	66	72	73	7
Nearest South Site Boundary (Gate 22)	Day	64	56	65	1
	Evening /Night	59	56	61	2
Nearest North Residential Receptor - Grand Ave and Lomita Ave.; School behind St. Anthony's Church 1,000 ft. north of refinery	Day	59	57	61	2
	Evening /Night	52	56	57	5
Nearest South Receptor Armory Ave. ~200 ft. south of Gate 22	Day	55	55	58	3
	Evening /Night	51	55	56	5

4.4.4.2 Operational Mitigation Measures

Operation of the proposed project is not expected to cause significant adverse noise impacts. Therefore, mitigation measures are not required for noise impacts during operation.

4.5 Solid and Hazardous Waste

The proposed project 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.

4.5.1 Construction Impacts

4.5.1.1 Non-Hazardous Waste Generated During Construction

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 whole proposed project at the refinery, approximately 358 tons of municipal (non-hazardous) solid waste would be generated over a 19-month period. This waste will include approximately 100 tons of non-asbestos insulation, 220 tons of broken concrete, and 38 tons of clean trash and debris.

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 sites 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 LARWQCB 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 19,000 cubic yards of soil, with a weight of approximately 23,000 tons, will be excavated over a total of nine months as a result of construction activities for the proposed project. Chevron estimates that a total of approximately 2,600 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 2,600 tons of non-hazardous waste would be generated during construction for the proposed project, and the total amount generated would be approximately 2,958 tons of solid waste.

Solid waste generated during construction of the proposed project will be stored on the refinery property prior to disposal at the Bradley Canyon Landfill maintained by Waste Management, Inc, or at one of the three landfills maintained by LACSD. Shipments of solid waste to the landfills would be scheduled to avoid exceeding the landfills' permitted daily capacities. Although, as stated in Section 3.5, the Bradley Canyon Landfill is expected to close in June 2007, which is before the end of the proposed project construction phase, the three landfills maintained by the Los Angeles County Sanitation Districts (LACSD) have the capacity to accept the waste produced by the proposed project.

4.5.1.2 Hazardous Waste Generated During Construction

Construction of the proposed project is anticipated to generate approximately 400 tons of hazardous waste, including approximately 245 tons of contaminated trash and debris, 140 tons of sand blasting residue, 20 tons of contaminated metal, and less than one ton each of paints/solvents and asbestos. Chevron estimates that a maximum of approximately one-third ton per day of hazardous wastes will be generated during the peak construction periods.

Additionally, as discussed previously, Chevron estimates that a total of approximately 2,600 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 2,600 tons of hazardous waste would be generated, and the total amount generated would be approximately 3,000 tons of hazardous waste.

Although these amounts of hazardous waste exceed the significance thresholds in the SCAQMD's 400-CEQA form, there is adequate capacity at the two Class I landfills in California approved to accept hazardous waste. Together, the landfills have 25 million cubic yards permitted capacity, which will accommodate these quantities. See Section 3.5 for more details. Therefore, the generation of 400 to 3,000 tons of potentially hazardous waste is not considered a significant impact.

4.5.2 Operational Impacts

There would be no new operations or expansion of existing operations that would generate additional waste. Although operation of the proposed project will increase the production of petroleum coke and sulfur at the refinery, these are considered products, not wastes. Therefore, no measurable increase in the generation of either non-hazardous or hazardous wastes is expected due to operation of the proposed project. No significant impacts on solid waste facilities are expected.

4.5.3 Mitigation Measures

No significant impacts to the waste disposal facilities are expected and thus no mitigation measures are required.

4.5.4 Ongoing Waste Reduction Policies

Although there are expected to be no significant impacts from the proposed project related to solid and hazardous waste, Chevron will continue to evaluate and implement existing waste minimization techniques to ensure that wastes generated from the project are minimized. Specifically, with respect to hazardous wastes, Chevron has prepared and implemented a refinery-wide Source Reduction Evaluation Review and Plan and Hazardous Waste Performance Report under the requirements of Senate Bill 14 (SB14). Under the requirements of this regulation, the refinery must:

- Reduce the generation of hazardous waste at its source;
- Reduce the release into the environment of chemicals that have adverse and serious health or environmental effects; and
- Document hazardous waste management information and make that information available.

Personnel working directly with soils that are hazardous wastes will be trained in accordance with 29 CFR 1910.120 - Hazardous Waste Operations and Emergency Response.

4.6 Transportation and Traffic

Traffic impacts will be considered significant if any of the following SCAQMD significance criteria are exceeded:

- Peak period levels on major arterials are disrupted to a point where level of service (LOS) is reduced to D, E or F 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;
- A major roadway is closed to all through traffic, and no alternate route is available;
- There is an increase in traffic (e.g., 350 heavy-duty truck round-trips per day) that is substantial in relation to the existing traffic load and capacity of the street system;
- The demand for parking facilities is substantially increased;
- Water borne, rail car or air traffic is substantially altered; or
- Traffic hazards to motor vehicles, bicyclists or pedestrians are substantially increased.

The Congestion Management Program (CMP) guidelines for the County of Los Angeles and the City of El Segundo's General Plan Circulation Element (City of El Segundo 2004) also contain traffic impact criteria. However, some of these other criteria are less stringent than the SCAQMD significance criteria for transportation and traffic. For example, Policy C3-1.2 in the City of El Segundo Circulation Element considers impacts from a project to be significant if the project would reduce the LOS from D or better to E or F, whereas the SCAQMD significance criteria consider an impact to be significant if the project degrades the LOS from C or better to D, E or F. Additionally, Policy C3-1.2 also considers impacts from a project to be significant if the project would increase the volume to capacity ratio of an intersection by 0.02 or more when the existing LOS is E or F, whereas the SCAQMD criteria consider an increase of 0.02 or more to be significant if the existing LOS is D, E or F.

Analyses of the potential traffic impacts from the proposed project are provided in Appendix E.

4.6.1 Construction Impacts

The following section discusses proposed project impacts on traffic and circulation during project construction. A two-step process was used to estimate the project-related traffic volumes at various points on the transportation system adjacent to the refinery. First, the amount of traffic that would be generated during project construction was determined. Next, the trips were assigned to specific roadways. The impacts on the assigned roadways and intersections of the additional trips generated by construction of the proposed project were then analyzed.

4.6.1.1 Trip Generation

The overall project construction period is expected to last a total of 22 months, beginning in June 2006 and ending in March 2008. Construction is anticipated to take place 10 hours per day, from 6:30 a.m. to 5:00 p.m., five days per week, Monday through Friday, during most of the 19-month construction period. During the turnaround for the No. 4 Crude Unit, from late-March 2007 through early-May 2007, construction for the proposed No. 4 Crude Unit modifications is anticipated to take place in two 10-hour shifts per day, from 6:30 a.m. to 5:00 p.m. and from 6:30 p.m. to 5:00 a.m., six days per week, Monday through Saturday. During the turnaround for the Coker, from mid-September 2007 through November 2007, construction for the proposed Coker modifications is anticipated to take place in two 10-hour shifts per day, from 6:30 a.m. to 5:00 p.m. and from 6:30 p.m. to 5:00 a.m., six days per week, Monday through Saturday.

The AM peak period of the adjacent street system surrounding the refinery is from 7:00 a.m. to 9:00 a.m. Because the daytime construction shift starts at 6:30 a.m., and the nighttime shift (when two shifts occur) ends at 5:00 a.m., worker commuting traffic attributable to project construction will not affect the AM peak hour conditions.

The PM peak period is from 4:00 p.m. to 6:00 p.m. The nighttime construction shift will not affect the PM peak period, because the nighttime shift will begin at 6:30 p.m., after the end of the PM peak period. However, because the daytime construction shift ends at 5:00 p.m., construction workers for the proposed project will leave during the PM peak period. Therefore, the analysis examines impacts from construction worker commuting only during the PM peak hour, when traffic congestion is highest.

The peak number of construction workers during a shift is anticipated to be 446, during the daytime shift in November 2006 (see Table 2-2). Construction personnel would commute to work in private automobiles, although carpooling would be encouraged. For purposes of a worst-case analysis, a vehicle occupancy rate of 1.0 persons per vehicle was used in the analysis, which means that there would be a peak of 446 worker vehicle trips generated at the beginning and end of a daytime construction shift by project construction activities.

The peak daily truck traffic at the refinery during construction would be approximately 82 trucks per day. Since these truck trips would mainly consist of material deliveries, they would be spread throughout the 10-hour workday. To minimize potential peak hour impacts, Chevron will arrange for deliveries of construction equipment and materials to avoid the AM and PM peak hours to the maximum extent possible. For analysis purposes, a change of two percent at an intersection caused by the addition of project traffic is considered a significant change but may or may not result in a significant impact. A typical four-legged intersection operating at an acceptable level of service will have approximately 3,000 to 6,000 vehicles using the intersection during a peak hour. To cause a two percent change in the intersection capacity utilization (ICU), a minimum of 60 vehicles during the peak hour would be required (3,000 vehicles X .02 = 60 vehicles). The maximum number of truck trips occurring during the AM or PM peak hours would be eight (one-tenth of the peak daily total of 82 truck trips). Therefore, project truck traffic during construction will have no or negligible impacts on traffic.

4.6.1.2 Trip Distribution

As discussed in Section 3.6, several of the intersections surrounding the refinery presently operate at an unacceptable level of service during the AM peak hour, PM peak hour, or both. To avoid impacts by project construction worker commuting traffic on congested intersections in the vicinity of the refinery, Chevron will use an off-site parking facility located at Dockweiler State Beach on Vista del Mar Avenue, as shown in Figure 4.6-1. The forecast trip distribution for the proposed project is also shown in Figure 4.6-1.

