CHAPTER 2

PROJECT DESCRIPTION

2.0 PROJECT DESCRIPTION

2.1 INTRODUCTION

BP is proposing a safety, compliance and optimization project at its existing Carson Refinery (Refinery). The proposed project will involve physical changes and additions to multiple process units and operations as well as operational and functional improvements within the confines of the existing Refinery. The portion of the proposed project related to enhancing safety will focus on modifications to the Coker Gas Debutanizer pressure relief valve, as well as adding equipment to the Fluid Catalytic Cracking Unit (FCCU), Fluid Feed Hydrodesulfurization (FFHDS), vapor recovery system, and flare system. The portion of the proposed project related to compliance will involve physical modifications to existing refinery units including the FCCU, FFHDS, vapor recovery system, and flare system so as to comply with multiple South Coast Air Quality Management District (SCAQMD) rules (e.g., Rule 1105.1 – PM10 and Ammonia Emissions from Fluid Catalytic Cracking Units, Rule 1118 – Control of Emissions From Refinery Flares, and Rule 1173 – Further Reductions of VOC Emissions From Storage Tanks at Petroleum Facilities) and to implement the terms of a settlement agreement between the SCAQMD and BP. Other modifications are proposed that will optimize operations relating to various existing refinery units including the FFHDS, the FCCU, the Alky Merox Unit, the Alkylation Unit, the Hydrocracker Unit, and the Sulfur Plant at the Refinery.

2.2 PROJECT OBJECTIVES

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

1. Comply with Rule 1105.1 - PM10 and Ammonia Emissions from Fluid Catalytic Cracking Units, Rule 1118 – Control of Emissions from Refinery Flares, and Rule 1173 - Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants;

2. Comply with the settlement agreement dated March 2005 between the SCAQMD and BP that required refinery modifications to reduce refinery emissions;

3. Improve the efficiency, availability and performance of vapor recovery systems;

4. Ensure that there is no increase in the annual average concentration of total reduced sulfur in the Refinery by improving the operational efficiency and optimizing operations of the FCCU, FFHDS Unit, Alky Merox Unit, Alkylation Unit, Hydrocracker Unit, and Sulfur Plant; and

5. Produce additional quantities of low sulfur gasoline, ultra low sulfur diesel, and jet fuel without increasing the crude throughput capacity of the BP Carson Refinery.

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

2.3 PROJECT LOCATION

The proposed project will occur entirely within the confines of the existing BP Carson Refinery, which is located at 1801 East Sepulveda Boulevard in the City of Carson, California. Figure 2-1 shows the regional location of the Refinery within the overall southern California region and Figure 2-2 shows the site location.

