CHAPTER 2
PROJECT DESCRIPTION

CHAPTER 2.0

PROJECT DESCRIPTION

PROJECT OBJECTIVES

The proposed project includes modifications and additions to the Paramount Refinery (Refinery) that will allow it to produce cleaner-burning gasoline and ULSD fuels for California markets in accordance with the requirements of the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (U.S EPA). Cleaner-burning gasoline and diesel fuels reduce emissions of criteria and toxic air pollutants from mobile sources that utilize the fuel, and thereby, help to achieve and maintain federal and state ambient air quality standards.

The objectives of the proposed project are as follows:

- Produce cleaner-burning California gasoline blend stock for oxygenate blending (CARBOB) by removing benzene from naphtha streams and increasing the octane rating of light gasoline components;

- Produce finished reformulated gasoline (RFG) by blending ethanol and the CARBOB product; and

- Produce cleaner-burning ULSD by removing sulfur from straight-run diesel streams.

REGULATORY BACKGROUND

California gasoline and diesel specifications are governed by both state and federal agencies. During the past decade, federal and state agencies have imposed numerous requirements on the production and sale of gasoline in California.

The federal Clean Air Act (CAA) directed the U.S. Environmental Protection Agency (U.S. EPA) to adopt federal reformulated fuel gasoline (RFG Phase 1) regulations applicable starting January 1995 in the nine major metropolitan areas of the country with the worst ozone pollution, including the South Coast Air Basin (Basin). The federal CAA required that RFG 1 contain at least 2.0 weight percent oxygen year-round. In addition to the federal RFG Phase 1 requirements, California adopted regulations for reformulated gasoline in 1991 (RFG Phase 2). Because of the federal requirements for oxygen content in RFG Phase 1, an oxygen content specification was incorporated in the RFG Phase 2 California reformulated gasoline regulations. The RFG Phase 2 requirements were implemented in March 1996. While there are several oxygenates that can be used to meet the oxygenate requirement for gasoline, methyl tertiary butyl ether (MTBE) and ethanol are used most frequently. In 1996, over 95 percent of the gasoline used in California was blended with MTBE (CARB, 1999).

In April 1994, the City of Paramount approved a Mitigated Negative Declaration for a proposed Reformulated Gasoline Project at the Refinery. The proposed project would allow the Refinery to

produce reformulated gasoline in accordance with state and federal regulations. The major components of the CARB Phase 2 Reformulated Gasoline Project included a new naphtha fractionation unit, a new isomerization unit, modifications to a reformer unit, a new hot oil system, and modifications to a gas oil hydrodesulfurizer reactor. Although the project was approved by the City, it was not fully implemented by the Refinery. Therefore, the Refinery does not currently produce reformulated gasoline for sale in the California market. The Refinery currently sells its gasoline range product (full range naphtha) to other refiners for further processing.

In December 1999, CARB developed additional regulations that affect the composition of gasoline in California. CARB adopted new gasoline specifications which are known as California Reformulated Gasoline Phase 3 (RFG Phase 3) requirements. A summary of RFG Phase 3 requirements is shown in Table 2-1.

TABLE 2-1

CARB REFORMULATED GASOLINE REQUIREMENTS(1)

PROPERTY	RFG Phase 2 Requirements	RFG Phase 3 Requirements
RVP (psi)	7.0	6.9(2)
Benzene (vol. %)	1.00	0.80
Sulfur (ppmw)	40	20
Aromatic Hydrocarbons (vol. %)	25	25
Olefins (vol. %).	6.0	6.0
Oxygen (wt. %)	1.8 to 2.2	1.8 to 2.2
T50 °F(3)	210	213
T90 °F(3)	300	305

Source: CARB, 1999.

(1) Based on the flat limit standard for producers, there are "average" and "cap" limits for all gasoline sold throughout the distribution system.

(2) The listed RVP limit applies when the Evaporative Model is activated within the Predictive Model. If the Evaporative Model is not activated the flat limit for RVP is 7 psi.

(3) T50 and T90 is the temperature at which 50 and 90 percent, respectively, of gasoline is distilled.

The RFG Phase 3 requirements prohibit the use of MTBE, while establishing more stringent standards for sulfur and benzene content in gasoline. Taken together, the RFG Phase 3 requirements are intended to preserve current emission reduction benefits associated with RFG 2 and to gain additional hydrocarbon, nitrogen oxide (NOx) and toxic air contaminant (TAC) emissions reductions. Sulfur is the only fuel parameter that, when reduced, simultaneously reduces emissions of hydrocarbons, NOx, and TACs. Therefore, lowering sulfur content provides additional NOx reductions (CARB, 1999). The two distillation standards (T50 and T90) are being relaxed (see Table 2-1). In addition, the RFG Phase 3 requirements provide flexibility in meeting the Reid vapor pressure (RVP) standard.

CARB estimates that the RFG Phase 3 requirements will reduce (on a state-wide basis) hydrocarbon emissions by 0.5 ton per day, NOx emissions by 19 tons per day, and will eliminate

MTBE concentrations. Potency-weighted TAC emissions are expected to decrease by about seven percent. These emission reductions were based on comparing the properties of the 1998 average fuel to the properties of a representative RFG Phase 3 fuel. The RFG Phase 3 requirements are expected to preserve and enhance the motor vehicle emission reduction benefits of the current program and will further aid in meeting the emission reductions required by the State Implementation Plan (CARB, 1999).

In 1988, CARB approved the current specifications for California diesel fuel. These regulations, implemented in 1993, established limits on both sulfur (500 parts per million by weight or ppmw) and aromatic hydrocarbon content (10 percent by volume, and 20 percent for small refiners). The regulations reduced SOx emissions by 80 tons per day (with concurrent sulfate particulate reductions), NOx emissions by 70 tons per day, particulate emissions by 20 tons per day, and VOC emissions by 17 tons per day statewide in 1993. The regulation reduced toxic emissions as well. Recently, U.S. EPA adopted national diesel fuel standards that will lower sulfur content to 15 ppmw starting in 2006. This change enables tighter emission standards for new diesel engines and retrofits that require the use of NOx adsorbers and particulate filters. CARB has adopted the new sulfur limits into the California diesel fuel regulations.

The diesel sulfur limit of 15 ppmw will help generate significant air quality benefits by enabling the effective performance of advanced diesel exhaust emissions control technologies that reduce emissions of ozone precursors (NOx and VOCs) and diesel particulate matter. These control technologies are needed to achieve the emissions reductions required for compliance with the stringent diesel engine emissions standards adopted by CARB in October 2001 for 2007 and subsequent model year medium-duty and heavy-duty diesel engines. The new emission standards represent a 90 percent reduction of NOx emissions, 72 percent reduction of VOC emissions, and 90 percent reduction of PM emissions compared to the 2004 standards. These standards will significantly reduce emissions of NOx, VOCs, SOx, and particulate matter, which will in turn result in reductions of ozone levels and ambient particulate matter levels. CARB estimates that the NOx emissions reductions in California are expected to range from about 100 tons per year in 2005 to about 35 tons per year in 2020. CARB estimates that the particulate matter emissions reductions in California are expected to range from about 16 tons per year in 2005 to about seven tons per year in 2020. Reductions in emissions of diesel particulate matter mean reduced ambient levels of toxic air contaminants found in diesel exhaust and reduced public exposure to those contaminants (CARB, 2003).

NEED FOR EMISSION REDUCTIONS

California continues to violate state and federal ambient ozone standards. California's plan for achieving the federal ozone standard is contained in the California State Implementation Plan (SIP) that was approved by the CARB in 1997. A significant part of the projected emission reductions in the SIP are to be achieved through controlling motor vehicle emissions. Table 2-2 shows the reactive organic gases (ROG) and NOx contribution to ozone formation from motor vehicles and stationary sources. The sources of air contaminants in the Basin vary by pollutant but generally include on-road mobile sources (e.g., automobiles, trucks, and buses), other off-road mobile sources (e.g., airplanes, ships, trains, construction equipment, etc.), residential/commercial sources,

and industrial/manufacturing sources. Mobile sources are responsible for a large portion of the total Basin emissions of several pollutants.