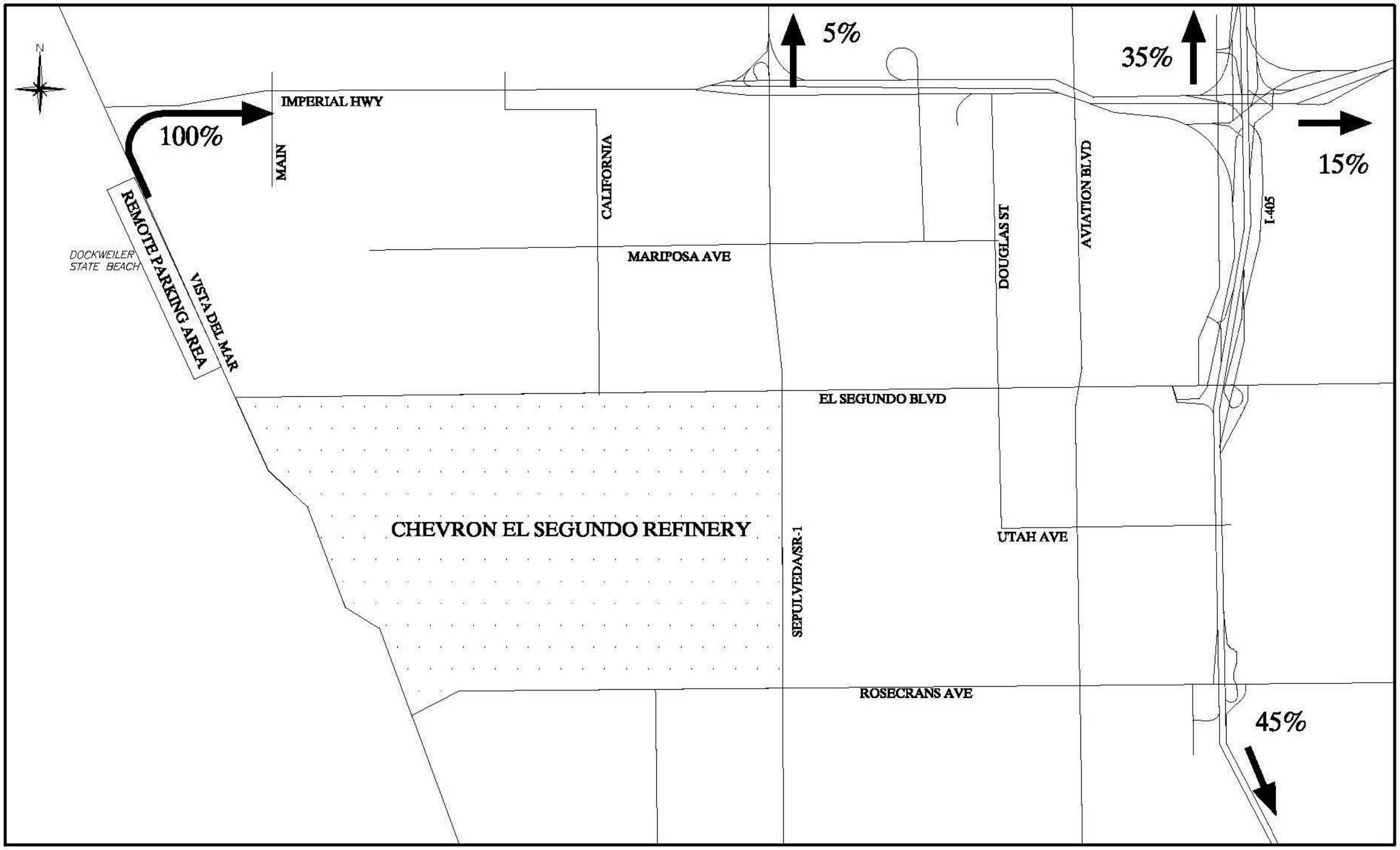


Figure 4.6-1 Construction Worker Commuting Trip Distribution

Construction workers will be shuttled by Chevron between the Dockweiler State Beach parking lot and the refinery using 40-passenger shuttle buses. To access this off-site parking facility, project construction employees would travel on the Glenn M. Anderson Freeway (I-105), to Imperial Highway (upon reaching the end of I-105 west of El Segundo Boulevard), and turn left on Vista del Mar. The I-105 freeway has an interchange with the San Diego Freeway (I-405), allowing connections to other freeways and locations north and south of the refinery. At the conclusion of the work shift, project construction workers will be returned by shuttle buses to the off-site parking area. As a contractual requirement between Chevron and its project construction contractors, project construction workers will be directed to turn left onto Vista Del Mar upon exiting the parking lot, then turn right onto Imperial Highway and to continue onto Imperial Highway onto the I-105 Freeway. By utilizing the off-site parking area and the specified routes, construction worker commuting will avoid the intersections currently operating at an unacceptable level of service in the vicinity of the refinery.

To ensure that project construction employees comply with the direction from Chevron regarding the travel routes to and from the off-site parking lot, Chevron will implement measures such as:

- Posting signs in the parking lot reminding project construction workers of the travel route requirement;
- Providing reminders to the construction workers by flyers or announcements by shuttle bus drivers; and
- Conducting periodic visual audits of worker compliance.

4.6.1.3 Existing Plus Project Traffic Impacts

As shown in Figure 4.6-1, the only intersections in the vicinity of the refinery that will be affected by construction worker commuter traffic from the proposed project are the intersections of Vista Del Mar and Imperial Highway, Main Street and Imperial Highway, and California Avenue and Imperial Highway. After the intersection of California Avenue and Imperial Highway, construction worker commuter traffic will continue on Imperial Highway to the start of the I-105 freeway, which is west of El Segundo Boulevard. During the PM peak hour, project construction traffic will use the northbound free right turn lane at the intersection of Vista del Mar and Imperial Highway. Free movements at intersections are not included in the level of service or delay calculations for intersections. Thus, project traffic will not impact the level of service at this location. Therefore, construction worker traffic for the proposed project will only affect the level-of-service at the intersections of California Avenue and Imperial Highway and Main Street and Imperial Highway.

The existing and projected PM peak period volume to capacity (V/C) ratios at the intersections of California Avenue and Imperial Highway and Main Street and Imperial Highway are shown in Table 4.6-1. Table 4.6-1 shows that the V/C ratio for California Avenue and Imperial Highway would increase from 0.482 (LOS A) to 0.575 (LOS A), and the V/C ratio for Main Street and Imperial Highway would increase from 0.617 (LOS B) to 0.710 (LOS C). Thus, construction worker commuter traffic for the proposed project will not cause the LOS at either of these intersections to decrease to D or worse. Therefore, construction worker commuter traffic for the proposed project will not cause significant adverse impacts on intersections in the vicinity of the refinery, under the SCAQMD CEQA significance criteria, the Los Angeles County Congestion Management Program guidelines or the City of El Segundo criteria.

Table 4.6-1
Existing and Forecasted Intersection Volume to Capacity Summary

Intersection	Existing PM V/C Ratio	Existing+ Project PM V/C ratio	Percent Change
California Ave & Imperial Hwy	.482	.575	.093
Main St. & Imperial Hwy.	.617	.710	.093

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 Above 1.0 F = LOS F Forced flow (above maximum capacity; unacceptable delay

To address potential impacts on the freeway system, four segments along the I-105 and the 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 projected LOS values on the freeway segments are summarized in Table 4.6-2. Table 4.6-2 shows that construction worker traffic for the proposed project will not cause the LOS on any of the four segments to degrade to level D or worse or cause an increase of 0.02 or more in the D/C ratio for a segment operating at LOS D, E, or F. Therefore, construction worker commuting traffic for the proposed project will not cause significant adverse impacts on freeways in the vicinity of the refinery.

Table 4.6-2
Existing and Existing-plus- Project Freeway Conditions

No.	Freeway Segment	Dir.	Peak Hour	Freeway Capacity[a]	Existing Conditions[b] D/C Ratio	Existing Conditions[b] LOS	Existing+Project Conditions Daily Volume	Peak Hour Volume	D/C Ratio	LOS	Project Impact
1	I-105 btwn Sepulveda Blvd & Douglas Street	E/B	AM	8,000	0.44	B	86,190	3,540	0.44	B	0.00
			PM	8,000	0.43	B		3,846	0.48	B	0.05
		W/B	AM	8,000	0.42	B		3,806	0.47	B	0.05
			PM	8,000	0.51	B		4,080	0.51	B	0.00
2	I-105 btwn. Douglas Street & I-405 Interchange	E/B	AM	8,000	0.63	C	127,900	5,050	0.63	C	0.00
			PM	8,000	0.61	C		5,326	0.66	C	0.05
		W/B	AM	8,000	0.60	C		5,236	0.65	C	0.05
			PM	8,000	0.73	C		5,830	0.73	C	0.00
3	I-405 btwn. Rosecrans Ave. & El Segundo Blvd.	N/B	AM	9,600**	1.08	F(0)	305,900	10,460	1.08	F(0)	0.00
			PM	9,600**	1.05	F(0)		10,090	1.05	F(0)	0.00
		S/B	AM	9,600**	1.03	F(0)		9,920	1.03	F(0)	0.00
			PM	9,600**	1.26	F(1)		12,280	1.27	F(1)	0.01
4	I-405 btwn. El Segundo Blvd & I-105 Interchange	N/B	AM	9,600**	0.85	D	242,500	8,200	0.85	D	0.00
			PM	9,600**	0.83	D		7,910	0.83	D	0.00
		S/B	AM	9,600**	0.81	D		7,780	0.81	D	0.00
			PM	9,600**	0.99	E		9,670	1.00	E	0.01

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 High Occupancy Vehicle (HOV) lane
[b] See Table 3.6-2
Source: Los Angeles County Metropolitan Transportation Authority, Congestion Management Program, 2002.

Additionally:

- Neither construction nor operation of the proposed project will require closing major roadways or railroads to all through traffic with no alternate route available; and
- Chevron has confirmed with the operator of the off-site parking lot that will be used for construction employees that parking places will be provided for the entire construction workforce, and, therefore, no on-street parking will be required and no substantial increases in demand on parking facilities will occur.

Therefore, construction of the proposed project will not cause significant adverse impacts to transportation and traffic.

4.6.2 Operational Impacts

The proposed project will not require additional operational employees at the refinery and will increase average daily truck traffic by only 22 trucks per day to export petroleum coke and sulfur from the refinery. These 22 additional export truck trips will be spread throughout the day. Therefore, impacts on the traffic system from these truck trips will be minimal.

No substantial increase in rail use is expected as a result of the proposed project. Because no changes in roadway design or other modifications to the roadway system will occur, there will be no substantial increases in traffic hazards to motor vehicles, bicyclists, or pedestrians. Additionally, the proposed refinery modifications do not involve construction of tall structures that would conflict with Federal Aviation Administration (FAA) height limitations in proximity to airport runways.

Therefore, operation of the proposed project will not cause significant adverse impacts to transportation and traffic.

4.6.3 Mitigation Measures

No significant adverse impacts to transportation and traffic are expected as a result of the activities associated with the proposed project. Therefore, no specific mitigation measures are required.

4.7 Growth Inducing Impacts of the Proposed Project

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 and additional refinery workers are not expected to be needed. 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 proposed project.

4.8 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 environmental impacts are impacts that would exceed established significance threshold levels (e.g., construction air pollutant emissions and operational hazard impacts 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 impacts on air quality during the construction phase, but not during the operational phase (see Section 4.1), and on hazards during the operational phase (see Section 4.2).

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.

4.9 Environmental Effects Not Found to be Significant

The environmental effects of the Chevron - El Segundo Refinery Heavy Crude Project are identified and analyzed in the preceding sections of Chapter 4 of this Final EIR and in the Initial Study (see Appendix A). CEQA Guidelines §15128 requires the environmental effects not found to be significant be identified in an EIR. The analyses in this Final EIR found that the following environmental topics were not found to pose potentially significant adverse effects:

- Hydrology and Water Quality
- Noise (after mitigation)
- Solid and Hazardous Waste
- Transportation and Traffic

Based on the assessment completed for the Initial Study, the following areas were determined not to pose potentially significant adverse effects.

<u>Aesthetics</u>

All project activities will take place within the boundaries of the existing refinery, and the new refinery 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 refinery. The primary change with a potential for visual resources impacts will be the proposed replacement of the existing Main Fractionator column at the Coker, which is 118 feet tall, with a new Main Fractionator column, which will be 170 feet tall. Thus, the proposed new Main Fractionator column will be approximately 30 percent taller than the existing column. Because of its height, the upper portion of the proposed new Main Fractionator column is expected to be visible from most off-site locations. However, there are other existing tall towers in the immediate vicinity of the proposed new Main Fractionator column. The new column will be located approximately 100 feet from the coke drums, and drilling structures on top of the coke drums are 340 feet high, which is approximately twice as tall as the new column. Also, the Fluid Catalytic Cracking (FCC) Unit Reactor at the refinery is located approximately 350 feet from the Coker, and the top of the FCC Unit Reactor is 332 feet above grade. Because of the physical similarity of the proposed new Coker Main Fractionator column to the existing refinery equipment, and because the new column will be located in areas of the refinery that already contain numerous and similar existing pieces of large refinery equipment, the structures that will be constructed as part of the proposed project are expected to have less-than-significant impacts on the existing visual character or quality of the refinery site and its surroundings.

Additionally, Section 15-6B-7 of the City of El Segundo Municipal Code provides Site Development Standards with which all uses within the M-2 (Heavy Manufacturing) zone, which includes the refinery, 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, because the proposed new structures will be less than 200 feet tall, the proposed project structures would be consistent and in compliance with the height requirements of the City of El Segundo.

Additional permanent lighting will be installed on the proposed new Coker Main Fractionator column. This new lighting will be consistent in intensity and type with the existing lighting on equipment and other refinery structures in the vicinity of the proposed new Coker Main Fractionator column, including the taller drilling structures on top of the coke drums and the taller Fluid Catalytic Cracking (FCC) Unit Reactor. Additionally, the proposed new Coker Main Fractionator column will be located in the middle of the refinery property. Thus, no new areas would be illuminated on-site or off-site by permanent additional lighting.