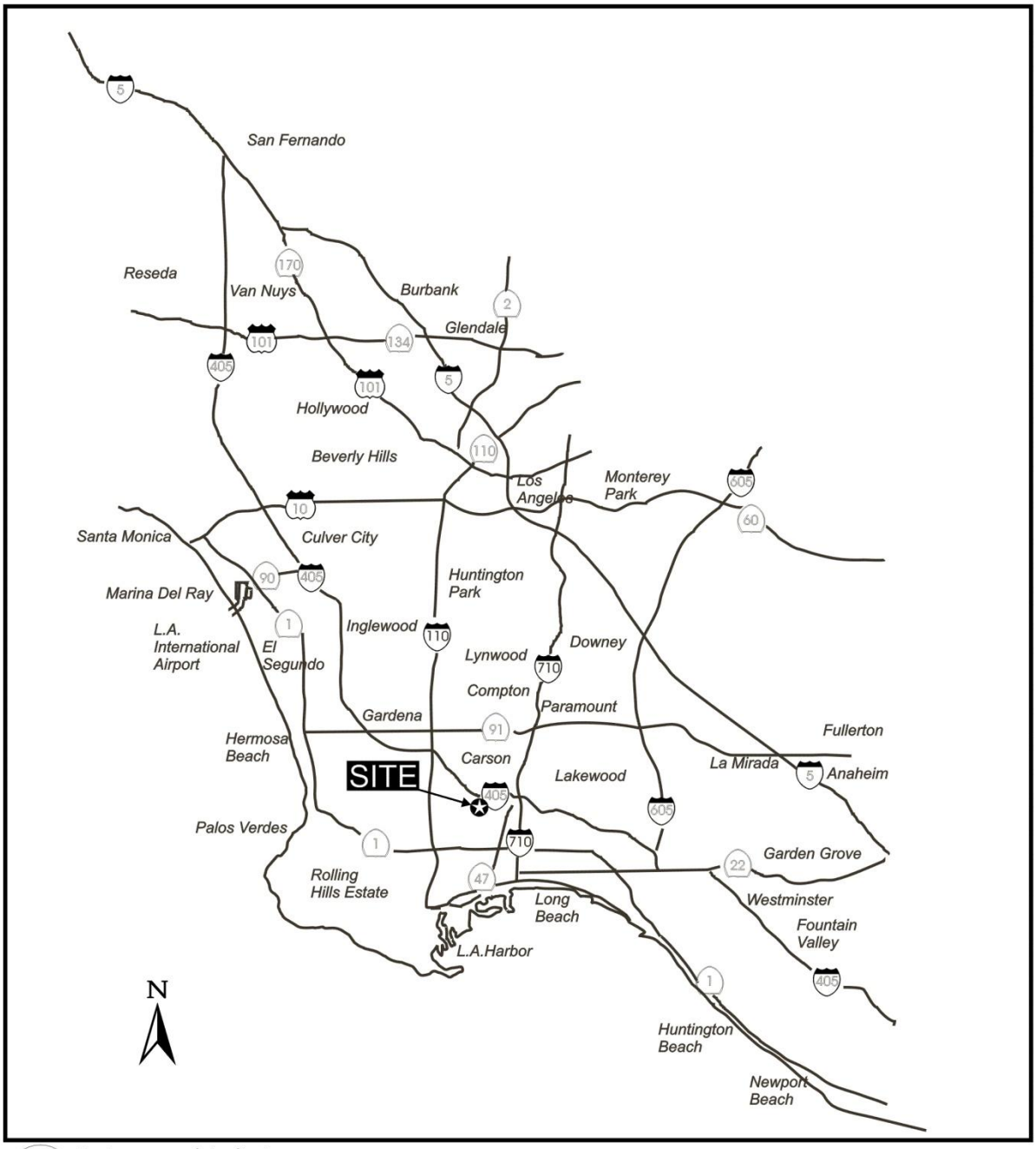
2.4 LAND USE AND ZONING

Implementation of the proposed modifications at the BP Carson Refinery will occur within existing property boundaries. Land use on the facility property and within the immediate vicinity is dominated by heavy industry and manufacturing. The Refinery and all adjacent properties are zoned manufacturing heavy (MH). The closest residential area is approximately 300 feet from the property line across Wilmington Avenue to the southwest of the Refinery (adjacent to the BP tank farm). The closest residential area to the proposed project locations within the Refinery is about 3,000 feet.

The Refinery is bounded by Wilmington Avenue to the west, 223rd Avenue to the north, Alameda Street to the east, and Sepulveda Boulevard to the south. The Dominguez Channel flows through the Refinery, dividing the property into two sections: Northeastern and Southern. Land to the north of the Refinery between Wilmington Avenue and Alameda Street is occupied by heavy industrial uses and vacant land formerly occupied by heavy industry. Land north of 223rd Street to I-405 is occupied by commercial uses, such as automobile dealerships and automobile repair services.

The Alameda Corridor, a major port access arterial, and other industrial facilities, including the BP Coke Barn, the Air Products Hydrogen Plant, the Shell Sulfur Plant, wrecking yards, and an intermodal container transfer facility (ICTF) are located to the east of the Refinery. Land to the east of the ICTF is in the City of Long Beach and includes a residential neighborhood and light manufacturing facilities. South of the BP Carson Refinery is Sepulveda Boulevard and the ConocoPhillips Carson Plant and a cold storage warehouse facility. This area is dominated by storage tanks, refinery equipment and a large warehouse.

To the west of the BP Refinery is Wilmington Avenue. The land adjacent to Wilmington Avenue on the west is occupied by the Watson Industrial Park, a development of manufacturing and warehouse-type structures. The land to the west of Wilmington Avenue and south of Sepulveda Boulevard, immediately west of BP's southwest tank farm, is a residential neighborhood and represents the closest residences (about 300 feet from the BP tank farm).