TABLE 2-2

OZONE PRECURSOR CONTRIBUTION FROM MOTOR VEHICLES
1995 Statewide Emissions (tons/day)

	ROG	NOx	ROG + NOx	Percent of Total
On-Road Gasoline Vehicles	1588	1574	3162	45
On-Road Diesel Vehicles	64	507	571	8
Other Mobile Sources	321	695	1016	14
Stationary Sources	735	633	1368	20
Area-Wide Sources	779	95	874	13
Total	3487	3504	6991	100

Source: CARB, 1999

Mobile sources account for approximately 63 percent of VOC emissions, 90 percent of the NOx emissions, 57 percent of the sulfur dioxide (SOx) emissions, 97 percent of the carbon monoxide (CO) emissions, and 14 percent of the particulate matter less than ten microns (PM10) emissions in the Basin (SCAQMD, 2003).

The state and federal CO standards are now attained in most areas of California. The requirements for cleaner burning vehicles and fuels have been primarily responsible for the reduction in CO, despite significant increases in population and the number of vehicle miles traveled each day. While the Basin is designated as non-attainment, violations of the state and federal CO standards are now limited to only a small portion of Los Angeles County. No violations have occurred in the other three counties of the Basin (Orange, Riverside, and San Bernardino) since 1992. California RFG Phase 2 requirements helped bring most areas in the state into CO attainment. Additional emission reductions will be needed in the future to keep pace with the increases in population and vehicle usage.

The majority of California, including the Basin, is designated as non-attainment for the state standards for particulate matter less than 10 microns in diameter (PM10). The federal PM10 standards were not exceeded in the Basin in 2002. The state PM10 standards were exceeded at a number of the monitoring locations in the Basin in 2002. The U.S. EPA has adopted air quality standards for particulate matter less than 2.5 microns in diameter (PM2.5). The federal PM2.5 standard was exceeded on ten monitoring locations in the Basin in 2002. It is expected that the Basin will be required to meet the federal PM2.5 standard by 2014 (SCAQMD, 2003).

PROJECT LOCATION

The Refinery is located in the City of Paramount. The City is located east of the Los Angeles River and is approximately 16.5 miles southeast of downtown Los Angeles. The City of Paramount is bounded by the cities of South Gate, Downey, Bellflower, Long Beach, Compton, and Lynwood. The Refinery is bounded by Lakewood Boulevard, Somerset Boulevard, Downey Avenue, and Contreras Street. The Refinery is located immediately west of the City of Bellflower municipal boundary lines, and approximately one-quarter mile south of the City of Downey boundary line (see Figures 2-1 and 2-2).

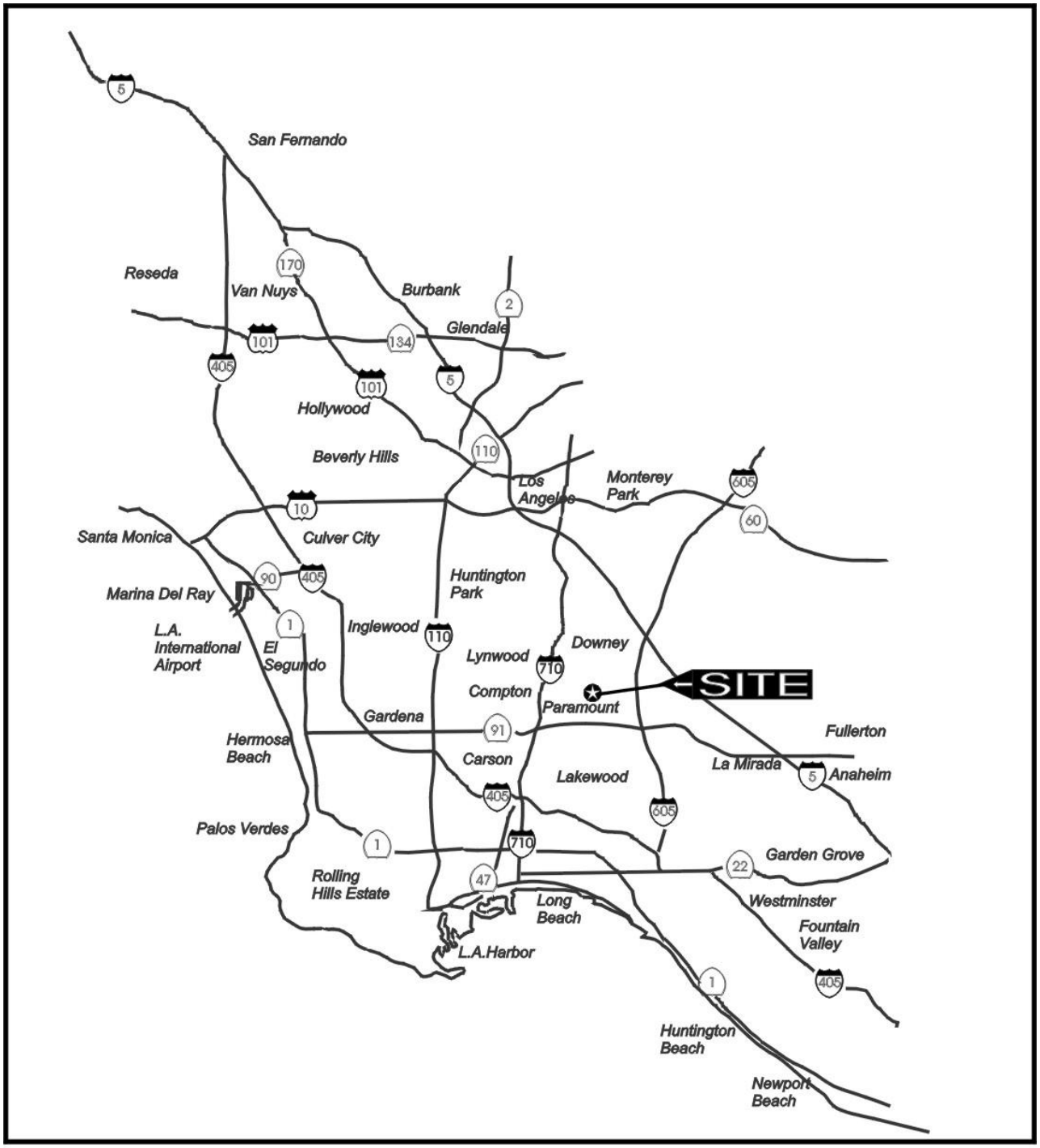
Regional access to the Refinery is provided by Interstates 605 and 710 which run north-south approximately two and a quarter miles east and west of the Refinery, respectively. State Route 91 runs east-west and is located approximately two miles south of the Refinery. Interstate 105 is located about three-quarters of a mile north of the Refinery.

Primary truck access to the Refinery is provided by Andry Drive, which is accessible from Somerset and Lakewood Boulevards. The main entrance to the administrative offices at the Refinery is at Downey Avenue. Lakewood Boulevard serves as the City's eastern boundary for both the City and project site. Somerset Boulevard and Downey Avenue, two of the City's major thoroughfares, define the southern and western edges of the project site. The Los Angeles Department of Water and Power (DWP) easement and the Union Pacific railroad (UPRR) separate the project site from multiple-family residential uses to the southwest.

LAND USE AND ZONING

The Refinery accounts for slightly more than half of the total acreage within the Somerset Ranch Area of the 1990 Paramount General Plan. The Somerset Ranch Area of Paramount is designated as "Mixed Use" and includes a mix of residential, commercial, industrial, and public uses. The Refinery is zoned M-2, Heavy Manufacturing. The land use pattern varies widely in the Paramount area on a parcel by parcel basis and reflects an area in transition from a variety of older land uses (that include the Refinery) to newer development (including apartment houses and commercial land uses, e.g., grocery stores and a Walmart).