For 16 months of the anticipated 22-month construction period, construction activities associated with the proposed project are planned to occur only during daylight hours, which will eliminate the need for additional night lighting during most of the construction activities. Temporary lighting will be required during the six-week period when nighttime construction is anticipated to occur for the No. 4 Crude Unit modifications and the three months when nighttime construction is anticipated to occur for the Coker modifications. Project construction activities associated with the proposed Coker modifications will take place in the interior of the refinery, and the temporary lighting associated with these activities is not expected to be discernible from the existing refinery lighting from off-site locations. However, the No. 4 Crude Unit is near the northern boundary of the refinery, and the No. 4 Crude Unit and its existing lighting are visible from off-site locations across El Segundo Boulevard and from a hilly area north of the refinery, although some limited screening is provided by existing trees along El Segundo Boulevard. The temporary construction lighting will be discernible from the normal lighting at the No. 4 Crude Unit from these locations.

Typical stanchion-mounted banks of lights will be used to provide the temporary lighting. Standard practice at the refinery is to place construction lighting so that it faces toward the interior of the refinery, particularly when working near the periphery of the refinery property, to shield and focus the lights so that they point downward or parallel to the ground, and to limit the amount of lighting to what is needed to adequately illuminate the specific locations where the night work is occurring. Additionally, the proposed nighttime construction activities at the No. 4 Crude Unit will occur during a currently scheduled turnaround (routine maintenance) for the unit, which is necessary even if the proposed project were not to occur. This turnaround will also include nighttime activities, which will require temporary lighting similar to the temporary lighting required for the proposed project. Thus, increased lighting levels at the No. 4 Crude Unit would occur during this six-week period in the absence of the proposed project. 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.

In summary, no significant adverse impacts on aesthetics or impacts from light and glare are expected from the proposed project.

Agricultural Resources

No agricultural resources exist at or in the vicinity of the refinery and no new land will be acquired as part of the proposed project. Therefore, no impacts on agricultural resources are expected from the proposed project.

Biological Resources

The refinery is zoned and has been used for heavy industrial purposes since 1911, and has already been disturbed. 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, plants are removed from operating areas 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 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. The proposed project modifications will occur 3,000 feet or more from the Chevron butterfly sanctuary, and, therefore, will not impact the El Segundo blue butterfly. The Pacific pocket mouse was last reported in the area of the refinery in 1938, and, thus, is not expected to exist at the refinery at present. The only reported occurrence for the beach spectaclepod at the refinery site was in 1884, and the species is not expected to exist at the refinery at present.

In summary, the proposed project is not expected to cause significant adverse impacts to biological resources.

<u>Cultural Resources</u>

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 refinery. 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. 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.

The proposed project includes demolition of an existing depropanizer that was built in 1948 and is, therefore, more than 50 years old. However, the depropanizer does not meet the criteria to be considered historically significant in CEQA Guidelines §15064.5(a)(3). 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.

The 90+ years of operations at the 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. 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 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.

In summary, the proposed project is not expected to have significant adverse impacts on historic or prehistoric cultural resources or paleontological resources.

Energy

The proposed project is not expected to conflict with energy conservation plans or energy standards. It is in Chevron's economic interest to conserve energy and comply with existing energy standards in order to minimize operating costs. New equipment installed as part of the proposed modifications will be as efficient or more efficient than replaced equipment.

It is not expected that natural gas-fired or electrically powered construction equipment or vehicles will be used and, thus, there will be no need for new or substantially altered power or natural gas utility systems during construction of the proposed project. The proposed project will not result in the need for new or substantially altered power or natural gas utility systems during operation, because the power and natural gas needed to operate the proposed new and modified equipment are available from the existing refinery utility system.

Operation of the proposed project is not expected to require additional staffing at the refinery, and thus there will be no additional fuel use associated with worker commute trips. No additional truck deliveries to the refinery are expected during project operations. Although up to 22 additional truck shipments per day of petroleum coke from the refinery are expected during operation, the additional diesel fuel required for these truck trips can be accommodated within existing supplies. Project operation will require the use of additional refinery fuel gas and electrical power in the new and modified refinery equipment, such as pumps, but these requirements can also be accommodated within existing supplies.

In summary, the impacts of project energy consumption during construction and operation are not considered to be a wasteful use of energy and are expected to be the same or less than the existing situation.

Geology and Soils

The proposed project will be constructed in an area of known seismic activity. The proposed construction activities will conform to the Uniform Building Code and other applicable codes. The City of El Segundo General Plan - Public Safety Element includes Goal PS1: Geology and Soils to "protect the public health and safety and minimize the social and economic impacts associated with geologic hazards," and Goal PS2: Faulting and Seismicity/Structural Hazards to "minimize injury and loss of life, property damage, and social, cultural and economic impacts caused by earthquake hazards." The Public Safety Element includes a number of policies and programs to implement these goals. These programs require review of building and developmental plans by the City of El Segundo to ensure that they are consistent with the policies that implement Goals PS1 and PS2. The City of El Segundo will act as the responsible agency for permits and approvals required by the City. Therefore, the proposed project will comply with the requirements of this element through the issuance of permits and approvals by the City. Additionally, the refinery site has not been identified as an area where liquefaction (transformation of loose, water-saturated soils to a liquid state during earthquakes) is considered a significant potential risk. With adherence to proper design and construction practices, no significant impacts from seismic ground shaking would be expected.

Erosion from wind or water could occur during construction of the proposed project as soils are exposed at the locations where new or modified equipment are proposed to be sited. However, the areas of project-related ground disturbance are expected to be small, and standard construction grading practices and retention features will contain runoff. A construction plan will be prepared that includes guidance for construction phase erosion control, and a Storm water Pollution Prevention Plan (SWPPP) will be developed for project construction to minimize storm water and sediment from the locations where project activities are planned. The proposed project will also comply with SCAQMD Rule 403, which requires various measures to control fugitive dust, and these measures will minimize wind erosion. For these reasons, potential erosion impacts are expected to be less than significant.

In summary, no significant adverse impacts on geology and soils are expected from the proposed project.

Land Use and Planning

The refinery is zoned by the City of El Segundo as Heavy Industrial (M-2) and used for heavy manufacturing. The overall activities and products produced at the refinery will remain the same, and 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.

Additionally, no established communities are located on the refinery property, and consequently, the proposed project will not physically divide an established community. Furthermore, 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.

In summary, the proposed project will not cause significant adverse impacts to land use or planning.

Mineral Resources

There are no known mineral resources on the refinery site. Any potential loss of mineral resources from the extraction of the crude oil processed by the refinery 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 locally or to the region and residents of the state. Therefore, no adverse impacts to mineral resources are expected from the construction and operation of the proposed project.

Population and Housing

Construction of the proposed project will take place over a period of approximately 19 months at a facility located in a highly urbanized and populous area of southern California. At the peak of construction, approximately 694 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 694 temporary construction jobs are expected to be filled from the existing regional labor pool. Once construction is completed, no additional staff is expected to be needed at the refinery for operation of the proposed project. Thus, the proposed project will not induce substantial growth either directly or indirectly. Therefore, no adverse impacts on population size, population distribution, or housing are expected to result from proposed project construction and operation.

Public Services

To respond to emergency situations, the Chevron El Segundo Refinery maintains an on-site fire department, which is capable of responding to petroleum and structure fires, hazardous materials releases, and confined-space rescues. The on-site fire department holds regular training sessions and drills in conjunction with local fire departments, including the City of El Segundo Fire Department. The refinery is also 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 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 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 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 refinery has an on-site security department that provides protective services for people and property within the refinery bounds. Because the proposed project will not change refinery staffing during operation or substantially expand the existing facilities within the refinery, there is expected to be no need for new or expanded police protection.

Because the proposed project will not require additional operational staffing at the refinery, there will be no increase in local population, and no impacts are expected to schools, parks, or other public facilities as a result of the proposed project.

In summary, the proposed project is not expected to result in significant adverse impacts on public services.

<u>Recreation</u>

There will be no changes in population size or densities resulting from the proposed project and, thus, implementation of the proposed project will not cause an increase in the use of existing neighborhood and regional parks or other recreational facilities. Further, the proposed project will be located at an established industrial facility and will have no effect on existing nearby parks or other recreational facilities. The proposed project also will not require the construction or expansion of recreational facilities and, thus, will not have an adverse physical effect on the environment. Therefore, the proposed project is not expected to result in significant adverse recreation impacts.

CHAPTER 5

ALTERNATIVES

INTRODUCTION
ALTERNATIVES REJECTED AS INFEASIBLE
PROJECT ALTERNATIVES
ALTERNATIVES ANALYSIS
CONCLUSION

5.0 PROJECT ALTERNATIVES

5.1 Introduction

The following sections identify and compare the relative merits of alternatives to the proposed project as required by the CEQA guidelines. According to CEQA Guidelines §15126.6(a), "An EIR shall describe a range of reasonable alternatives to the proposed project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project…" The alternatives presented in this section have been selected based on the assumption that each is potentially capable of reducing or eliminating significant effects of the project.

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 project. The CEQA Guidelines also state in §15126.6(f)(2)(B) 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.

An alternatives analysis also includes an evaluation of the "no project" alternative as a basis for comparing the relative merits and potential significant environmental impacts of the proposed project and the project alternatives.

Three project alternatives, including the "no project" alternative, are proposed for consideration. Project alternatives were developed by considering different approaches or engineering designs that would allow the proposed project to increase the amount of heavy crude oil processed by the refinery while maintaining, or slightly increasing, the production of motor fuels and other saleable products. Analyses of the alternatives are presented in this Chapter along with a description of the modifications and/or additions that would be required at the refinery.

5.2 Alternatives Rejected as Infeasible

Section 15126.6(c) of the CEQA Guidelines states that the EIR should identify alternatives that were considered, but that were rejected as infeasible. The project design presented in Chapter 2 was developed by Chevron after extensive evaluation of existing refinery facilities and necessary process modifications/additions. During this evaluation, the following alternatives were investigated and determined to be infeasible:

- Implementing the proposed project at an alternative location. As required by CEQA Guidelines §15126.6(f)(2)(B), the feasibility of implementing the proposed project at an alternative location was evaluated. Implementing the proposed project at an alternative location is not feasible, because the proposed project consists of modifications to existing process units at the refinery and to relocate the refinery or portions of the refinery would be a massive undertaking generating more significant impacts.

- Adding a second vacuum distillation column in the No. 4 Crude Unit: This alternative would increase the No. 4 Crude Unit vacuum residuum processing capacity and increase the Coker capacity by more efficient removal of lighter products from the Coker feed. This alternative would reduce the amount of on-site construction by allowing the use of the existing No. 4 Crude Unit vacuum column without modifications while the new column would be constructed off-site. However, this alternative is not feasible because there is not adequate space within the existing No. 4 Crude Unit to install a new vacuum distillation column.

- Replacing the Coker coke drums with larger capacity drums. This alternative would increase the Coker petroleum coke production rate without the need for modifications to reduce the coke drum cycle time. However, this alternative is not feasible because the existing coke drum structures do not have room to add significant capacity by constructing larger-diameter drums and installation of taller coke drums would violate the current height limitations in the Cite of El Segundo's Municipal Code.

- Installing two new coke drums and an additional feed heater. This alternative would also increase the Coker petroleum coke production rate without the need for modifications to reduce the coke drum cycle time. However, this alternative is not feasible because adequate space does not exist in the Coker area to accommodate additional coke drums and installation of new coke drums would violate the current height limitations in the Cite of El Segundo's Municipal Code

- Constructing a new Coker unit instead of modifying the existing Coker. This alternative is not feasible because the refinery does not have adequate space to construct a new Coker, and shutting down and demolishing the existing Coker to make room for a new Coker would disrupt the production of refined products for an extended time period, which would substantially impact motor fuel supplies in southern California.

- Constructing the proposed replacement Coker Main Fractionator column at an off-site location and transporting it to the refinery for installation. This alternative would reduce the amount of on-site construction activities required, which would reduce criteria air pollutant emissions during the construction phase. However, this alternative is not feasible, because the diameter of the bottom section of the proposed replacement Main

Fractionator column is 27 feet, which exceeds the cargo size that can be transported safely on the public roadways to the refinery.