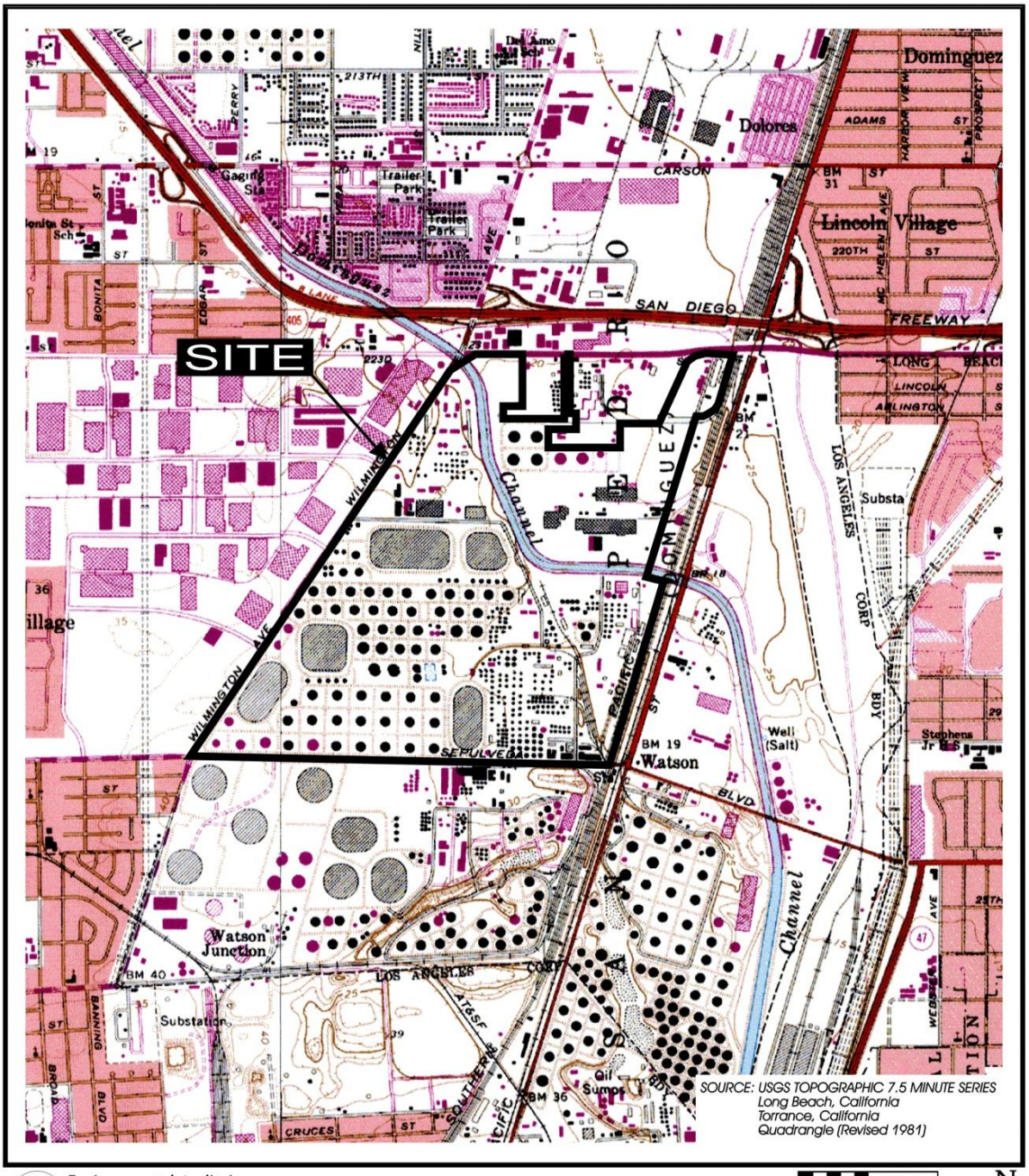


Environmental Audit, Inc.