Wirtz School is located at the corner of Contreras and Downey Avenues; the Cinderella Mobile Home Community, and single-family homes are located further east along Contreras Avenue. The two parcels northeast of the site have been developed with commercial uses, e.g. Albertson's and Walmart. The Baxter School is located east of Lakewood Boulevard in the City of Bellflower. The east side of Lakewood Boulevard is developed with commercial uses, including several auto-related uses, the Rainbow Trailer Park, Fox Trailer Court, and the Hazy 8 Motel. The Los Angeles Department of Water and Power easement and the UPRR tracks run diagonally across Somerset Boulevard and Downey Avenue and separate the Refinery from the Somerset Village condominiums and a neighborhood that consists of single-family dwellings. Further south along Somerset Boulevard, there are single-family neighborhoods and commercial and industrial land uses. The opposite side of Downey Avenue contains a mix of single- and multiple-family developments and Paramount High School.



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REGIONAL MAP

Project No. 2150
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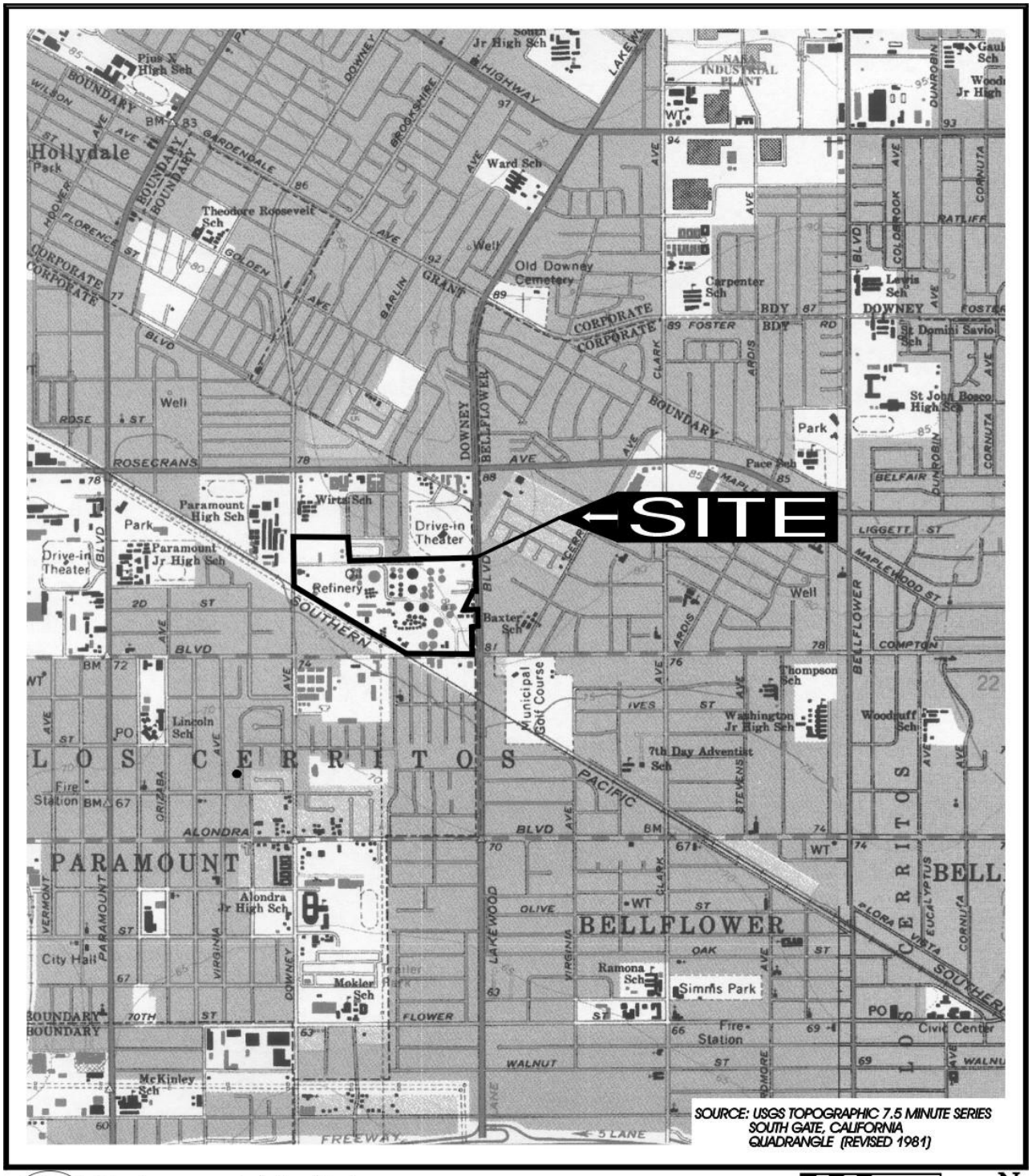
Figure 2-1



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SITE LOCATION MAP
14700 Downey Avenue
Paramount, California

Figure 2-2

Project No. 2150
N:/2150/Site Map

EXISTING REFINERY CONFIGURATION AND OPERATION

The Refinery currently processes about 50,000 barrels per day of crude oil. The range and quantity of products produced by the Refinery has varied over the years in response to the market and other factors. Currently, production from the Refinery includes a full line of asphalt products, heavy fuel oil, gas oil, diesel products, military jet fuel, and full range naphtha. The asphalt products are used in the construction industry, primarily in the production of roofing products and paved roadways. Heavy fuel oils are used to produce fuels for the marine industry. Full range naphtha and gas oil are sold to other refiners for further processing into finished products.

The Refinery is capable of producing conventional gasoline products and has done so in the past. However, California state and federal laws now mandate that only cleaner-burning (reformulated) gasolines be sold in areas with moderate to severe air pollution. Since there is no local market for conventional gasoline, the Refinery currently sells its gasoline range product (full range naphtha) to other refiners for further processing.

Diesel sold in California is subject to CARB specifications that limit the aromatics content of the fuel in order to reduce the quantity of exhaust emissions. Large refiners must produce diesel with no more than 10 percent aromatics or a fuel with equivalent emission characteristics. Small refiners, such as Paramount must produce diesel with no more than 20 percent aromatics, or a fuel with equivalent emission characteristics. Paramount Petroleum has a CARB certified formula for a 20 percent equivalent diesel fuel that it can sell in California. The Refinery is capable of producing up to 8,500 barrels per day of CARB Diesel produced to its approved small-refiner formulation, and has done so in the past. However, unless the Refinery produces gasoline, it can make only a small quantity of CARB Diesel and no ULSD. This is because without gasoline production, the hydrogen needed to remove sulfur from the diesel streams is not available. Currently, the Refinery produces high-sulfur distillate fuels (for military and off-road use or for further processing at other refineries).

Except for periods of maintenance or repair activity, the Refinery operates 24 hours per day, 365 days per year. The Refinery employs approximately 180 people. During normal business hours (Monday through Friday, 7 AM to 5 PM) there are approximately 140-150 employees and contractors on site. During nights and weekends, this number drops to around 15 employees.

The specific units in operation at any given time depend upon the types of products being produced. Currently, the main equipment in operation at the Refinery includes two crude units, two vacuum distillation units, a light naphtha stabilizer, a jet treater, an asphalt air blowing plant, an asphalt emulsion plant, and a polymer-modified asphalt plant. Support facilities (Water Treating, Fuel Gas System, Boilers, a Cogeneration Unit, and Cooling Towers) and pollution control devices (Amine Unit, Caustic Scrubber, and Incinerators) are also operating. Because the Refinery is not currently producing finished gasoline, the following units are not operating: the Reformer (for gasoline and hydrogen production); components of three distillate hydrodesulfurization (HDS) units, and a Claus Sulfur Recovery train. Table 2-3 identifies (1) the existing refinery equipment that is currently operating (Operating Units); (2) the existing refinery equipment that is not currently operating (Non-Operating Units); (3) proposed new refinery equipment; and (4) proposed modifications to existing equipment. The environmental baseline for the analysis includes all the

existing refinery equipment, whether it is currently operating or not. All proposed new refinery equipment and modifications to existing equipment are considered part of the proposed project.