- Constructing proposed new equipment, such as banks of heat exchangers and pumps, in modules off-site. This alternative would also reduce the amount of on-site construction required, which would reduce criteria air pollutant emissions during the construction phase. However, this alternative is also not feasible because the varied locations of the proposed new equipment within the existing refinery process units are not equipped for modularization of the equipment.

5.3 Project Alternatives

Three project alternatives have been identified as technically feasible and are described in the following subsections Unless otherwise stated, all other components of each project alternative are identical to the proposed project.

Alternative 1: Use the Existing Coker Main Fractionator Column Instead of Replacing It with a Larger, More Efficient Column.

Alternative 1 would use the existing Coker Main Fractionator column and not replace it with a new column. The new column would be constructed on-site under the proposed project. So, by not installing a new Coker Main Fractionator column, on-site construction activities under Alternative 1 would be substantially reduced. It would reduce the peak construction workforce by 60 workers and avoid the use of one 600-ton crane, one 230-ton crane, two welders, and a portable heater that would be used for stress relief for the new column.

This alternative was not included as part of the proposed project because the capacity of the existing Coker Main Fractionator column would limit the increase in heavy crude oil that could be processed by the refinery to approximately one-quarter of the increase that could be realized by the proposed project. Thus, Alternative 1 would only partially meet the objective of the project to increase the quantity of heavy crude oil processed by the refinery.

Construction manpower requirements for this alternative are listed by month in Table 5.3-1.

Table 5.3-1a
Alternative 1 Construction Manpower by Month (June ’06 - March ’07)

Project Component	Jun 06	Jul 06	Aug 06	Sep 06	Oct 06	Nov 06	Dec 06	Jan 07	Feb 07	Mar 07
No. 4 Crude Unit	0	3	5	9	20	14	16	18	10	84
Coker	0	133	186	173	217	260	241	248	208	244
No. 6 H_2S Plant	4	28	52	74	109	112	69	20	5	0
Total pr Day	**4**	**164**	**243**	**256**	**346**	**386**	**326**	**286**	**223**	**328**
Total per Shift	**4**	**164**	**243**	**256**	**346**	**386**	**326**	**286**	**223**	**286**

Table 5.3-1b
Alternative 1 Construction Manpower by Month (April ’07 - March ’08)

Project Component	Apr 07	May 07	Jun 07	Jul 07	Aug 07	Sep 07	Oct 07	Nov 07	Dec 07	Jan 08	Feb 08	Mar 08
No. 4 Crude Unit	223	70	0	0	0	0	0	0	0	0	0	0
Coker	240	201	174	94	20	214	649	212	77	40	20	20
No. 6 H_2S Plant	0	0	0	0	0	0	0	0	0	0	0	0
Total per Day	**463**	**271**	**174**	**94**	**20**	**214**	**649**	**212**	**77**	**40**	**20**	**20**
Total per Shift	**352**	**236**	**174**	**94**	**20**	**107**	**325**	**106**	**77**	**40**	**20**	**20**

[a] Construction for the proposed No. 4 Crude Unit modifications will occur two shifts per day from late-March 2007 through early-May 2007, and construction for the proposed Coker modifications will occur two shifts per day from mid-September 2007 through November 2007. Construction will occur one shift per day for the rest of the construction period. Shaded entries indicate periods with two daily construction shifts.

Alternative 2 - Add Heating and Insulation to Crude Oil Storage Tanks

Crude oil imported to the refinery is stored in tanks prior to processing. Heavy crude oil requires heating to reduce its viscosity so that it can be handled in the refinery. The refinery currently has three different crude oil storage and feed systems, each containing multiple storage tanks. Only one of those systems includes tanks that are heated and insulated to handle heavy crude oil. The other two crude oil storage and feed systems are not heated, so they cannot handle heavy crude oil.

Chevron currently imports and stores heavy crude oil from different sources at the same time. Because crude oils from different sources have different properties, such as sulfur content, they need to be stored in separate storage tanks. The refinery currently has sufficient heated crude oil storage tank capacity to store the additional quantity of heavy crude oil that will be imported during operation of the proposed project, but the number of different types of heavy crude oil that Chevron can store at the same time will decrease. Alternative 2 would provide additional heavy crude oil storage capacity that would enable the refinery to maintain its current capabilities to store heavy crude oil from multiple sources during operation of the proposed project. This alternative was not included as part of the proposed project because the increased flexibility to store heavy crude oils from multiple sources was not considered to be absolutely necessary by Chevron for the cost to implement it.

Currently, as well as during operation of the proposed project, marine tankers occasionally need to wait offshore or in the Port of Los Angeles before they offload at the ESMT because of a number of reasons. One primary reason is if the tankers are carrying a different type of heavy crude oil than is already in storage at the refinery and none of the heavy crude oil storage tanks is empty. Alternative 2 would potentially reduce the amount of time that marine tankers would need to wait before offloading heavy crude oil by increasing the number of storage tanks that can accommodate heavy crude oil. By allowing the marine tankers to unload heavy crude oil sooner, emissions from the idling of marine tankers as well as emissions from the hoteling (auxiliary power) sources are reduced. However, the reduction in the amount of time tankers would need to wait to offload cannot be predicted at this time because the quantities of heavy crude oil that will be in refinery storage tanks when a crude oil tanker arrives with a different type of heavy crude oil cannot be predicted. Thus, related emission reductions cannot be quantified.

Alternative 2 includes adding insulation to one crude oil storage tank, adding heating systems to two crude oil storage tanks, adding piping, and upgrading pumps associated with crude oil storage tanks to enable them to handle the higher viscosity crude oil. Specific modifications would include:

- Insulate one existing crude oil storage tank (Tank T-1000);
- Add heating systems, consisting of heat exchangers, pumps and piping, to two existing crude oil storage tanks (Tanks T-1002 and T-1006). The steam required for the heating systems would primarily be produced by the refinery's cogeneration plant, which produces both steam and electricity. No modifications to the cogeneration plant would be proposed. The production of the additional 11,000 to 70,000 pounds per hour of steam required for the heaters is within the cogeneration plant's current permitted capacity.

- Install piping to enable existing crude oil storage tank T-1000 to change from general crude oil service to dedicated San Joaquin Valley (SJV) heavy crude oil service and to enable existing crude oil storage tank T-1006 to change from dedicated SJV crude oil service to general crude oil service. This change would be made to optimize the tank and pumping arrangement with the new heavy crude oils.

- Upgrade one pump to handle the higher viscosity crude oil.

Construction of the crude oil storage tank modifications would take place from September 2006 through December 2006 and require a peak of 25 additional construction workers (in October 2006) as well as the use of additional construction equipment. Construction manpower for Alternative 2 is listed by month in Table 5.3-2.

Table 5.3-2a
Alternative 2 Construction Manpower by Month (June '06 - March '07)

Project Component	Jun 06	Jul 06	Aug 06	Sep 06	Oct 06	Nov 06	Dec 06	Jan 07	Feb 07	Mar 07
No. 4 Crude Unit	0	3	5	9	20	14	16	18	10	84
Coker	0	148	226	233	277	320	286	293	253	264
No. 6 H_2S Plant	4	28	52	74	109	112	69	20	5	0
Crude Tanks	0	0	11	19	25	6	0	0	0	0
Total per Day	**4**	**179**	**294**	**335**	**431**	**452**	**371**	**331**	**268**	**348**
Total per Shift	**4**	**179**	**294**	**335**	**431**	**452**	**371**	**331**	**268**	**306**

Table 5.3-2b
Alternative 2 Construction Manpower by Month (April '07 - March '08)

Project Component	Apr 07	May 07	Jun 07	Jul 07	Aug 07	Sep 07	Oct 07	Nov 07	Dec 07	Jan 08	Feb 08	Mar 08
No. 4 Crude Unit	223	70	0	0	0	0	0	0	0	0	0	0
Coker	250	201	174	94	20	234	694	252	77	40	20	20
No. 6 H_2S Plant	0	0	0	0	0	0	0	0	0	0	0	0
Crude Tanks	0	0	0	0	0	0	0	0	0	0	0	0
Total per Day	**473**	**271**	**174**	**94**	**20**	**234**	**694**	**252**	**77**	**40**	**20**	**20**
Total per Shift	**362**	**236**	**174**	**94**	**20**	**117**	**347**	**126**	**77**	**40**	**20**	**20**

[a] Construction for the proposed No. 4 Crude Unit modifications will occur two shifts per day from late-March 2007 through early-May 2007, and construction for the proposed Coker modifications will occur two shifts per day from mid-September 2007 through November 2007. Construction will occur one shift per day for the rest of the construction period. Shaded entries indicate periods with two daily construction shifts.

Alternative 3 - No Project Alternative

Under the "no project" alternative, Chevron would not implement any portions of the proposed project, and there would not be any potential impacts to the existing environment. However, none of the objectives of the proposed project would be met. In the future, refinery output would be reduced as available crude oils become heavier, assuming permit conditions are not exceeded, because the production capacity of the equipment that currently processes light crude oil would be reduced when processing heavy crude oil. Alternatively, the costs to main current production levels would increase as the price of lighter crude oils increases and overall supply is reduced. Both of these situations would threaten the future economic viability of the refinery and supplies to the regional community.

5.4 Alternatives Analysis

This section contains an analysis of the three alternatives by each environmental topic.

5.4.1 Air Quality

5.4.1.1 Construction Emissions

Table 5.4-1 summarizes the mitigated emissions associated with construction for the project alternatives in comparison with the proposed project. Details of the construction emission calculations for the alternatives are in Appendix B and Attachment B.1. Peak daily construction emissions will occur during the Coker turnaround in October 2007 for Alternatives 1 and 2 as well as for the proposed project. Mitigated peak daily construction emissions are slightly lower for Alternative 1 than for the proposed project, because not replacing the Coker Main Fractionator column would reduce the construction manpower and equipment requirements during the Coker turnaround. Peak daily construction emissions from Alternative 2 are the same as for the proposed project, because modifications to the crude oil storage tanks, including the additional construction workers, would not occur during the period of the peak construction activities. Mitigated CO, VOC and NO_x emissions exceed the SCAQMD's CEQA significance thresholds for Alternatives 1 and 2 as well as for the proposed project. There are no construction emissions from the "no project" alternative.

Table 5.4-1
Summary of Mitigated Peak Daily Construction Emissions for Alternatives

Pollutant	Peak Daily Emissions (lb/day)				
	Proposed Project	Alternative 1	Alternative 2	No Project Alternative	SCAQMD CEQA Threshold
CO	928	906	928	0	550
VOC	221	218	221	0	75
NO_X	1,333	1,330	1,333	0	100
SO_X	2	2	2	0	150
PM10	138	136	138	0	150

5.4.1.2 Operational Criteria Pollutant Emissions

Tables 5.4-2 summarizes the operational criteria pollutant emissions of non-RECLAIM pollutants associated with the project alternatives in comparison with the proposed project. Peak daily RECLAIM pollutant emissions will not increase during operation of the proposed project or any of the alternatives. Details of the operational emission calculations for the alternatives are in Appendix B and Attachment B.2.

Table 5.4-2
Summary of Peak Daily Operational Emissions of Non-RECLAIM Pollutants for Alternatives

Pollutant	Peak Daily Emissions (lb/day)				
	Proposed Project	Alternative 1	Alternative 2	No Project Alternative	SCAQMD CEQA Threshold
CO	4.1	4.1	4.1	0	550
VOC	25.2	25.2	28.0	0	55
NO_X	26.0	26.0	26.0	0	55
SO_X	0.0	0.0	0.0	0	150
PM10	144.2	144.2	144.2	0	150

Peak daily operational emissions for Alternative 1 are the same as for the proposed project. Although Alternative 1 would not include construction of a replacement Coker Main Fractionator column with the addition of new components with fugitive VOC emissions, the proposed project includes removal of the existing Coker Main Fractionator column and its components. The increase in fugitive VOC emissions from the construction of the replacement Coker Main Fractionator column for the proposed project is offset by the decrease in fugitive emissions from removal of the existing Coker Main Fractionator column. Therefore, fugitive VOC emissions for

Alternative 1 are the same as for the proposed project. Sources of emissions of the other criteria pollutants are the same for Alternative 1 as for the proposed project.