REGIONAL MAP
BP CARSON REFINERY

Project No. 2393 Figure 2-1

N:\2393\Regional Map.cdr



SITE LOCATION MAP
BP CARSON REFINERY

Project No. 2393 Figure 2-2

N:\2393\Site Loc Map.cdr

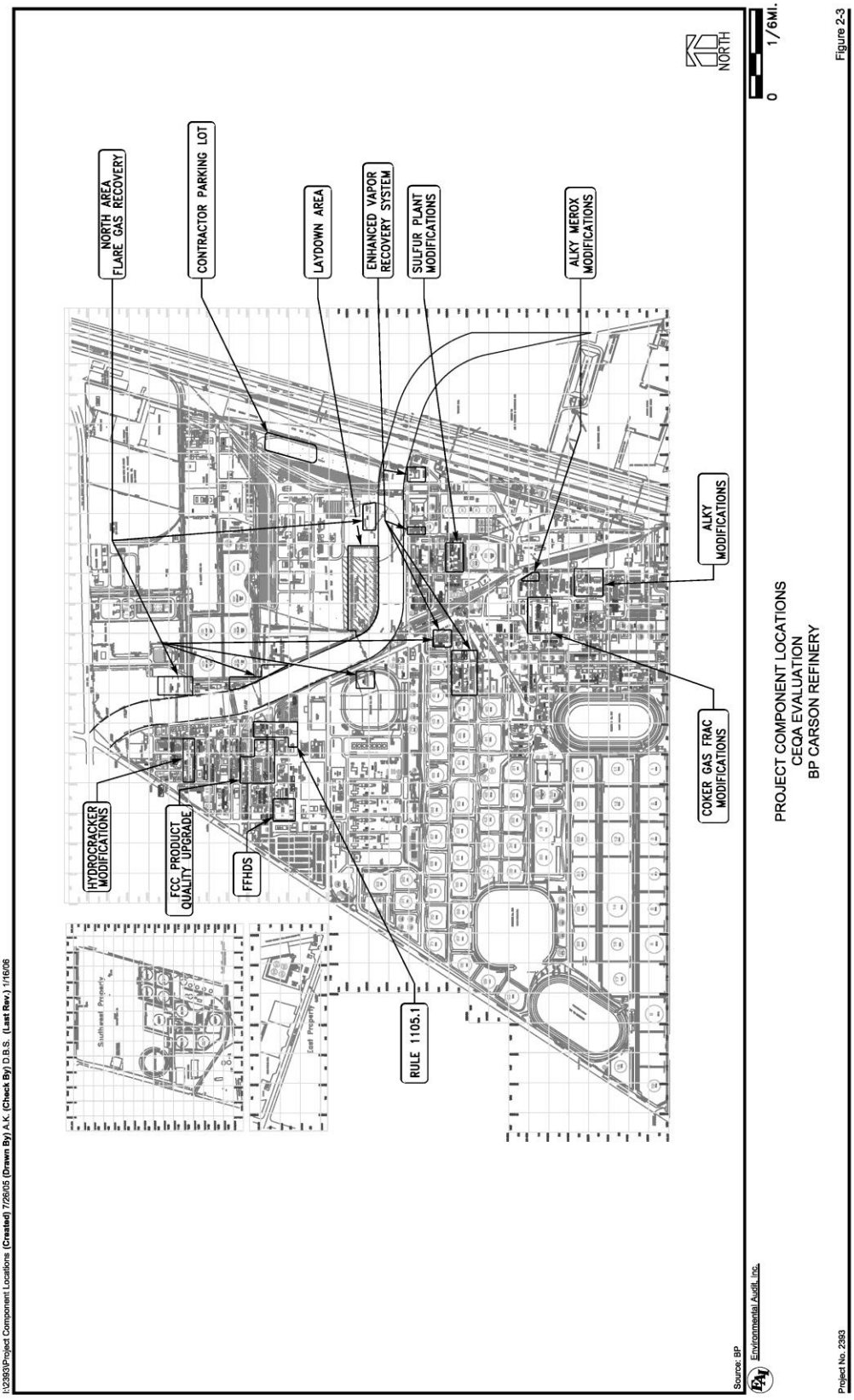
2.5 EXISTING REFINERY CONFIGURATION AND OPERATION

The locations of the existing Refinery units are shown in Figure 2-3. Figure 2-4 shows a flow diagram of the existing Refinery operations. Crude oil, used to produce gasoline and other petroleum products, is delivered by ship to the marine terminal in the Port of Long Beach by ship, or via pipelines from inland sources, and pumped to the Refinery by existing pipelines. The crude oil is then processed in the crude units where it is heated and distilled into multiple feedstock components that are later processed elsewhere in the Refinery. The heavy residual oil leaving the crude units is further distilled in the vacuum units to yield additional, lighter hydrocarbon products and the vacuum residuum. The lighter hydrocarbon components from the crude units and vacuum units are fed to other Refinery units for further processing, primarily the Fluid Catalytic Cracking Unit, Catalytic Hydrocracking Unit, Hydrotreating Units, and the Alkylation Unit.

The feedstocks are refined into the major Refinery products such as unleaded gasoline, diesel, jet fuel, petroleum gases, petroleum coke, and sulfur. During the refining process, elemental sulfur and petroleum coke are produced as by-products. The major categories of processing units at the Refinery include the following units: 1) crude and vacuum distillation; 2) coking; 3) catalytic reforming; 4) hydrocracking; 5) hydrotreating; 6) fluid catalytic cracking; 7) alkylation; 8) sulfur recovery; and, 9) other auxiliary systems. Auxiliary systems include a hydrogen plant (to produce hydrogen needed for certain refinery reactions), boilers to produce steam, cogeneration plant to produce electricity, and wastewater treatment. Finished products are transported by pipeline to BP distribution and third party terminals located throughout California and adjacent states. These products are sold and shipped to consumers. See Figure 2-4 for a flow diagram of the existing Refinery.

2.6 PROPOSED PROJECT MODIFICATIONS TO THE REFINERY

The proposed Refinery modifications are summarized in this section. The locations of the proposed new and modified units are shown in Figure 2-3. All components of the proposed project are associated with enhancing safety, complying with multiple SCAQMD rules and the March 2005 Settlement Agreement, and optimizing the overall operations of the existing Refinery. Many components of the proposed project are related to the FCCU modifications and the subsequent changes to other related units. *Subsequent to the release of the Draft EIR, additional engineering review of the SCAQMD permit applications for certain refinery unit modifications was completed that resulted in minor changes to fugitive component counts and related air emissions. The details of these changes are provided in Appendix B. The proposed project changes were evaluated and 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.*