TABLE 2-3

PROJECT SUMMARY TABLE

PROJECT SUMMARY	
EXISTING REFINERY EQUIPMENT – CURRENTLY OPERATING	
(2) Crude Units Light Naphtha Stabilizer (2) Vacuum Units Asphalt Blowing (AB) Plant with (4) AB Stills Asphalt Emulsion Plant Polymer Modified Asphalt Plant Cogeneration Unit Gasoline Blender Truck and Rail Loading and Unloading facilities Liquefied Petroleum Gas (LPG) Vaporizer Jet Treater	Water Treatment Plant (3) Boilers Cooling Towers Emission Control Systems (amine, caustic scrubber and SRU incinerator, AB incinerator and SOx Scrubber) Fuel Gas Mix Drum (2) Air Compressors Components of (3) HDS Units LPG Column (Depropanizer, part of Reformer) Cogeneration Unit Flare
EXISTING REFINERY EQUIPMENT – NOT CURRENTLY OPERATING	
Reformer Unit (gasoline and hydrogen production) Components of three Hydrodesulfurization (HDS) Units (No. 1, No. 3 and No. 5 HDS)	Claus Sulfur Recovery Train and Tail Gas Treating Unit Merox Treater
↑ BASELINE ↑	
↓ PROJECT ↓	
PROPOSED NEW REFINERY EQUIPMENT	
Naphtha Splitter Benzene Saturation and Isomerization Unit Light Naphtha Storage Chiller	Ethanol Unloading & Blending Facilities Pressure Swing Adsorption Unit
PROPOSED MODIFICATIONS TO EXISTING EQUIPMENT	
No. 1 HDS Naphtha Stripper (Convert hot hydrogen stripper to reboiled stripper) Light Naphtha Stabilizer (replace fired reboiler with steam reboiler)	Gasoline Blender (analyzers and controls) Butane Loading Rack (modify for butane/pentane service)

The Refinery receives most (about 96 percent) of its crude oil via underground pipelines. The remainder is received via truck transport. Likewise, most of its distilled products (full range naphtha, military fuels, diesel products, and gas oil) are shipped out via underground pipelines as required by the Refinery's feedstock customers. The Refinery ships all of its asphalt products via truck or rail transport.

Figure 2-3 shows a block flow diagram for the operation of the existing Refinery. Figure 2-4 shows the Refinery layout and the location of the process units, including the proposed project. A short description of each process unit follows:

Crude and vacuum distillation: The Refinery has two crude units, each consisting of atmospheric and vacuum distillation columns. The distillation process separates the crude oil into narrow-boiling fractions. These fractions - naphtha (gasoline range), straight-run kerosene (jet range) straight-run diesel (diesel range), gas oil, and residuum - can sometimes be blended into finished products, but most often require further refining. This is especially true for transportation fuels (gasoline, jet, and diesel) since these products must meet stringent quality requirements.

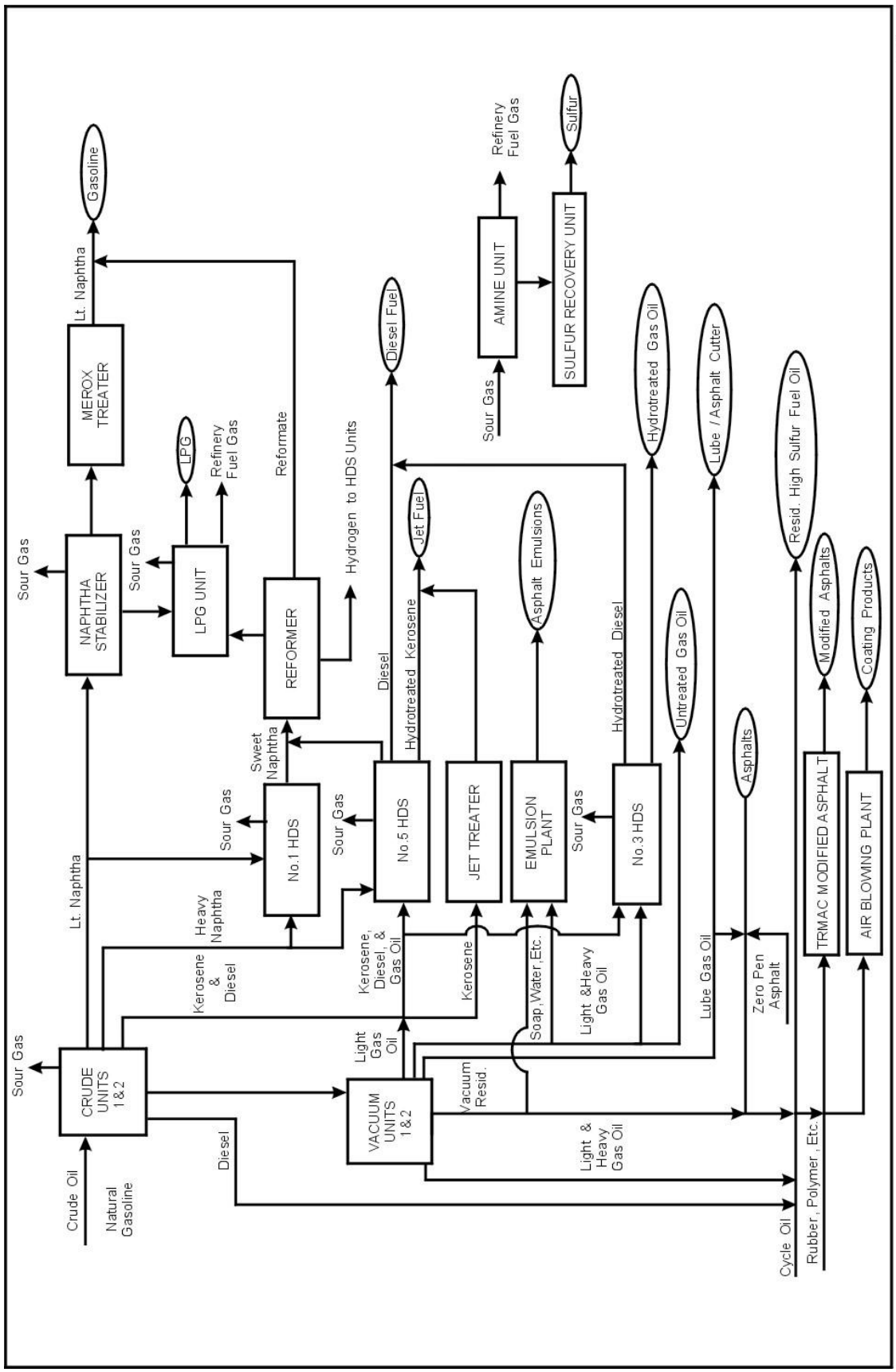
Light Naphtha Stabilization: The light naphtha produced at the Crude Units contains light hydrocarbon compounds such as ethane, propane, and butane. Before the light naphtha can be safely stored in a floating roof storage tank, these compounds must be removed to reduce the vapor pressure of the naphtha. This process separates the light hydrocarbons from the light naphtha by distillation. The light hydrocarbons are then treated to remove sulfur compounds before being used as an internal fuel for the Refinery heaters.