As shown in Table 5.4-2, peak daily operational VOC emissions for Alternative 2 are higher than for the proposed project. The higher VOC emissions are caused by fugitive VOC emissions from new components associated with the crude oil storage tank modifications. Sources of emissions of the other criteria pollutants are the same for Alternative 2 as for the proposed project. Although implementation of Alternative 2 would potentially reduce hoteling emissions from marine tankers waiting to unload heavy crude oil at the ESMT, the potential reductions cannot be quantified.

The “no project” alternative would not increase operational emissions.

Operational criteria pollutant emission increases from the proposed project and from the alternatives are below the significance thresholds.

5.4.1.3 Toxic Air Contaminant Emissions and Health Risks

Direct TAC emissions and the resulting potential health risks are the same for Alternative 1 as for the proposed project. Fugitive emissions of TACs in crude oil cause TAC emissions to be higher for Alternative 2 than for the proposed project. Details of the fugitive TAC emission calculations for Alternative 2 are in Appendix B and Attachment B.2.

Table 5.4-3 summarizes the results of health risk assessments for direct TAC emissions for the alternatives and the proposed project. The health risks for Alternative 1 are the same as for the proposed project, while the health risks are higher for Alternative 2 than for the proposed project. The maximum individual cancer risk is higher for Alternative 2 relative to the proposed project and Alternative 1, due to increases in fugitive emissions of carcinogenic TACs from the proposed crude oil storage tank modifications occurring in Alternative 2. The tank modifications in Alternative 2 also increase the emissions of TACs with non-cancer health effects, which is why the chronic and acute non-cancer HIs are slightly higher than the proposed project and Alternative 1. The incremental health risks for both alternatives are below the SCAQMD’s significance thresholds. The “no project” alternative does not cause an increase in health risks.

Table 5.4-3
Summary of Health Risks for Alternatives

Health Risk	Results from Health Risk Assessments				
	Proposed Project	**Alternative 1**	**Alternative 2**	**No Project Alternative**	**SCAQMD CEQA Threshold**
Maximum Individual Cancer Risk	0.00652 in one million	0.00652 in one million	0.0188 in one million	0	10 in one million
Chronic Non-Cancer Risk Hazard Index	0.0109	0.0109	0.0110	0	1.0
Acute Hazard Index	0.0657	0.0657	0.0658	0	1.0

Indirect emissions of DPM from trucks exporting petroleum coke and sulfur from the refinery are the same for Alternatives 1 and 2 as for the proposed project. Indirect emissions of DPM from marine crude oil tankers importing crude oil to the ESMT are the same for Alternative 1 as for the proposed project. Implementation of Alternative 2 could potentially result in less hoteling time for crude oil tankers waiting to offload at the ESMT than the proposed project or Alternative 1, which would lead to lower annual DPM emissions than for the proposed project or Alternative 1. However, this potential reduction cannot be quantified. Therefore, the resulting health risks from exposure to DPM from these sources are estimated to be the same for Alternatives 1 and 2 as for the proposed project and below the significance criteria of 10 in one million. The “no project” alternative does not cause an increase in indirect DPM emissions.

5.4.1.4 Odors

Proposed modifications to the No. 6 H_2S Plant are the same for Alternatives 1 and 2 as for the proposed project. Because fugitive H_2S emissions associated with the proposed modifications to the No. 6 H_2S plant are the only potential source of noticeable off-site odors, potential impacts to odors are the same for Alternatives 1 and 2 as for the proposed project. Since the proposed project is not anticipated to cause objectionable off-site odors, Alternatives 1 and 2 are also not anticipated to cause objectionable off-site odors. The “no project” alternative does not cause increased H_2S emissions.

5.4.1.5 PM10 Ambient Air Quality Impacts

Proposed modifications to the operation of the coke drums and Cooling Tower No. 9 are the same for Alternatives 1 and 2 as for the proposed project. Because the coke drums and Cooling Tower No. 9 are the sources of increased direct operational PM10 emissions for the proposed project, potential ambient air quality PM10 impacts are the same for Alternatives 1 and 2 as for the proposed project. Since the proposed project is not anticipated to cause significant adverse impacts to ambient PM10 concentrations, Alternatives 1 and 2 are also not anticipated to cause significant adverse impacts to ambient PM10. The "no project" alternative does not cause increased direct operational PM10 emissions.

5.4.1.6 Carbon Monoxide Ambient Air Quality Impacts

As discussed in the transportation and traffic analysis of the alternatives in Section 5.4.6, neither the proposed project nor the alternatives would cause the level-of-service at an intersection that is currently at C to degrade to D or worse, and none of the alternatives would cause the volume-to-capacity ratio of an intersection that is currently rated D or worse to increase by more than 0.02. Therefore, neither the proposed project nor the alternatives have the potential to cause significant adverse impacts on ambient CO concentrations by creating CO hot spots.

5.4.2 Hazards

As presented in Section 4.2.2, the proposed project would potentially cause significant adverse hazard impacts from a catastrophic release of H_2S from the proposed modifications to the No. 6 H_2S Plant. Because Alternatives 1 and 2 include the same proposed modifications to the No. 6 H_2S Plant as the proposed project, they would also potentially cause significant adverse hazard impacts.

Alternative 1 does not include replacing the existing Coker Main Fractionator column. As presented in Sections 4.2.2.3 and 4.2.2.4, catastrophic releases and subsequent ignition of the contents of neither the existing nor the proposed replacement Main Fractionator columns would have significant adverse off-site impacts. Therefore, hazard impacts from Alternative 1 would be the same as for the proposed project.

Alternative 2 would include proposed modifications to crude oil storage tanks. These proposed modifications would not alter the quantities of hazardous material at the refinery or the manner in which they are processed. Therefore, potential hazard impacts from Alternative 2 are the same as for the proposed project.

The "no project" alternative would .would not introduce the potential for increased off-site impacts from releases of hazardous materials. Thus, the "no project" alternative would not create potential off-site impacts from an H_2S release from the No. 6 H_2S Plant.

5.4.3 Hydrology and Water Quality

If implemented, water use during construction of Alternative 1 would be less than for the proposed project, because water would not be required for fugitive PM10 control during excavation for foundations for the proposed replacement Coker Main Fractionator column or for hydrotesting of the proposed replacement column. Construction of Alternative 2 would not require additional soil excavation relative to the proposed project. Thus, Alternative 2 would not increase the amount of water required for dust control, and water use during construction of Alternative 2 would be approximately the same as for construction of the proposed project. Water would not be required for construction for the “no project” alternative. Because there is expected to be no significant adverse impact to water resources from the proposed project, there would be no significant impact to water resources from the alternatives.

If implemented, water use and wastewater generation during operation of Alternatives 1 and 2 would be the same as for the proposed project. Additional water would not be used and additional wastewater would not be generated under the “no project” alternative. Because there is expected to be no significant adverse impact to water resources during operation of the proposed project, there would be no significant impact to water resources from the alternatives.

5.4.4 Noise

5.4.4.1 Construction Noise Impacts

Table 5.4-4 summarizes mitigated construction noise impacts for the alternatives and the proposed project. The construction noise mitigation measure that would be employed for Alternatives 1 and 2 would be the same as for the proposed project, as presented in Section 4.4.4.1. Mitigated construction noise impacts for Alternative 1 are the same as for the proposed project, and construction noise impacts for Alternative 2 are slightly higher during the day at the nearest Manhattan Beach residential receptor as a result of additional noise generated by equipment used to construct the proposed crude oil storage tank modifications near the southern refinery boundary. Mitigated construction noise impacts are not significant for Alternatives 1 or 2 or for the proposed project. The “no project” alternative would not cause construction noise impacts. Details of the construction noise impacts analyses for the alternatives are presented in Appendix D.2.

Table 5.4-4
Mitigated Construction Noise Impacts for Alternatives

Receptor Location	Time	Total Increase in Sound Level During Construction (L_{eq} - dBA)				
		Proposed Project	Alternative 1	Alternative 2	No Project Alternative	Maximum Allowable Increase
Nearest El Segundo Site Boundary (El Segundo Blvd.)	Day	8	8	8	0	8
	Evening /Night	7	7	7	0	8
Nearest Manhattan Beach Site Boundary (Gate 22)	Day	1	1	1	0	N/A
	Evening /Night	2	2	2	0	N/A
Nearest El Segundo Residential Receptor (Grand Ave and Lomita Ave.; School behind St. Anthony's Church 1,000 ft. north of refinery)	Day	2	2	2	0	5
	Evening /Night	5	5	5	0	5
Nearest Manhattan Beach Residential Receptor (Armory Ave. ~200 ft. south of Gate 22)	Day	3	3	5	0	N/A
	Evening /Night	5	5	5	0	N/A

Although Alternative 1 would require the use of less construction equipment than the proposed project because the proposed replacement Coker Main Fractionator column would not be constructed, the reduction in equipment requirements would not occur during the construction months when the peak noise impacts are expected to occur. Alternative 2 would include construction of crude oil storage tank modifications near the southern boundary of the refinery. Table 5.4-4 shows that the noise impacts from this additional construction would increase the maximum daytime construction noise impacts at the nearest Manhattan Beach residential receptor by two dBA relative to the proposed project, from three dBA to five dBA.

5.4.4.2 Operational Noise Impacts

Table 5.4-5 summarizes operational noise impacts for the alternatives and the proposed project. Details of the operational noise impacts analyses for the alternatives are presented in Appendix D.3. Operational noise impacts for Alternative 1 are the same as for the proposed project and are not significant. Implementation of Alternative 2 would include the installation of two 50 horsepower electric pumps in the vicinity of the crude oil storage tanks, near the southern boundary of the refinery, which would not be installed for the proposed project or for Alternative 1. However, installation of these two pumps would not increase operational noise impacts, and, therefore, operational noise impacts for Alternative 2 are not significant. The "no project" alternative would not cause operational noise impacts.

Table 5.4-5
Operational Noise Impacts for Alternatives

Receptor Location	Time	Total Increase in Sound Level During Operation (L_{eq} - dBA)				
		Proposed Project	Alternative 1	Alternative 2	No Project Alternative	Maximum Allowable Increase
Nearest El Segundo Site Boundary (El Segundo Blvd.)	Day	0	0	0	0	8
	Evening /Night	0	0	0	0	8
Nearest Manhattan Beach Site Boundary (Gate 22)	Day	0	0	0	0	3
	Evening /Night	0	0	0	0	3
Nearest El Segundo Residential Receptor (Grand Ave and Lomita Ave.; School behind St. Anthony's Church 1,000 ft. north of refinery)	Day	0	0	0	0	5
	Evening /Night	1	1	1	0	5
Nearest Manhattan Beach Residential Receptor (Armory Ave. ~200 ft. south of Gate 22)	Day	0	0	0	0	3
	Evening /Night	1	1	1	0	3

5.4.5 Solid and Hazardous Waste

Alternatives 1 and 2 are expected to be similar to the proposed project with respect to the amounts of waste generated during construction, although slightly less waste would be generated during construction of Alternative 1 because of the reduction in construction activities caused by not constructing a replacement Coker Main Fractionator column, and slightly more waste would be generated for Alternative 2 during construction of crude oil storage tank modifications. It was determined in Section 4.5.1 that solid and hazardous wastes generated during construction of the proposed project would not cause significant adverse impacts. Because the quantities of solid and hazardous wastes generated during the construction of Alternatives 1 and 2 would be similar to the proposed project, solid and hazardous waste impacts during construction of these alternatives are also not expected to be significant.

Neither the proposed project nor Alternatives 1 or 2 would increase the amount of solid or hazardous waste generated by refinery operations. Therefore, neither of these alternatives would cause solid or hazardous waste impacts during operation.

The “no project” alternative would not generate additional solid or hazardous waste. Based on these considerations, as with the proposed project, none of the alternatives is expected to have a significant impact on solid and hazardous waste.