NORTH AREA FLARE GAS RECOVERY
CONTRACTOR PARKING LOT
LAYDOWN AREA
ENHANCED VAPOR RECOVERY SYSTEM
SULFUR PLANT MODIFICATIONS
ALKY MEROX MODIFICATIONS
ALKY MODIFICATIONS
COKER GAS FRAC MODIFICATIONS
HYDROCRACKER MODIFICATIONS
FCC PRODUCT QUALITY UPGRADE
FFHDS
RULE 1105.1
NORTH
0
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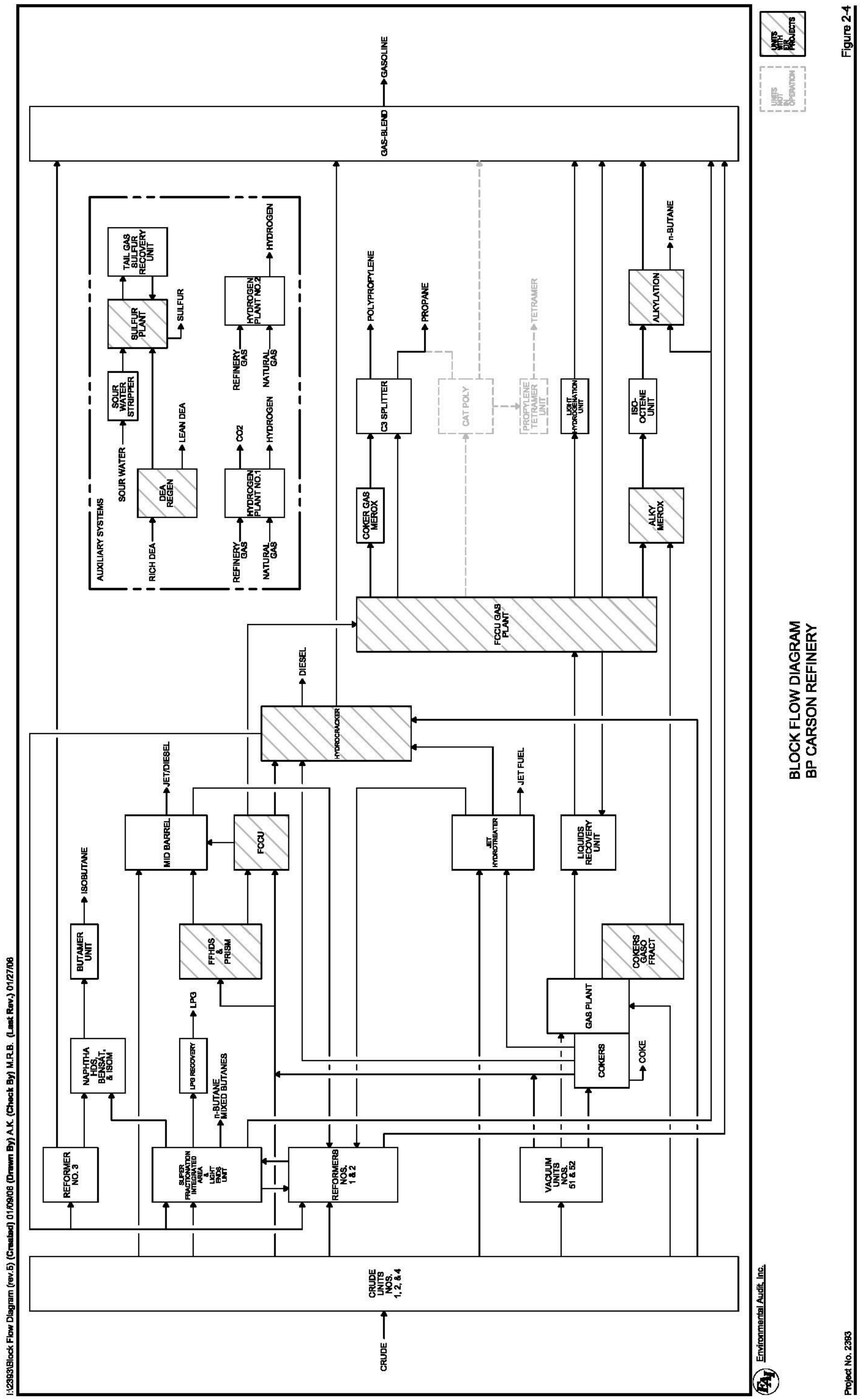
PROJECT COMPONENT LOCATIONS
CEQA EVALUATION
BP CARSON REFINERY
Source: BP
Environmental Audit, Inc.
Project No. 2393
Figure 2-3
I:\2393\Project Component Locations (Created) 7/26/05 (Drawn By) A.K. (Check By) D.B.S. (Last Rev.) 1/16/06


BLOCK FLOW DIAGRAM
BP CARSON REFINERY
Figure 2-4
Project No. 2393
Environmental Audit, Inc.
CRUDE
CRUDE UNITS NOS. 1, 2, & 4
GAS-BLEND
GASOLINE
REFORMER NO. 3
SUPER FRACTIONATION INTEGRATED AREA & LIGHT ENDS UNIT
REFORMERS NOS. 1 & 2
VACUUM UNITS NOS. 51 & 52
NAPHTHA HDS, BENSAT, & ISOM
BUTAMER UNIT
ISOBUTANE
LPG RECOVERY
LPG
n-BUTANE MIXED BUTANES
FFHDS & PRISM
MID BARREL
JET/DIESEL
FCCU
HYDROCRACKER
DIESEL
JET HYDROTREATER
JET FUEL
LIQUIDS RECOVERY UNIT
COKERS
COKE
GAS PLANT
COKERS GASO FRACT
FCCU GAS PLANT
COKER GAS MEROX
C3 SPLITTER
POLYPROPYLENE
PROPANE
CAT POLY
PROPYLENE TETRAMER UNIT
TETRAMER
LIGHT HYDROGENATION UNIT
ALKY MEROX
ISO-OCTENE UNIT
ALKYLATION
n-BUTANE
AUXILIARY SYSTEMS
RICH DEA
DEA REGEN
LEAN DEA
SOUR WATER
SOUR WATER STRIPPER
SULFUR PLANT
SULFUR
TAIL GAS SULFUR RECOVERY UNIT
REFINERY GAS
NATURAL GAS
HYDROGEN PLANT NO.1
CO2
HYDROGEN
HYDROGEN PLANT NO.2
UNITS NOT IN OPERATION
UNITS WITH EIR PROJECTS

2.6.1 MODIFY EXISTING FLUID CATALYTIC CRACKING UNIT

The proposed project will involve several changes to the FCCU and its emissions control system, including changes specifically for complying with SCAQMD Rule 1105.1 plus other changes for improving the operational efficiency of the FCCU.