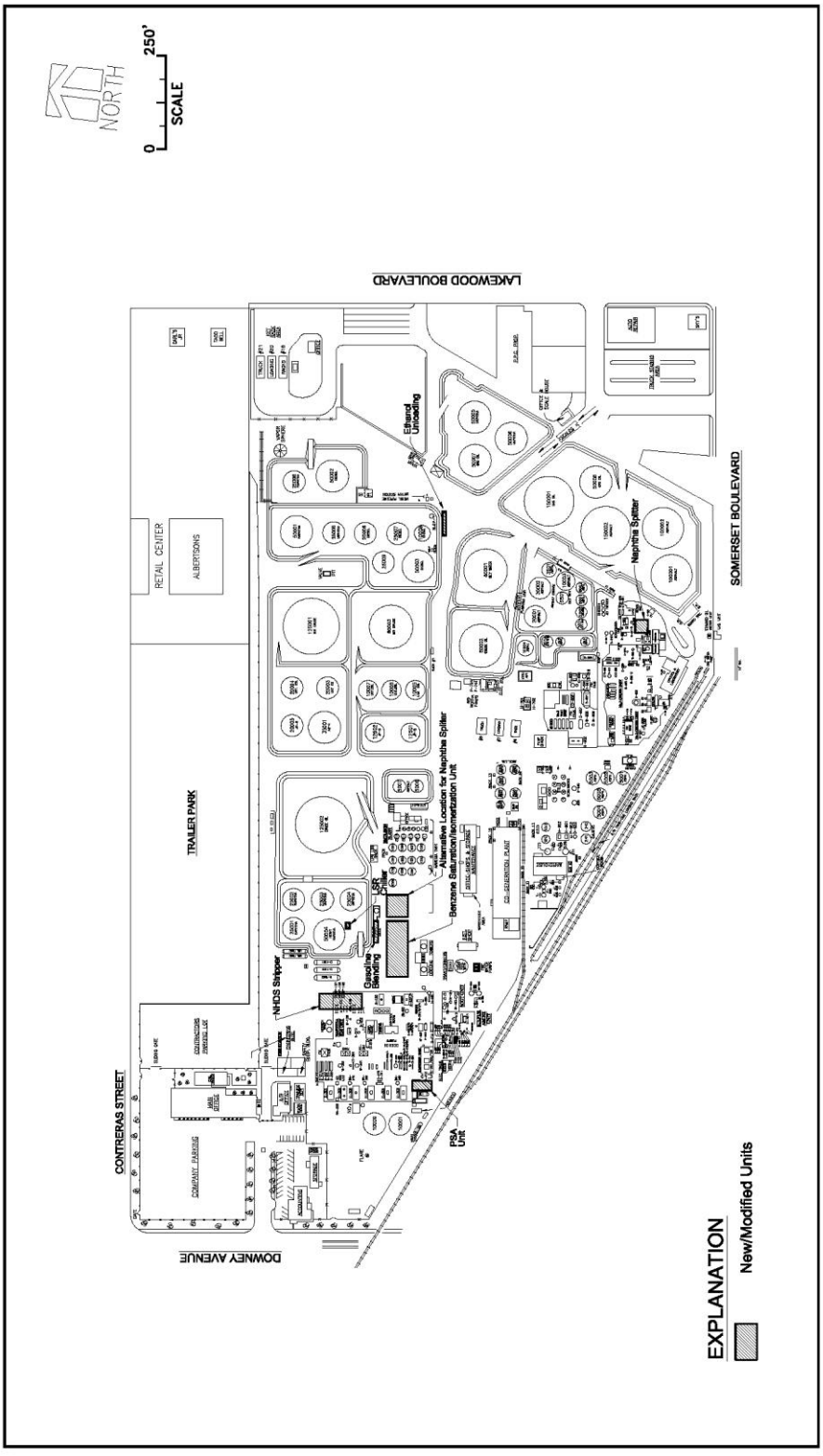
Reformer: The Reformer makes it possible to produce gasoline by increasing the octane rating of the naphtha stream. This is accomplished by a chemical reaction that converts low-octane molecules into higher-octane molecules. Hydrogen, which is used in downstream sulfur removal processes, is formed as a byproduct of the reforming process.

Hydrodesulfurization: The Refinery's three hydrodesulfurization (HDS) units all serve the same purpose—to remove sulfur compounds and other impurities from the hydrocarbon fractions produced at the crude and vacuum units. This is accomplished by a chemical reaction that uses hydrogen and a solid catalyst to convert the sulfur compounds into hydrogen sulfide. Since hydrogen sulfide is a gas, it can then easily be separated from the liquid products. Depending on the type of feed being processed, sulfur removal from the liquid feed ranges from 95-99 percent.

Amine Treating/Sulfur Recovery: Sulfur compounds in the crude oil fractions are removed in the form of hydrogen sulfide gas. Hydrogen sulfide is a corrosive, toxic substance that is controlled through the use of Amine treating and sulfur recovery. The Refinery does not store hydrogen sulfide. Shortly after hydrogen sulfide is produced at the HDS units, it is contacted with an amine solution. This process binds the hydrogen sulfide as a water-based soluble salt. This "rich" amine solution is transported via pipeline to a vessel where it is heated to liberate the hydrogen sulfide. The hydrogen sulfide is then fed to the Sulfur Recovery unit where it is converted to molten elemental sulfur, a non-toxic compound. More than 99.9 percent of the hydrogen sulfide produced at the HDS units is converted to elemental sulfur. Any unconverted hydrogen sulfide is combusted to form sulfur dioxide—a less toxic compound—before it is discharged to the atmosphere.

Flare System: The Refinery has an emergency relief system that includes a flare to incinerate relief gases. Pressurized systems are protected by relief valves that open if the operating pressure exceeds design limits. This reduces the operating pressure by venting hydrocarbon gases. These gases must be incinerated to prevent release of raw hydrocarbons to the atmosphere. The flare is equipped with continuous pilots that ignite hydrocarbon gases as they exit the flare tip. To ensure


PARAMOUNT PETROLEUM
RIFINERY BLOCK FLOW DIAGRAM
EXISTING REFINERY
N
Figure 2-3
ENVIRONMENTAL AUDIT, INC.
Project No. 2150
N:\2150\Existing Refinery\ Fig 2-3
Crude Oil
Natural Gasoline
Sour Gas
CRUDE UNITS 1&2
Diesel
Lt. Naphtha
Kerosene & Diesel
Heavy Naphtha
Light Gas Oil
VACUUM UNITS 1&2
Vacuum Resid.
Light & Heavy Gas Oil
Cycle Oil
Rubber, Polymer, Etc.
NAPHTHA STABILIZER
Sour Gas
MEROX TREATER
Gasoline
LPG UNIT
LPG
Refinery Fuel Gas
Reformate
REFORMER
Hydrogen to HDS Units
Sweet Naphtha
No.1 HDS
Sour Gas
Kerosene, Diesel, & Gas Oil
No.5 HDS
Diesel
Hydrotreated Kerosene
Diesel Fuel
Jet Fuel
JET TREATER
Kerosene
EMULSION PLANT
Soap,Water,Etc.
Asphalt Emulsions
Light &Heavy Gas Oil
No.3 HDS
Hydrotreated Diesel
Hydrotreated Gas Oil
Untreated Gas Oil
Lube Gas Oil
Zero Pen Asphalt
Asphalts
Lube / Asphalt Cutter
Resid. High Sulfur Fuel Oil
Modified Asphalts
TRMAC MODIFIED ASPHALT
Coating Products
AIR BLOWING PLANT
Sour Gas
AMINE UNIT
Refinery Fuel Gas
Sour Gas
SULFUR RECOVERY UNIT
Sulfur


NORTH
0
250'
SCALE
LAKEWOOD BOULEVARD
SOMERSET BOULEVARD
CONTRERAS STREET
DOWNEY AVENUE
RETAIL CENTER
ALBERTSONS
TRAILER PARK
Ethanol Unloading
Naphtha Splitter
Alternative Location for Naphtha Splitter
Benzene Saturation/Isomerization Unit
NHDS Stripper
Gasoline Blending
LSR
PSA Unit
EXPLANATION
New/Modified Units
REFINERY LAYOUT AND
LOCATION OF PROCESS UNITS
ENVIRONMENTAL AUDIT, INC.
Project No. 2150
13150\Refinery Layout 2-4 Revised
Figure 2-4

adequate incineration and smokeless operation of the flare, steam is injected at the point of combustion. This steam mixes the burning gases with the surrounding air to promote proper combustion of the hydrocarbons.

PROPOSED REFINERY MODIFICATIONS

The Refinery is proposing modifications to the Refinery that will allow it to produce gasoline and diesel fuels for California markets. After completion of the project, the Refinery will be able to produce about 7,500 barrels per day (315,000 gallons per day) of reformulated gasoline and 8,500 barrels per day (357,000 gallons per day) of ultra low sulfur diesel (ULSD). The proposed project will not increase the crude throughput capacity of the Refinery.