5.4.6 Transportation and Traffic

As shown in Table 5.3-1, Alternative 1 would have a peak of 386 construction worker commuting trips per shift, which is 60 lower than the peak of 446 for the proposed project. Because the peak number of trips for Alternative 1 is lower than for the proposed project, which will not cause significant adverse impacts to traffic during construction, Alternative 1 will also not cause significant adverse impacts to traffic during construction.

As shown in Table 5.3-2, Alternative 2 would have a peak of 452 construction worker commuting trips per shift, which is six higher then the peak for the proposed project. The potential impacts of the 452 construction worker commuting trips for Alternative 2 were evaluated, as described in the traffic study in Appendix E. This evaluation concluded that construction worker commuting trips for Alternative 2 would not cause significant adverse traffic impacts.

Operational traffic would be the same for Alternatives 1 and 2 as for the proposed project and would not cause significant adverse impacts to traffic.

The “no project” alternative would not generate additional traffic during construction or operation, and thus would have no traffic impacts.

5.5 Conclusion

The significance of potential environmental impacts from the alternatives as compared to the proposed project are summarized in Table 5.5-1.

Table 5.5-1
Significance of Environmental Impacts of Alternatives Compared with the Proposed Project

Environmental Topic	Proposed Project[a]	Alternative 1[a]	Alternative 2[a]	“No Project” Alternative[a]
Air Quality				
Construction	S	S (-)	S (=)[b]	N (-)
Operation	N	N (=)	N (+)	N (-)
Toxics	N	N (=)	N (+)	N (-)

Table 5.5-1 (concluded)
Significance of Environmental Impacts of Alternatives Compared with the Proposed Project

Environmental Topic	Proposed Project[a]	Alternative 1[a]	Alternative 2[a]	"No Project" Alternative[a]
Hazards	S	S (=)	S (=)	N (-)
Hydrology/ Water Quality				
Construction	N	N (-)	N (=)	N (-)
Operation	N	N (=)	N (=)	N (-)
Noise				
Construction	M	M (=)	M (+)	N (-)
Operation	N	N (=)	N (=)	N (-)
Solid/Hazardous Waste				
Construction	N	N (-)	N (+)	N (-)
Operation	N	N (=)	N (=)	N (=)
Traffic/ Transportation				
Construction	N	N (-)	N (+)	N (-)
Operation	N	N (=)	N (=)	N (-)

[a] Key:
S = Significant
N = Less than significant
M = less than significant after mitigation
(+) = Greater impacts than proposed project
(=) = same impacts as proposed project
(-) = Less impacts than proposed project

[b] Although Alternative 2 will require more construction activities and manpower than the proposed project, construction Activities for Alternative 2 do not overlap with the other construction activities that cause the peak daily construction emissions.

Based on the comparisons of the different alternatives with the proposed project, all of the alternatives, except the "no project" Alternative, generate similar adverse impacts to the environment as the proposed project. The "no project" Alternative will have less environmental impacts but would not fulfill the goals of the project and potentially deprive the region of fuels necessary to power vehicles and transportation modes that are critical to the regions economy and lifestyle. Similarly, Alternative 1 would also potentially reduce the production of motor fuels by the refinery. As a result, the proposed project is the preferred alternative to enable Chevron to process more heavy crude oil than currently while maintaining production levels of saleable products.

CHAPTER 6

CUMULATIVE IMPACTS

6.0 CUMULATIVE IMPACTS

6.1 Introduction

An EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable as defined in CEQA Guidelines §15065(a)(3). This assessment of cumulative impacts in the proposed project area includes a discussion of the potential cumulative effects of past, present, and probable future projects that may produce related or cumulative impacts. The cumulative impacts analyses in this section have addressed the following:

- Do the impacts of individual projects, when considered together, compound or increase other environmental impacts?
- Will cumulative impacts result from individually minor but collectively significant projects taking place over a period of time?

According to §15130(b) of the CEQA Guidelines, "The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone."

The environmental disciplines evaluated in this Final EIR are included in this section together with proposed appropriate mitigation measures for potential cumulative impacts.

6.2 Proposed Projects

Based upon information received from Chevron, local planning agencies, and individuals contacted to compile data for this Chapter, projects with the potential to have cumulative impacts with the proposed project are discussed in this section. Two categories of cumulative developments were assessed: 1) other planned refinery developments during the same timeframe as the proposed project, and 2) new development in nearby communities.

6.2.1 Other Chevron Projects During the Same Timeframe as the Proposed Project

Two other Chevron projects are expected to occur during the same time period as the construction activities for the proposed project. Domes will be installed on a total of 22 storage tanks in order to comply with SCAQMD Rule 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities. Chevron anticipates that domes will be installed on 11 storage tanks during 2006 and on six storage tanks during 2007. The remainder of the domes will be installed after construction for the proposed project is completed at the end of 2007.

Environmental impacts from installation of the domes will be considered as part of the cumulative impacts analysis for the proposed project.

Chevron is also seeking approval from the California State Lands Commission (CSLC) of a new 30-year lease, through September 30, 2032, to continue current operations at the existing ESMT. The proposed new 30-year lease is considered a project under CEQA, and it is currently undergoing the CEQA process, with the CSLC as the Lead Agency. The CSLC prepared a NOP of a Draft EIR for the proposed lease and distributed it on March 22,2006 (CSLC, 2006). However, because renewal of the lease will allow the ESMT will continue its current operations, potential impacts will not change and no new impacts will occur. Therefore, the proposed new 30-year lease for the ESMT will not lead to contributions to cumulative impacts.

6.2.2 New Development Near the Refinery

Several projects are in various stages of planning, permitting, and construction within the City of El Segundo (Schopp, 2006). The larger projects (i.e., those that would develop more than 100,000 square feet of floor space) are listed in Table 6.2-1. The first three projects listed in Table 6.2-1 are currently under construction and may contribute cumulative impacts to those generated by the proposed project. The first project listed in Table 6.2-1, the Plaza El Segundo project, is located adjacent to the southeast corner of the refinery and is the closest 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.

Table 6.2-1
Proposed and Approved Projects within the City of El Segundo

Project Location(s)	Existing Use	Proposed Use	Proposed Size, Square Feet	Status
850 S. Sepulveda Blvd.	Vacant	Retail Shopping Center	850,000	First phase of construction of Plaza El Segundo project is expected to be complete by September 2006.
200 N. Douglas St. (Area B)	Air Force Base	Office	546,929	Under construction.

Table 6.2-1 (concluded)
Proposed and Approved Projects within the City of El Segundo

Project Location(s)	Existing Use	Proposed Use	Proposed Size, Square Feet	Status
700 N. Nash St.,	Vacant	Office	1,740,000	Construction of 425,000 sq. ft. at 700 N. Nash St. is expected to be completed by end of 2006. A construction start date for remainder of complex is unknown.
800 N. Nash St.,		Hotel	87,000	
400 – 500 N. Nash St., El Segundo Corporate Campus		Light Industrial, R&D	100,000	
		Commercial, Retail	248,000	
		Park	217,800	
888 N. Sepulveda Blvd.	Vacant	Office	120,610	Project approved, but construction start date is unknown
445 & 475 Continental Blvd.	Vacant Office	R&D Building & Office	300,000	Development of the Corporate Campus for Mattel, Inc. is partially complete. Although the Draft EIR indicates the complex will not be completed until 2011, the possibility of earlier activity should be considered.
1955 E. Grand Ave.			174,240	
2300 E. Imperial Hwy.	Office	Office	100,000	Project approved, but construction start date is unknown.
999 N. Sepulveda Blvd.	Office	Office Addition	14,750	Project approved, but construction start date is unknown.
		Office Renovation	115,000	
301 Vista Del Mar	Power Plant	Redevelopment of Power Plant	Not Given	On hold
2350 E. El Segundo Blvd.	Office	Office	150,000	Pending Approval
		Lab	15,000	

There are no projects in the planning, permitting, or construction stages in the City of Manhattan Beach that would overlap with the construction or operation of the proposed project (Moreno, 2006).

6.3 Cumulative Effects

The cumulative effects of the installation of domes on storage tanks at the refinery, the new development in the City of El Segundo, and the proposed project are assessed in the following subsections.

6.3.1 Air Quality

6.3.1.1 Construction Impacts

It was assumed as a "worst-case" for this cumulative impacts analysis that construction of a dome on a storage tank at the refinery would occur at the same time as the construction activities for the proposed project that generate the peak daily emissions. Peak daily construction emissions from the installation of a dome on a storage tank at the refinery were assumed to be the same as calculated in the Final Environmental Assessment (FEA) for SCAQMD Proposed Rule (PR) 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities (SCAQMD, 2001b).

Construction dates and emission values are not available for all of the projects in the City of El Segundo that are listed in Table 6-1. However, construction of the Plaza El Segundo project, which is located near the southeast corner of the refinery, is currently underway and is likely to continue during construction of the proposed project. It was conservatively assumed that the peak daily construction emissions in the Draft EIR for the Plaza El Segundo project (City of El Segundo, 2004) would occur at the same time as the peak daily construction emissions for the proposed project.

Peak daily construction emissions from the construction of a dome on a storage tank at the refinery and from construction of the Plaza El Segundo project are listed in Table 6.3-1, along with mitigated peak daily construction emissions for the proposed project from Table 4.1-18. The cumulative total emissions listed in the table would occur if peak daily emissions from construction of a dome on a storage tank at the refinery and construction of the Plaza El Segundo project occurred at the same time as the peak daily emissions from construction of the Chevron Heavy Crude project, during October 2007.

Cumulative peak daily construction emissions listed in the table exceed the significance thresholds for CO, VOC, NO_x and PM10. Since peak daily construction emissions from the Chevron Heavy Crude Project alone exceed the significance thresholds for CO, VOC and NO_x, emissions from the proposed project during construction are already cumulatively considerable. Impacts from the other two projects during construction will make the cumulative impacts worse.

Additionally, although peak daily PM10 construction emissions from each of the projects are below the CEQA significance threshold, the cumulative PM10 emissions from the three projects exceed the significance threshold. Therefore, cumulatively significant impacts to PM10 air quality may also occur during construction.

Table 6.3-1
Summary of Cumulative Peak Daily Construction Emissions (Mitigated)

Project	CO (lb/day)	VOC (lb/day)	NO_x (lb/day)	SO_x (lb/day)	PM10 (lb/day)
Storage Tank Dome[a]	62	10	56	14	3
Plaza El Segundo[b]	493	**288**	**470**	0	20
Chevron Heavy Crude	**928**	**221**	**1,333**	2	138
Cumulative Total	**1,483**	**519**	**1,859**	16	**161**
CEQA Significance Threshold	550	75	100	150	150
Significant? (Y/N)	**Yes**	**Yes**	**Yes**	No	**Yes**

Note: Values in bold exceed significance threshold.
[a] Source: Final Environmental Assessment (FEA) for SCAQMD Proposed Rule (PR) 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities (SCAQMD, 2001b), Appendix D, Table D-1.
[b] Source: Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development Draft Environmental Impact Report (City of El Segundo, 2004), Table IV.C-8

6.3.1.2 Operational Impacts – Criteria Pollutants

The peak daily operational criteria pollutant emissions associated with the proposed project are listed in Table 4.1-7 and are below the SCAQMD significance criteria. The emission sources associated with the proposed project are comprised of fugitive emissions, cooling tower emissions, emissions from coke drum depressurization, and off-site emissions from trucks exporting petroleum coke from the refinery.

Installation of domes on storage tanks at the refinery will reduce VOC emissions from the storage tanks and, therefore, would not create significant cumulative impacts in combination with the proposed project. VOC emission reductions from installing domes on the tanks have already been accounted for in the SCAQMD ozone attainment strategy. As a result, credit for VOC emission reductions from complying with Rule 1178 will not be applied to the cumulative analysis for the proposed project.

The projects within the City of El Segundo listed in Table 6.2-1 may generate long-term emissions from operations, primarily from on-road motor vehicles. However, only operational emissions from the Plaza El Segundo project are available at this time. Peak daily operational criteria pollutant emissions associated with the Chevron Heavy Crude Project are shown in Table 4.1-7 and Table 6.3-2 below, along with peak daily operational emissions for the Plaza El Segundo project (City of El Segundo, 2004).