Rule 1105.1 Compliance

In November 2003, the SCAQMD adopted Rule 1105.1 – PM10 and Ammonia Emissions from Fluid Catalytic Cracking Units, which regulates particulate matter less than 10 microns in diameter (PM10) and ammonia flue gas emissions from FCCUs. According to Rule 1105.1, operators of the affected FCCUs will need to apply one of the following PM10 emission limits:

- 3.6 pounds of PM10 per hour; or
- 0.005 grains of PM10 per dry standard cubic foot (SCF) in the flue gas, corrected to three percent oxygen; or
- 2.8 pounds of PM10 per 1,000 barrels of fresh feed.

BP currently has two existing dry electrostatic precipitators (ESPs) that process the flue gas streams which capture and reduce particulate emissions. To comply with the requirements in Rule 1105.1, BP operators have evaluated their existing system and determined that it would be unable to achieve the future effective PM_{10} and ammonia emission requirements with the exiting ESPs. As a result, BP operators are proposing to install a new flue gas pollution control system for the FCCU, which would replace their two existing dry ESPs with one new dual chamber ESP. Each chamber of the new ESP will exhaust into a common flue gas stack that is mounted on top of the ESP. Also, the new ESP will be installed downstream of the Selective Catalytic Reduction (SCR) Unit (the existing ESP's are upstream of the SCR Unit), and it will be located directly west of the existing SCR Unit. The common stack is expected to be a maximum of 250 feet above grade. The height of the stack is determined from the diameter of the stack and the flow mixing requirements required by the monitoring instrumentation. BP is considering installing new soot blowers to clean the catalyst beds in the existing SCR unit; however, the new soot blowers may not be required. In order to provide a conservative analysis, the EIR assumes that the soot blowers will be installed.

FCCU Product Upgrades

BP's FCCU refines heavier feedstocks known as gas oils into lighter components used for gasoline blending. This portion of the project would allow the FCCU to process increased volumes of gasoline that result from higher conversion of low sulfur feed from the FFHDS. Modifications fall into three categories: Gas Plant Modifications, Feed Preheat Modifications and Disengager Reactor Modifications.

The Gas Plant Modifications mainly involve improvements to heat exchangers, pumps and piping. Modifications proposed to the Absorber Overhead Cooler, Absorber Bottoms Reboiler, Rerun Overhead Condensers, Rerun Overhead Product Coolers, and replacement of the Rerun Overhead Pumps would allow recovery of more FCC gasoline. Heat exchanger modifications include retubing and/or repiping cooling water from series to parallel flow. Additionally, redundant level gauges will be provided on four vessels and a Sour Water Pot to improve safety and reliability.

The Feed Preheat Modifications mainly involve improvements to heat exchangers and piping. Modifications proposed provide additional feed preheat with a new set of Cold Feed/Gulftronics Feed Exchangers to improve heat recovery and increase feed preheat temperature. Additionally, the Gulftronics Coolers would be replaced to increase design pressure, and to improve safety and reliability. Piping around these coolers would be upgraded as well.

The proposed Disengager Reactor Modifications would upgrade the Rough Cut Cyclone gas outlet tubes to reduce internal Disengager Reactor erosion. Additionally, quench rings would be installed in the bottom of the Main Fractionator to reduce coking.

These proposed modifications would not increase the capacity of the FCCU to process gas oil feed but would increase gasoline yield.

2.6.2 INSTALL NEW FLUID FEED HYDRODESULFURIZATION REACTOR

BP currently has one Fluid Feed Hydrodesulfurization (FFHDS) reactor that removes sulfur compounds from the feed to the FCCU to produce lower sulfur end products as well as lower stack emissions. Even though the FCCU is designed to operate continuously for five years, the current FFHDS reactor needs to be shutdown approximately 25 days each year to replace the spent catalyst with fresh catalyst. This shutdown time is necessary to allow a single reactor system to cool down, unload the spent catalyst, reload the fresh catalyst, prepare the catalyst, heat, and restart the reactor. During this shutdown period, the refinery production capacity is less because the feed rates are reduced at the crude units and FCCU. The FCCU must reduce rate because it no longer receives feed directly from the FFHDS and must bring in hydrotreated feed from tankage. The crude units operate at reduced production because sour gas oil that is produced cannot go to the FFHDS and must be stored in tanks. The refinery has limitations in both the capability to store and transport gas oils.