Figure 2-5 is a block flow diagram that represents the Refinery processing scheme after completion of the proposed project. In this figure, the shaded blocks represent new or modified processing equipment.

Reformulated Gasoline Production

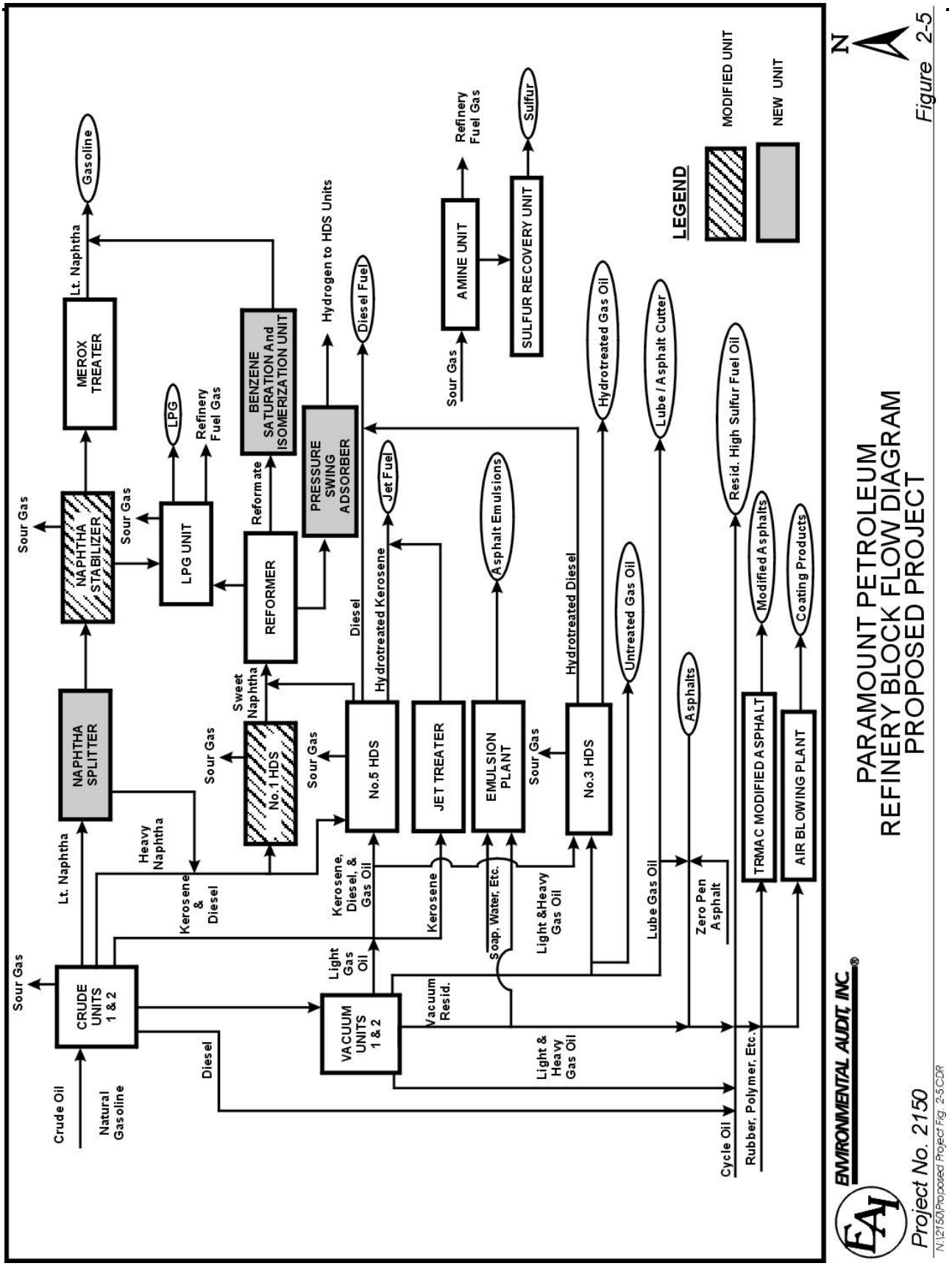
Producing RFG will require the Refinery to:

- Reduce the benzene content of its manufactured gasoline components;
- Increase the octane rating of light gasoline components;
- Remove and sell certain light components of gasoline in order to reduce the vapor pressure of finished gasoline; and,
- Purchase and import gasoline components for blending into the finished gasoline product.

To achieve these results, the Refinery proposes to install the following new equipment:

- Naphtha Splitter,
- Benzene Saturation and Isomerization Unit,
- Light Naphtha rundown chiller, and
- Ethanol Unloading and Blending facilities.

Additionally, the Refinery proposes to: convert its existing Light Naphtha Stabilizer from a fired reboiler to a steam reboiler; modify an HDS unit to improve the quality of Reformer feed; modify its existing butane loading and unloading rack to accommodate pentane loading; change the service of two existing internal floating roof storage tanks; and, modify its existing gasoline blender to handle the additional blendstocks needed to produce RFG.


PARAMOUNT PETROLEUM
REFINERY BLOCK FLOW DIAGRAM
PROPOSED PROJECT
LEGEND
MODIFIED UNIT
NEW UNIT
N
Crude Oil
Natural Gasoline
CRUDE UNITS 1 & 2
VACUUM UNITS 1 & 2
NAPHTHA SPLITTER
NAPHTHA STABILIZER
MEROX TREATER
Gasoline
Lt. Naphtha
Heavy Naphtha
Kerosene & Diesel
Kerosene, Diesel, & Gas Oil
Kerosene
Light Gas Oil
Vacuum Resid.
Diesel
Light & Heavy Gas Oil
Sour Gas
LPG UNIT
LPG
Refinery Fuel Gas
REFORMER
Reformate
BENZENE SATURATION And ISOMERIZATION UNIT
Sweet Naphtha
No.1 HDS
No.5 HDS
JET TREATER
EMULSION PLANT
No.3 HDS
PRESSURE SWING ADSORBER
Hydrogen to HDS Units
Diesel Fuel
Jet Fuel
Hydrotreated Kerosene
Diesel
Asphalt Emulsions
Soap, Water, Etc.
Light &Heavy Gas Oil
Hydrotreated Diesel
AMINE UNIT
SULFUR RECOVERY UNIT
Refinery Fuel Gas
Sulfur
Hydrotreated Gas Oil
Untreated Gas Oil
Lube / Asphalt Cutter
Lube Gas Oil
Asphalts
Zero Pen Asphalt
Resid. High Sulfur Fuel Oil
Modified Asphalts
Coating Products
TRMAC MODIFIED ASPHALT
AIR BLOWING PLANT
Cycle Oil
Rubber, Polymer, Etc.
ENVIRONMENTAL AUDIT, INC.
Project No. 2150
N:\2150\Proposed Project Fig. 2-5.CDR
Figure 2-5

Naphtha Splitter and Benzene Saturation Unit

Benzene is a naturally occurring component of crude oil and is manufactured in the gasoline reforming process. Because of its designation as a carcinogen, regulators require, and this project will result in, reduced levels of benzene in reformulated gasoline.

To reduce benzene in gasoline to regulated levels, the Refinery is proposing to install a new Naphtha Splitter and a new Benzene Saturation Unit.

The Naphtha Splitter will concentrate naturally occurring benzene into the heavy naphtha feed to the Reformer. The Benzene Saturation Unit will then process the high-octane product from the Reformer (reformate) to convert all of the manufactured benzene and most of the naturally occurring benzene into cyclohexane. Since the release of the Draft EIR, the location of the Naphtha Splitter has been changed (per Alternative 3, evaluated in Chapter 6) to reduce the potentially significant hazard impacts associated with this unit to less than significant.

Isomerization

Gasoline engines require fuels with minimum octane ratings in order to prevent fuel pre-ignition (knocking) that can reduce engine performance and result in engine damage. The naturally-occurring gasoline-range hydrocarbons present in crude oil generally have octane ratings below these required minimums. As a result, refiners use a variety of processes to increase the octane rating of gasoline-range hydrocarbons.