Table 6.3-2
Summary of Cumulative Peak Daily Operational Emissions (Mitigated)

Project	CO (lb/day)	VOC (lb/day)	NO_x (lb/day)	SO_x (lb/day)	PM10 (lb/day)
Plaza El Segundo[a]	**1,794**	**132**	**170**	1	**163**
Chevron Heavy Crude	4	25	26	<1	144
Cumulative Total	**1,798**	**157**	**196**	1	**307**
CEQA Significance Threshold	550	55	75	150	150
Significant? (Y/N)	**Yes**	**Yes**	**Yes**	No	**Yes**

Note: Values in bold exceed significance threshold.
[a] Source: Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development Draft Environmental Impact Report (City of El Segundo, 2004), Table IV.C-11

Although operational emissions from the proposed project do not exceed any applicable significance criteria, cumulative peak daily operational emissions listed in the table exceed the significance thresholds for CO, VOC, NO_x and PM10. Since peak daily operational emissions from the Plaza El Segundo project alone exceed the significance thresholds for CO, VOC, NO_x and PM10, because of the proximity of the this project to the proposed project, the cumulative effects of the two projects are considered to be significant adverse cumulative impacts for these criteria pollutants. Therefore, the proposed Chevron Heavy Crude project will contribute to cumulatively significant criteria pollutant impacts during operations.

6.3.1.3 Operational Impacts – Toxic Air Contaminants

The operational toxic air contaminant emissions associated with the proposed project are shown in Table 4.1-8. The results of the health risk assessment presented in Section 4.1.4 indicate that these TAC emissions will not cause significant adverse impacts.

Installation of domes on storage tanks at the refinery will reduce VOC emissions, including emissions of TACs, from the storage tanks and, therefore, would not create significant cumulative impacts in combination with the proposed project. As with operational criteria pollutant emission impacts, credit is not applied to the proposed project with regard to a reduction in air toxics impacts.

Toxic air contaminant emissions from operation of the other identified projects listed in Table 6.2-1 are not available. However, operational emissions from those projects are not expected to generate long-term toxic air contaminant emissions from operations. Therefore, the proposed Chevron Heavy Crude Project will not create cumulatively significant toxic air pollutant impacts during operations.

6.3.1.4 Mitigation Measures

As indicated in Table 6.3-1, construction activities may have significant adverse cumulative air quality impacts for CO, VOC, NO_X, and PM10. Mitigation measures to reduce these emissions during construction of the proposed project were identified in Section 4.1.8.1. No additional feasible mitigation measures for emissions during construction have been identified. Therefore adverse cumulative air quality impacts during construction will remain significant after mitigation.

As indicated in Table 6.3-2, operation of the proposed project may have significant adverse cumulative air quality impacts for CO, VOC, NO_X, and PM10. The cumulative significance determination is primarily based on the Plaza El Segundo project, which will generate significant operational air quality impacts. Because emissions of these pollutants during the operation of the proposed project by itself are not significant, because they do not exceed any applicable significance criteria, feasible mitigation measures for the proposed project have not been identified. Therefore, adverse cumulative air quality impacts during operation will remain significant.

6.3.2 Hazards and Hazardous Materials

6.3.2.1 Potential Cumulative Impacts

Generally, adding domes to existing storage tanks will not change or alter the nature of the stored contents. The cumulative projects that could potentially contribute to cumulative impacts discussed in Section 6.2 pose no substantial hazards or risk of upset because they do not utilize hazardous materials. For example, based on the level of detail in the documentation for the proposed commercial developments in El Segundo, no facilities have been identified that use hazardous materials that could potentially have a significant impact beyond their property lines. While there is a potentially significant adverse hazards impact from the proposed Chevron Heavy Crude Project, as discussed in Section 4.2, impacts from the other projects will not change this significance conclusion or worsen the impacts.

6.3.2.2 Mitigation Measures

One mitigation measure for potentially significant hazard impacts during operation of the proposed project was identified in Section 4.2.3. No additional feasible mitigation measures have been identified. Therefore adverse cumulative hazard impacts during operation will remain significant after mitigation.

6.3.3 Hydrology and Water Quality

6.3.3.1 Cumulative Impacts

Water demand of the proposed project, as well as potential water quality impacts, are considered less than significant. As presented in Section 4.3, the proposed project would require a maximum of 80,000 gallons per day of water, for pressure testing, during construction. Construction of tank domes will not require water for dust control during construction, because neither excavation nor grading would occur, and water would not be required for pressure testing. Therefore, water usage during construction of a storage tank dome would be minimal. Water use estimates during construction of the Plaza El Segundo project are not available. Therefore, based on available information, construction of the proposed project is not anticipated to cause significant adverse cumulative impacts to water supply.

As presented in Section 4.3, the proposed project is anticipated to increase water demand by approximately 178,000 gallons per day during operations. The installation of domes on storage tanks at the refinery would not require additional water during operations. The Plaza El Segundo project is anticipated to increase water demand by approximately 167,000 gallons per day (City of El Segundo, 2004). Thus, the cumulative increase in water demand from the three projects is approximately 345,000 gallons per day, which is well below the SCAQMD's significance threshold of five million gallons per day. Therefore, operation of the proposed project will not cause significant adverse cumulative water supply impacts.

The proposed project is anticipated to increase wastewater discharge by a maximum of 80,000 gallons per day during construction. Constructing domes on storage tanks is not anticipated to increase wastewater discharge during construction, because water use during construction would be minimal. Wastewater discharge estimates during construction of the Plaza El Segundo project are not available. Therefore, based on available information, construction of the proposed project is not anticipated to cause significant adverse cumulative impacts from wastewater discharge.

Operation of the proposed project is expected to increase wastewater discharge by 178,000 gallons per day (see Section 4.3). Installation of domes on storage tanks would not generate additional wastewater during operations. The Plaza El Segundo project is anticipated to generate approximately 139,000 gallons per day of wastewater (City of El Segundo, 2004). The increased wastewater discharge from the refinery would be well within its current NPDES limits and would not exceed the capacity of existing wastewater treatment or sewer systems. The EIR for the Plaza El Segundo project also concluded that its wastewater discharge can be accommodated within the existing treatment capacity and that the capacity of existing sewer systems along with new sewer infrastructure proposed for the project would be adequate to handle the increase. Therefore, the proposed project will not cause significant adverse cumulative wastewater discharge impacts.

Since the proposed project is not expected to change storm water discharge or runoff to local storm water systems significantly, no significant adverse cumulative storm water quality impacts are expected to result from the operation of the proposed project.

6.3.3.2 Mitigation Measures

Based on the above analyses, no significant adverse cumulative impacts to water quality and supply during construction or operation are expected as a result of the activities associated with the proposed project. Therefore, no specific mitigation measures are required for cumulative impacts.

6.3.4 Noise

6.3.4.1 Cumulative Impacts

Noise levels during construction and operation of the proposed project are not expected to cause significant adverse impacts, as discussed in Section 4.4.

The Final Environmental Assessment for Proposed Rule 1178 (SCAQMD, 2001b) determined that, because construction of a dome on a storage tank would only require use of one crane and one compressor, it would likely not change ambient noise levels beyond the boundaries of the industrial facilities where the construction would occur. Thus, construction of a dome on a storage tank would not contribute to cumulative noise impacts during construction of the proposed project.

The EIR for the Plaza El Segundo project (City of El Segundo, 2004) analyzed noise impacts to three receptors during construction. The closest receptor to the refinery that was evaluated is a residential area located south of the southeast corner of the refinery. The Plaza El Segundo EIR concluded that construction would increase the ambient noise level at this receptor by four dBA, from 63 to 67 dBA. Potential cumulative noise impacts at this receptor during construction of the proposed project were calculated and are summarized in Table 6.3-3. Construction of the Plaza El Segundo project only occurs during the daytime, so the analysis was only conducted for daytime construction activities for the proposed project. Details of the calculations can be found in Appendix D.2. Table 6.3-3 shows that noise generated during construction of the proposed project will not increase ambient sound levels at this receptor above the sound levels resulting from construction of the Plaza El Segundo project. Therefore, the proposed project will not cause significant adverse cumulative noise impacts during construction.

Table 6.3-3
Cumulative Construction Noise Impacts

Receptor Location	Time	Ambient Sound Level During Construction of Plaza El Segundo Project (L_{eq} dBA)	Estimated Sound Level from Construction of Proposed Project (L_{eq} - dBA)[a]	Total Sound Level During Construction (L_{eq} - dBA)	Total Increase in Sound Level During Construction (L_{eq} - dBA)
Residences South of Southeast Corner of Refinery	Day	67	50	67	0

Domes on storage tanks at the refinery would not generate additional noise during operations. Additionally, the Plaza El Segundo project EIR (City of El Segundo, 2004) concluded that operation of the project would not alter the existing noise environment. Therefore, because the proposed project will not cause significant adverse noise impacts during operation, and because neither the installation of domes on storage tanks nor operation of the Plaza El Segundo project would alter the existing noise environment, the proposed project will not cause significant adverse cumulative noise impacts during operation.

6.3.4.2 Mitigation Measures

Based on the above analyses, no significant adverse cumulative noise impacts during construction or operation are expected as a result of the activities associated with the proposed project. Therefore, no specific mitigation measures are required for cumulative impacts.

6.3.5 Solid and Hazardous Waste

6.3.5.1 Cumulative Impacts

As presented in Section 4.5, it is estimated that during the construction of the entire proposed project at the refinery, approximately 3,000 tons of municipal (non-hazardous) solid waste would be generated over a 19-month period, which can be accommodated within the capacities of the three landfills maintained by LACSD. Because the installation of domes on storage tanks would not require demolition of existing equipment or structures, only minimal amounts of solid waste would be generated during storage tank dome construction activities. Most of the solid waste generated during construction of the Plaza El Segundo project will be recycled (City of El Segundo, 2004), so disposal requirements will be minimal. Therefore, construction of the proposed project is not anticipated to cause significant adverse cumulative impacts from solid waste generated during construction.

Hazardous waste generated during construction of the proposed project can be accommodated within the capacities of the two Class I landfills in California approved to accept hazardous waste, and will not cause significant adverse impacts during construction (see Section 4.5). Construction of domes on storage tanks is not anticipated to generate hazardous wastes, and construction of the Plaza El Segundo project is not anticipated to require disposal of hazardous wastes. Therefore, the proposed project will not cause significant adverse cumulative impacts from hazardous waste generated during construction.

As discussed in Section 4.5, operation of the proposed project is not expected to generate additional solid or hazardous wastes. Therefore, operation of the proposed project will not cause significant adverse cumulative impacts from solid or hazardous wastes.

6.3.5.2 Mitigation Measures

Based on the above analyses, no significant adverse cumulative solid or hazardous waste impacts during construction or operation are expected as a result of the activities associated with the proposed project. Therefore, no specific mitigation measures are required for cumulative impacts.

6.3.6 Transportation and Traffic

6.3.6.1 Cumulative Impacts

As discussed in Section 4.6, the proposed project is not anticipated to create significant adverse impacts to traffic during construction or operation.

The Final Environmental Assessment for Proposed Rule 1178 estimated that construction of a dome on a storage tank would require four to eight construction workers and one to five delivery truck trips per day. This small amount of additional traffic would have a minimal impact on traffic.

The Plaza El Segundo project EIR (City of El Segundo, 2004) evaluated potential impacts during operation of the project on 25 intersections that were anticipated to serve the project area and determined that, during operation, the project would cause significant adverse impacts to traffic at one intersection within the City of El Segundo (El Segundo Boulevard and Sepulveda Boulevard) and to six intersections outside the City of El Segundo after the imposition of mitigation measures. The planned use of a remote parking lot at Dockweiler State Beach for the proposed project, shuttle buses to transport workers to and from the refinery, and the contractually required route from the remote lot onto the I-105 Freeway, will avoid the use of the 25 intersections that could be impacted by the Plaza El Segundo project by construction worker commuting traffic for the proposed project. Therefore, the proposed project will not cause potential impacts to the same intersections that will potentially be affected by the Plaza El Segundo project and would not create significant cumulative adverse impacts to traffic at intersections.