To minimize these production losses during turnarounds, BP is proposing to install a second FFHDS reactor to run in parallel with the existing FFHDS reactor so that the FFHDS can run for longer periods of time between turnarounds. During normal operation, the existing reactor will operate in parallel with the new reactor. The addition of a second reactor will increase the FFHDS operating flexibility which will allow the unit to increase the cycle length from one year to two years or to maintain the current one year cycle with additional product sulfur removal. Plus, the addition of a second reactor

will allow the unit at almost normal feed rates while one reactor is brought down for catalyst change-out. With the longer cycle length capability and with the ability to maintain consistent feed rate while one reactor is shutdown, the FFHDS will have the flexibility to operate at higher feed rates with higher feed sulfur and with lower product sulfur sent to the FCCU. The existing FFHDS unit has operated at a feed rate as much as 105,000 barrels per day for a short duration, but the typical feed rate is 95,000 barrels per day because of catalyst cycle life limitations. By adding a second reactor, the FFHDS system will be able to process 105,000 thousand barrels continuously. The ability to lower the amount of sulfur being fed to the FCCU will reduce the amount of sulfur by-product from the FCCU cracking reaction which will lower sulfur in the FCCU products and will reduce the amount of sulfur that will need to be burned off the catalyst. This will result in lower regenerator stack emissions.

To accommodate having two reactors operating in parallel service, the existing FFHDS heater feed and outlet piping will be divided to allow both FFHDS reactors to operate independently. Other modifications to the support equipment for this process, such as controls, piping, pumps, and ancillary equipment, will also be necessary.

2.6.3 MODIFY EXISTING ALKY MEROX UNIT

The purpose of the Alky Merox Unit is to remove mercaptans (sulfur containing compounds) from the olefin feed streams to the Iso-Octene and Alkylation Units, therefore producing lower sulfur gasoline blending component products from the Iso-Octene and Alkylation Units. Currently, the Alky Merox Unit does not have the capability of processing all of the olefin streams produced at the Refinery. Therefore, some olefin must be bypassed and fed directly to the Iso-Octene and Alkylation Units. When the Iso-Octene product is blended directly into gasoline, it has the impact of raising the sulfur content in the gasoline pool. Producing lower sulfur gasoline is desirable because low sulfur gasoline results in fewer sulfur oxide emissions from mobile sources that use the fuel, plus it complies with local, state and federal sulfur content limitations for gasoline.

The capacity of the Alky Merox Unit is limited to processing approximately 600 barrels per hour. Sour olefins and some sweet olefins are fed through the extractor to the Water Wash Tower. (Note: The term "sweet" refers to refinery streams with less than about 0.5 percent sulfur. The term "sour" refers to refinery streams with greater than about 2.5 percent sulfur). The sour olefins are fed to the extractor to reduce the concentration of mercaptans. The extractor uses caustic to remove the mercaptans. The olefins exiting the extractor contain some residual caustic, which is removed in the subsequent water wash tower. Sweet olefins are also fed to the water wash tower in order to reduce the level of contaminants, which can poison the downstream catalyst. The proposed modifications to the Alky Merox Unit will increase the extractor capacity to 1,000 barrels per hour, which will be large enough to process all of the sweet and sour olefins produced at the Refinery. The proposed modifications also include installing new vessels, piping, and other ancillary equipment.

2.6.4 MODIFY EXISTING ALKYLATION UNIT

The main function of the Alkylation Unit is to convert olefins into Alkylate, a high octane and clean gasoline blending component. Using liquid sulfuric acid as a catalyst, the Alkylation reaction combines light olefins (C4's in BP Carson Refinery) with isobutane to form an alkylate. Alkylates are largely isoparaffin isomers of gasoline boiling range with motor octane number from 88-95 and research octane numbers from 90-98.

The light olefins generated in the Refinery were historically processed through the Alky Merox Unit, sent to the MTBE Unit, and finally fed to the Alkylation Unit. With the elimination of MTBE blending in gasoline, the MTBE Unit has been converted to an IsoOctene Unit and this unit should be ready for start-up in the near future.

Currently the throughput of the Alkylation unit is restricted by hydraulics, thermal, and coalescing limitations. BP operators are proposing to increase the throughput of olefin feed to the Alkylation unit. The current production of light olefin is approximately 19,500 barrels per day with processing at the Alky Merox and Alkylation units. The modifications to the Alkylation Unit (see Section 2.6.4) will allow the refinery to process up to approximately 22,500 barrels per day. This assumes that the IsoOctene Unit will be in operation, which directionally unloads the Alkylation Unit. The 15 percent increase in available light olefin feeds is due to anticipated increases in FCCU production (due to the FCCU Product Upgrade Project - see Section 2.6.1) and possible purchases of light olefins. The modifications to the Alkylation Unit will also provide operating flexibility for when the IsoOctene Unit is down.

The proposed modifications to the Alkylation Unit will primarily affect piping, pumps, heat exchangers, coalescer and other ancillary equipments. Additionally, possible tray modifications may be necessary for the Deisobutanizer, Debutanizer and Depropanizer to improve capacity, efficiency, and product quality.

2.6.5 MODIFY EXISTING HYDROCRACKER UNIT

BP's Hydrocracker Unit processes high sulfur diesel feeds into both ultra-low sulfur diesel and gasoline blending components. The use of low sulfur fuels results in lower emissions of SOx and particulate matter from vehicles that use the fuels. The throughput of the Hydrocracker Unit is currently limited by the availability of the fractionation gas plant, the capacity of the distillation towers, and product cooling constraints. Hydraulic constraints in the reaction section of the Hydrocracker Unit also limit the feed rate.