The Paramount Refinery currently uses a process called Catalytic Reforming to increase the octane rating of heavy gasoline components. Although this process is very effective in improving the octane rating of heavy gasoline components, it does so by increasing the aromatic content of the fuel. Since reformulated gasoline now limits the maximum aromatic content in gasoline, the Refinery can no longer produce the necessary octane rating for its gasoline products solely by use of its existing Catalytic Reforming process.

Isomerization is a process that increases the octane rating of light gasoline components without increasing the aromatic content of the fuel. Through the use of Isomerization, the Paramount Refinery will be able to meet RFG octane rating requirements while converting less of the heavy gasoline components into aromatics. This will allow the Refinery to produce gasoline fuels that simultaneously meet the minimum octane rating and maximum aromatic specifications.

Vapor Pressure Reduction

In order to produce reformulated gasoline blendstock that can be mixed with ethanol to produce finished gasoline, the Refinery must remove some of the pentane from its gasoline pool. The pentane will be removed at a distillation column that is part of the new Benzene Saturation Unit. The material will be stored in an existing pressurized storage vessel. A portion of this pentane product will be blended into the finished gasoline. Excess pentane that cannot be blended into gasoline will be shipped out of the Refinery using pressurized truck transport.

Reformer Feed Quality Control

The Refinery's Reformer operation is key to producing Clean Fuels, and one key to proper Reformer operation is high quality feed to the unit. An HDS unit treats the Reformer feed to remove sulfur and nitrogen contaminants and water, all of which can negatively impact Reformer yields and poison the reforming catalyst. Since the Reformer is the only source of refinery hydrogen, unplanned outages due to reforming catalyst poisoning result in the shutdown of all hydrogen-dependent units.

The Refinery's No. 1 HDS Unit uses a Hot Hydrogen Stripper as the final treatment for the Reformer feed. This is a design that does not consistently reduce contaminants to a sufficiently low level for optimal reformer operating conditions. To consistently reduce contaminants to the desired levels, the Refinery is proposing modifications that will convert the Hot Hydrogen Stripper to a reboiled stripper. This conversion will require a new pressurized vessel, several heat exchangers, some pumps, and use of an existing process heater (H-860), which will be moved from another existing unit in the Refinery.

Light Naphtha Stabilization

The Refinery's Light Naphtha Stabilizer removes butane and lighter hydrocarbons from light straight-run naphtha to reduce its vapor pressure. The heat for this distillation column operation is currently supplied from a fired heater, H-860.

In order to produce reformulated gasoline, the Refinery will need to reduce the average boiling point of the stabilized light naphtha by allowing some of the heavier hydrocarbon molecules to enter the heavy naphtha stream. This will produce light naphtha that boils over a narrower range than the Refinery's current light naphtha product.

To ensure consistent quality of this product, the Refinery proposes to install a steam reboiler. Heat input is more easily controlled using a steam reboiler than with a fired heater, especially when distilling narrow-boiling fractions. Converting the Light Naphtha Stabilizer to a steam reboiler will also free up the H-860 heater for use at the modified No. 1 HDS Stripper, described earlier.

Logistics

Producing reformulated gasoline will require some new or modified equipment within the Refinery's product storage and handling facilities. No additional storage tanks or physical modifications to existing storage tanks are required.

The benzene control scheme that the Refinery is proposing will result in production of a light naphtha stream with a relatively high vapor pressure. The Refinery will install a chiller unit to reduce the light naphtha rundown temperature and vapor pressure. The chiller is a self-contained refrigeration unit that will cool the light naphtha to a storage temperature of about 75 ^{o}F.

The production of excess pentane will be a small volume and will be shipped out of the Refinery. This will require use of an existing butane loading rack in pentane service. On average, the Refinery expects to ship about 200 barrels per day of pentane – about one truckload per day.

To accommodate additional gasoline blendstocks needed to produce CARBOB and RFG, the Refinery will change the service of one ~~two~~ existing fixed ~~internal floating~~ roof storage tank~~s~~ (Tank 10005) from its ~~their~~ current jet fuel service to naphtha service and convert it to a fixed roof tank with an internal floating roof. The Refinery had originally proposed the modification of two storage tanks and, after further evaluation, determined that the only one tank modification was required. ~~This change of service will not require any physical modifications to the tanks, but will require minor piping changes to accommodate the new service.~~

Producing reformulated gasoline will require that the Refinery modify its existing gasoline blender to handle additional blendstocks. This requires the addition of pumps, piping, control systems, and in-line analyzers.

Finally, to produce finished RFG, the Refinery will install ethanol-blending facilities at its existing truck loading rack. Ethanol will be delivered to the Refinery via truck transport and stored in an existing floating roof storage tank. Receiving the ethanol will require a new unloading rack. The ethanol will be truck-blended with CARBOB at the existing truck loading rack using a new loading pump and transfer piping.

Ultra Low Sulfur Diesel Production

The physical modifications to the Refinery are necessary to manufacture reformulated gasoline and ULSD, by allowing full use of the Refinery's HDS units.

In order to produce ULSD to meet state and federal specifications, the Refinery proposes to install a new Pressure Swing Adsorption (PSA) unit to convert the Reformer hydrogen to a higher purity hydrogen stream. This high purity hydrogen will increase the desulfurization capabilities of the existing HDS units such that the Refinery can produce diesel that will meet the 15 ppm sulfur specification.

Pressure Swing Adsorption (PSA)

The hydrogen produced at the Refinery's Reformer contains 75-85 mole percent hydrogen. The purity of this stream is sufficient to process the Refinery's existing diesel streams to the 500 ppm by weight sulfur level required for CARB Diesel production. However, in order to produce ULSD in the Refinery's existing HDS units, a hydrogen stream with a purity of at least 98 mole percent hydrogen is needed.

Hydrogen purification can be accomplished by means of PSA. This technology uses a solid adsorbent to trap the impurities contained in the low purity hydrogen stream. The resulting high-purity stream contains more than 99 mole percent hydrogen. The removed impurities, primarily light hydrocarbon gases, are burned as refinery fuel gas.

CONSTRUCTION OF THE PROPOSED PROJECT

Construction Schedule

Construction for the proposed project is expected to begin in the first quarter of 2004 and take approximately one year for completion with an estimated fourth quarter 2004 completion date. Most construction activities associated with the proposed project are expected to take place during normal business hours, Monday through Saturday.

Construction Workforce and Vehicles

Construction of the proposed project is expected to employ a maximum of about 60 workers. Parking for the construction workers will be provided in an existing parking lot at the Refinery. The Refinery currently has sufficient parking for construction workers as well as the small increase in permanent employees that will result from the project.

The proposed project is expected to increase the number of trips related to construction workers and construction equipment during the construction phase. The proposed project is expected to require a maximum of about 60 construction workers and two additional heavy-duty trucks per day for delivery of construction materials. Construction workers are expected to arrive at the work site between 6:30-7:00 a.m. and depart at about 5:00 p.m. The construction activities are expected to avoid peak hour traffic during morning hours, which occurs between 7-9 a.m.

OPERATION OF THE PROPOSED PROJECT

During the operational phase, an increase of about 14 workers and worker-related vehicles is expected. The Refinery has sufficient parking to handle the projected increase in workers so no additional parking will be required to handle the proposed project. The proposed project is expected to generate additional truck trips associated with the delivery of gasoline, diesel fuel, pentane, ethanol, and alkylate to/from the Refinery. Most of the finished products from the Refinery (other than asphalt) are currently transported via pipeline. By comparison, reformulated gasoline and diesel fuel will be transported via truck following completion of the proposed project. Additional trucks are associated with the delivery of fuel blending components (including alkylate and ethanol).

PERMITS AND APPROVALS

The proposed project will require approvals from a variety of federal, state, and local agencies (see Table 2-4). Examples of permits and approvals that are required, may be required or may require modification for the Refinery are summarized below.