As also discussed in Section 4.6, construction worker commuting for the proposed project will not cause significant adverse impacts to traffic on the freeways in the vicinity of the refinery. However, the Plaza El Segundo project EIR (City of El Segundo, 2004) concluded that the project would cause significant adverse impacts during the PM traffic peak to southbound traffic on the I-405 freeway between the intersection with the I-105 freeway and El Segundo Boulevard. As shown in Table 4.6-2, construction worker commuting traffic for the proposed project is also anticipated to impact this freeway segment and to reduce the LOS by 0.01. Therefore, construction worker commuting traffic for the proposed project would potentially worsen the adverse impact caused by the Plaza El Segundo project. Additionally, the analysis in the Plaza El Segundo project EIR concluded that that the project would increase the LOS on the southbound I-405 freeway between the El Segundo Boulevard and Rosecrans Avenue, which is currently operating at LOS F(1), by 0.01 during the PM traffic peak, and Table 4.6-2 shows that the proposed project would also increase the LOS on that segment by 0.01 during the PM peak period. The combined increase in LOS of 0.02 on a segment that is currently operating at LOS F(1) would be a significant adverse cumulative impact.

Operation or the proposed project will generate a total of 22 additional truck trips, generally spread throughout the day and night, and will not require additional refinery employees. Thus, traffic during operation of the proposed project will not affect traffic associated with construction or operation of the other projects discussed in Section 6.2. Therefore, operation of the proposed project will not create significant cumulative adverse impacts to traffic or transportation.

6.3.6.2 Mitigation Measures

Based on the above analyses, significant adverse cumulative impacts to traffic on two segments of the I-405 freeway may occur during construction of the proposed project. These impacts will be temporary and will cease after construction of the proposed project is completed. Feasible mitigation measures for these impacts have not been identified. Therefore, adverse cumulative impacts to traffic on these freeway segments during construction will remain significant.

6.4 Cumulative Impacts Summary

Following are the conclusions from the cumulative impacts analyses:

6.4.1 Unavoidable Adverse Cumulative Impacts

Air Quality: Cumulative construction emissions of CO, VOC, NO_x and PM10 are expected to remain significant following mitigation.

Operational emissions of CO, VOC, NO_x and PM10 are expected to be cumulatively significant. Because emissions of these pollutants during the operation of the proposed project by itself are not significant, feasible mitigation measures for the proposed project have not been identified.

Hazards: The proposed modifications to the No. 6 H_2S Plant could result in public exposure to significant adverse H_2S concentrations under "worst-case" consequence analysis conditions. As a result, the potential consequences of a release of H_2S associated with these proposed modifications are cumulatively significant.

Traffic/
Transportation: Traffic associated with construction of the proposed project will cause a significant adverse cumulative impact on two freeway segments. Feasible mitigation measures for these potential impacts have not been identified.

6.4.2 Potentially Significant but Mitigable Adverse Cumulative Impacts

Noise: Cumulative construction noise impacts are expected to be reduced to less than significant levels without additional mitigation.

6.4.3 Less Than Significant Cumulative Impacts

Air Quality: Cumulative construction emissions of SO_x are expected to be less than significant.

On-site CO and PM10 construction emissions are not expected to cause significant cumulative localized ambient air quality impacts.

Cumulative operational SOx emissions are less than significant.

Cumulative adverse health impacts are less than significant.

Cumulative ambient air quality CO, NOx and PM10 impacts during operation are expected to be less than significant.

No significant traffic impacts were identified at local intersections so no significant cumulative increases in CO hot spots are expected.

Cumulative potential odor impacts are expected to be less than significant.

Hazards: The proposed modifications to the No. 4 Crude Unit and the Coker are not expected to result in significant adverse cumulative impacts.

Hydrology/
Water Quality: The proposed project is not expected to cause significant adverse cumulative impacts to water supply, water quality or wastewater disposal during construction or operation.

Noise: Operation of the proposed project is not expected to cause significant adverse cumulative noise impacts.

Solid/Hazardous
Waste: The proposed project is not expected to cause significant adverse cumulative impacts from generation of solid or hazardous wastes during construction or operation.

Traffic/
Transportation: The proposed project is not expected to cause significant adverse cumulative impacts to traffic or transportation during operation.

CHAPTER 7

ORGANIZATIONS AND PERSONS CONSULTED

7.0 ORGANIZATIONS AND PERSONS CONSULTED

CEQA Guidelines § 15129 requires that organizations and persons consulted be provided in the EIR.

In the course of preparation of the Final EIR for the Chevron Heavy Crude Project, various local agencies; industries; and individuals have been consulted. A Notice of Preparation for this EIR was distributed to parties and individuals in October 2005. Additionally, the Notice was announced in the Los Angeles Times and the Daily Breeze. Comments received in response to the Notice have been reviewed and as appropriate been used to focus the analysis in this EIR.

Listed below are the following organizations and individuals who provided input to the EIR.

7.1 Organizations

City of El Segundo Planning Department
City of Manhattan Beach Planning Department

7.2 Persons Consulted

Moreno, Dan, Associate Planner, City of Manhattan Beach
Schopp, Alexis, Planner, City of El Segundo Planning and Building Safety Department

7.3 List of Preparers

South Coast Air Quality Management District
Diamond Bar, California

ENSR Corporation
Camarillo, California

Austin-Foust Associates, Inc.
Santa Ana, California

Conejo Archaeological Consultants
Thousand Oaks, California

This page intentionally left blank

CHAPTER 8

REFERENCES

This page intentionally left blank

8.0 REFERENCES

References for Air Quality

California Air Resources Board OFF-ROAD off-road mobile source emission factor model; emission rates for off-road equipment in the South Coast Air Basin downloaded at http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html.

California Air Resources Board EMFAC 2002 on-road motor vehicle emission factor model; emission rates for on-road motor vehicles in the South Coast Air Basin downloaded at http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html.

California Air Resources Board, 1997. Emission Inventory Methodology 7.9, Entrained Paved Road Dust, 1997. Available for download at http://www.arb.ca.gov/ei/areasrc/onehtm/one7-9.htm

California Air Resources Board, 2001. January 31, 2001, verification letter from Dean C. Simeroth, California Air Resources Board, to Thomas J. Sheahan, Lubrizol Corp.

California Air Resources Board, 2003. HotSpots Analysis and Reporting Program User Guide, Version 1.0. December.

California Air Resources Board, 2005. URBEMIS 2002 User's Guide, April 2005. Available for download at http://www.aqmd.gov/ceqa/urbemis.html.

California Air Resources Board, 2005b. HotSpots Analysis and Reporting Program (HARP), Version 1.2a. California Air Resources Board. August.

California Air Resources Board, 2005c. On-line Emissions Summaries, http://www.arb.ca.gov/ei/maps/statemap/abmap.htm

Gale 1981. *Weather of U.S. Cities*.

Radian, 2000. *AB 2588 Air Toxics "Hot Spots" 1999 Health Risk Assessment Chevron U.S.A. Products Company El Segundo Refinery*, prepared by Radian International, El Segundo, California, December 18, 2000.

Rogozen et al. (1988). *Sources and Concentrations of Chloroform Emissions in the South Coast Air basin, Final Report*, prepared by Science Applications International Corporation, Manhattan Beach, CA for California Air Resources Board, Research Contract No. A4-115-

32, April 8, 1988. Available for download from http://www.arb.ca.gov/research/abstracts/a4-115-32.htm.

OEHHA 1999. "Air Toxicity Summary, Hydrogen Sulfide" (March).

OEHHA 2003. Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, Office of Environmental Health Hazard Assessment. August 2003.

SCAQMD, 1993. *CEQA Air Quality Handbook*, November 1993.

SCAQMD, 2000. *Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES II)*. March 2000. Available for download at http://www.aqmd.gov/matesiidf/matestoc.htm.

SCAQMD, 2003. *2003 Air Quality Management Plan.* August 2003. Available for download at http://www.aqmd.gov/aqmp/AQMD03AQMP.htm.

SCAQMD, 2003b. *Final Localized Significance Threshold Methodology*. June 2003 Available for download at http://www.aqmd.gov/ceqa/handbook/LST/LST.html.

SCAQMD, 2004. Volatile Organic Compound (VOC), Carbon Monoxide (CO), and Particulate Matter (PM) Emissions from a Coke Drum Steam Vent. Source Test Report 03-194. May 14, 2004.

SCAQMD, 2005a. Air quality data summaries. Downloaded from http://www.aqmd.gov/smog/historicaldata.htm.

SCAQMD, 2005b. *Risk Assessment Procedures for Rules 1401 and 212*. Version 7.0. July 1, 2005.

U.S. EPA, various dates. *Compilation of Air Pollutant Emission Factors, AP-42, Volume I, Fifth Edition*; available for download at http://www.epa.gov/ttn/chief/ap42/index.html

U.S. EPA, 1992. *Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures*, 1992.

U.S. EPA, 1995. User's Guide for the Industrial Source Complex (ISC3) Dispersion Models, EPA-454/B-95-003a, OAQPS, Research Triangle Park, NC. September.

References for Hazards and Hazardous Materials

American Institute of Chemical Engineers, 1989. Center for Chemical Process Safety. *Process Equipment Reliability Data*.

Environmental Protection Agency, 1999. *Risk Management Program Guidance for Offsite Consequence Analysis*. April.

References for Hydrology and Water Quality

U.S. EPA, 1992. Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures.

References for Noise

Bies, D.A. and C.H., Hansen, 1988. *Engineering Noise Control: Theory and Practice*.

Bolt, Beranek, and Newman, 1973. *Fundamentals and Abatement of Highway Traffic Noise.*

California 2003. *State of California General Plan Guidelines - Appendix C. Noise Element Guidelines. October.*

City of EL Segundo, 1996, *Municipal Code Chapter 7-2*. Accessed via internet site: http://66.113.195.234/CA/El%20Segundo.

City of Manhattan Beach, 1999. *Municipal Code - Chapter 5.48*. Accessed via internet site: http://www.ci.manhattan-beach.ca.us/municode/Title_5/48/index.html

Higher Power, 2006. Consumer advertisement for Wacker Light Tower. Access via internet at http://www.higherpowersupplies.com/page/HPS/PROD/IND-CE-LT/WG-0009376.

Hoover, Robert, and Keith, Reginald H., 1994. Noise Control for Buildings, Manufacturing Plants, Equipment and Products, Hoover and Keith, Inc. 1981; Seventh Printing, 1994.

Pacific Insulation, 2005. October 24, 2005 facsimile from Pacific Insulation of Technical Data Sheet for the Polydamp Acoustical Barrier from Polymer Technologies, Inc..

SCAQMD, 2001a. Final EIR for the Chevron El Segundo Refinery California Air Resources Board (CARB) Phase 3 Clean Fuels Project, November.

References for Solid and Hazardous Waste

California Integrated Waste Management Board, 2005. Solid Waste Information System Data File, accessed at http://www.ciwmb.ca.gov/SWIS/Search.asp#DOWNLOAD.

References for Transportation and Traffic

City of El Segundo, 2004. City of El Segundo General Plan Circulation Element.

City of El Segundo, 2005. Final Environmental Impact Report for Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development. February.

References for Cumulative Impacts

California State Lands Commission, 2006. Notice of Preparation (NOP) of a Draft Environmental Impact Report and Notice of Public Scoping Meeting, Chevron El Segundo Marine Terminal New 30-Year Lease.

City of El Segundo, 2004. Draft Environmental Impact Report for Sepulveda/Rosecrans Site Rezoning and Plaza El Segundo Development.

Moreno, 2006. Personal communication with D. Moreno, Associate Planner, City of Manhattan Beach, January 6.

Schopp, 2006. Fax from A. Schopp, Planner, Planning and Building Safety Department, City of El Segundo, January 10.

SCAQMD, 2001b. Final Environmental Assessment for Proposed Rule 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities, December.