Federal Approvals

Direct federal approvals for the proposed project are not expected. Many of the U.S. EPA regulations and requirements are implemented by state or local agencies. The Spill Prevention

Control and Countermeasure (SPCC) Plan may require modifications to assure that all new and modified Refinery units are included in the Plan.

State Approvals

Construction-related permits may be required from the California Occupational Safety and Health Administration (CalOSHA) for demolition, construction, excavation, and tower and crane erection. Any transport of heavy construction equipment, which requires the use of oversized transport vehicles on state highways, will require a Caltrans transportation permit. The project may require revisions to the National Pollutant Discharge Elimination System (NPDES) permit, including storm water runoff, from the Regional Water Quality Control Board. The Process Safety Management program may require updating due to project revisions including an hazardous operation analysis, development of operating procedures, training procedures, and pre-start safety review.

Local Approvals

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

The Los Angeles County Sanitation Districts (LACSD) has responsibility for issuance of industrial wastewater discharge permits which are required for discharges into public sewers. Project modifications may require modification to the industrial wastewater discharge permit.

The City of Paramount has issued a conditional use permit for operation of the current refinery. The conditional use permit will need to be reviewed and modified, as appropriate, to include the proposed project.

California Assembly Bill 2185 requires local agencies to regulate the storage and handling of hazardous materials and requires development of a plan to mitigate the release of hazardous materials. Businesses that handle any of the specified hazardous materials must submit to government agencies (i.e., fire departments), an inventory of the hazardous materials, an emergency response plan, and an employee training program. The business plans must provide a description of the types of hazardous materials/waste on-site and the location of these materials. The information in the business plan can then be used in the event of an emergency to determine the appropriate response action, the need for public notification, and the need for evacuation. The City of Paramount Fire Department is responsible for review and approval of Risk Management Plans (RMP). The RMP for the Refinery is expected to require updating to include the proposed project.

Building and grading permits for the proposed project may be required from the City to assure that the project complies with the Uniform Building Code.

TABLE 2-4

FEDERAL, STATE AND LOCAL AGENCY PERMITS AND APPLICATIONS

Agency Permit or Approval	Requirement	Applicability to Project
Federal		
U.S. EPA	Spill Prevention Control and Countermeasure Plan (40 CFR Part 112)	Modifications to Refinery facilities that affect the potential for oil or flammable materials discharge into navigable waters.
	Title III of the federal Clean Air Act Amendments of 1990, including development of an Accidental Release Program. Title III of the Superfund Amendments and Reauthorization Act of 1986, including Section 313 – Annual Release Reporting.	Modifications to Refinery facilities/ operations involving listed air toxics or use of extremely hazardous substances. Requires the preparation of an RMP Modifications to Refinery facilities/ operations involving use or storage of extremely hazardous substances or other regulated hazardous materials.
Occupational Safety and Health Administration	Compliance with 29 CFR 1920, including preparation of an Emergency Response Plan, a Fire Prevention Plan, Process Hazards Safety Review, and employee training.	Modifications to Refinery facilities involving materials that are acutely toxic, flammable, or explosive.
U.S. Department of Transportation	Compliance with DOT regulations regarding transportation of hazardous substances (40 CFR Part 172)	Project-related transportation (import/ export) of hazardous substances.
State		
State Water Resources Control Board (SWRCB)	National Pollutant Discharge Elimination System (NPDES) Permit/Waste Discharge reqt.	Project-related modifications to applicable stormwater runoff plans.
Caltrans	Transportation Permit (CCR 21, Division 2, et.seq.)	Project-related application to transport overweight, oversize, and wide loads on state highways.
CalOSHA	Process Safety Management (PSM) Program (40 CFR Part 1910).	PSM program may require updating due to project revisions including written process safety information, hazardous operation (hazop) analysis, development of operating procedures, training procedures, and pre-start safety review.

TABLE 2-4 (Continued)

FEDERAL, STATE AND LOCAL AGENCY PERMITS AND APPLICATIONS

Agency Permit or Approval	Requirement	Applicability to Project
State (cont.)		
California Environmental Protection Agency, Dept. of Toxic Substances Control (DTSC)	On-site hazardous waste generation.	Project-related modifications to applicable hazardous materials and hazardous waste generation and handling at the Refinery.
State Water Resources Control Board (SWRCB)	National Pollutant Discharge Elimination System (NPDES) Permit/Waste Discharge requirements.	Project-related modifications to applicable stormwater runoff plans.
Caltrans	Transportation Permit (CCR 21, Division 2, et.seq.)	Project-related application to transport overweight, oversize, and wide loads on state highways.
CalOSHA	Process Safety Management (PSM) Program (40 CFR Part 1910).	PSM program may require updating due to project revisions including written process safety information, hazardous operation (hazop) analysis, development of operating procedures, training procedures, and pre-start safety review.
CalOSHA	Construction-related permits (CCR Title 8, Division 1, Chapter 4)	Excavation, construction, demolition and tower and crane erection permit.
	Written Hazard Communication Standard Compliance Program	Project-related modifications to Refinery facilities/operations involving hazardous materials (including needed modifications to employee training programs.
Local South Coast Air Quality Management District (SCAQMD)	Permits to Construct and Title V of the 1990 Clean Air Act.	SCAQMD Rule 201 and Regulation XXX: Permit to construct and operate. Applications are required to construct, operate or modify stationary emission sources.
	Permits to Operate	SCAQMD Rule 203: Permit to Operate. Applications are required to operate stationary emissions sources.
	California Environmental Quality Act Review	The SCAQMD is the lead agency for preparation of the environmental document (Public Resources Code §21067).

TABLE 2-4 (Continued)

FEDERAL, STATE AND LOCAL AGENCY PERMITS AND APPLICATIONS

Agency Permit or Approval	Requirement	Applicability to Project
SCAQMD (cont.)		
	Standards for Approving Permits	SCAQMD Rule 212: Permits cannot be issued if air contaminants create a public nuisance or exceed capacity limits. Also requires public notification of significant project.
	VOC Emissions from Fugitive Components	SCAQMD Rule 1173: Fugitive Emissions of Volatile Organic Compounds. Controls VOC leaks from various fugitive components including valves, fittings, pumps, pressure relief devices, and compressors.
	VOC Emissions from Storage Tanks	SCAQMD Rule 1178, Further Reductions of VOC Emissions from Storage Tanks: Requires emission reduction from storage tanks at specified petroleum facilities.
	BACT and Modeling	SCAQMD Regulation XX and Regulation XIII, New Source Review: New or modified permit units must apply BACT, obtain offsets and perform modeling of new emissions increases. Pursuant to Rule 1304, the proposed project is exempt from offsets because it is being required under state law.
	T-BACT and Risk Assessment	SCAQMD Rule 1401: NSR of Toxic Air Contaminants. New or modified permit units must comply with maximum allowed risk levels.
	Asbestos Emissions	SCAQMD Rule 1403: Asbestos Emissions from Demolition. Controls emissions from certain demolition and renovation activities.
	Soil Contamination	SCAQMD Rule 1166: Requires the control of VOC emissions from soil remediation activities.

TABLE 2-4 (Concluded)

FEDERAL, STATE AND LOCAL AGENCY PERMITS AND APPLICATIONS

Agency Permit or Approval	Requirement	Applicability to Project
City of Paramount	Building Permit	Required for project-related foundations and buildings to assure compliance with UBC, etc.
	Grading Permit	Required prior to grading.
	Plumbing and electrical permit	General construction permit.
	Hazardous Materials Business Plan	Storage of project-related hazardous materials.
	Acutely Hazardous Material Registration/Risk Management Plan	Project-related use/storage of acutely hazardous materials.
	Above ground storage of hazardous/flammable materials (Uniform Fire Code, Article 80)	Project-related storage of regulated materials.
	Conditional Use Permit	Expected to require modifications due to the proposed project.
County Sanitation Districts of Los Angeles	Industrial Wastewater Discharge Permit (CA Health & Safety Code, Division 6, Chapter 4, Article 1, Section 6521)	Project-related modifications to the Refinery's industrial wastewater discharge to the sewer if it affects the quantity, quality, or method of industrial wastewater disposal.

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