BP proposes to increase the capacity of the fractionation gas plant by about 10 percent. The proposed modifications to the fractionation gas plant will convert the lean oil absorber tower to a low pressure diethanol amine (DEA) scrubber tower so that the fractionator overhead compressor's feed gas can be processed into fuel gas. Doing so will divert the fractionator overhead gas to the fuel gas system when the compressors are operating at full capacity. BP also proposes to increase the capacity of the distillation towers by about 10 percent by retraying the HP DEA scrubber, debutanizer tower and the

main fractionator tower. BP also proposes to increase the product cooling capacity by installing a new air cooled exchanger and modifying water coolers.

Because the reaction section in the Hydrocracker Unit contains older, less efficient technology, BP proposes to replace the liquid/gas distributor trays with new, state of the art trays. This proposed change will result in more efficient use of the catalyst and allow higher feed rates. BP proposes to increase the feed throughput to the Hydrocracker reactor section by approximately 10 percent by addressing these limitations. The project scope also includes modifying piping, controls, and ancillary equipment.

2.6.6 MODIFY EXISTING COKER GAS DEBUTANIZER PRESSURE RELIEF VALVE

The Coker Gas Fractionation area has three towers: a Dehexanizer Tower, a Debutanizer Tower, and a Swing Tower. On November 23, 2004, there was an emergency release of hydrocarbon gas from the Debutanizer Tower. This release from the Debutanizer Tower was due to pressures inside the tower exceeding the designed relieving pressure of the pressure relief valve. However, the release caused approximately 6,000 pounds of volatile organic compounds (VOCs) to be emitted to the atmosphere. As a result of the release event, SCAQMD Rule 1173 requires BP to vent the Debutanizer Tower pressure relief valve to a closed system or pay a mitigation fee. BP is proposing to replace the pressure relief valve on the Debutanizer Tower and route the future emergency gas releases to an existing flare.

2.6.7 MODIFY EXISTING SULFUR PLANT

BP's existing Sulfur Plant currently converts hydrogen sulfide and ammonia-rich acid gases into elemental sulfur, water, and nitrogen via a partial combustion (Claus) reaction. The Sulfur Plant includes amine contactors for removal of hydrogen sulfide from fuel gas, sour water strippers for removal of hydrogen sulfide and ammonia from water, Claus Units for conversion of hydrogen sulfide to sulfur and destruction of ammonia, and tail gas units to recover any unconverted hydrogen sulfide. The current capacity of the Sulfur Plant is permitted to produce 449.33 long tons per day (LT/D) of elemental sulfur from the four Claus Units (A, B, C and D). BP proposes the following modifications to the Sulfur Plant:

- Change the solvent used in the main amine system from DEA to methyl diethanol amine (MDEA) to allow more amine circulation since MDEA is effective at higher concentrations (50 percent MDEA versus 25 percent DEA).

- Change the "C" Claus to allow oxygen enrichment up to 28 percent, which will allow an additional 10 to 20 LT/D sulfur capacity to bring this unit to its permitted capacity of 120.33 LT/D.

- Add oxygen injection to ”D” Claus Unit, which will allow an additional 30 long tons per day sulfur capacity to bring this unit to its permitted capacity of 150.2 LT/D. [Note that "A" and "B" Claus units make up the remaining capacity at 89.4 LT/D each."]

The proposed modifications include: (1) Replacing the existing pump impellers and control valve trims and recalibrating the level and flow transmitters in the main amine system to account for a higher MDEA solution viscosity; (2) installing a new burner for the “D” Claus Unit to allow oxygen injection; (3) modifying the oxygen piping for “D” Claus Unit; and, (4) modifying the control and shutdown systems for the “D” Claus Unit. The existing tail gas units have sufficient capacity to handle the proposed changes to the Claus Units. The proposed modifications will help the sulfur plant to consistently operate at higher production rates but within the current permitted capacity.

2.6.8 MODIFY EXISTING VAPOR RECOVERY SYSTEMS

BP’s existing Vapor Recovery System collects vent gases from multiple sources located throughout the refinery that would alternatively release to atmosphere or the flares. The vapor recovery system is comprised of multiple compressors and has a combined maximum compression capacity of 355,000 standard cubic feet per hour (SCFH). BP is currently operating below this level because one vapor recovery compressor, the No. 7 unit permitted at 95,000 SCFH, is not functional.

As part of the March 2005 settlement agreement between the SCAQMD and the BP Carson Refinery, BP agreed to implement a Supplemental Environmental Project (SEP) that would increase the capabilities of the existing vapor recovery system to collect and treat vent gases that would otherwise vent to atmosphere or the flares, with a priority placed on maximizing collection of vent gas streams with high sulfur content. The gases that vent to the Coker Flare were selected for control due to their higher sulfur content, which will maximize the reduction of sulfur emissions. The SEP requires BP to increase the total vapor compression capacity by a minimum of 195,000 SCFH. BP proposes to accomplish part of this obligation by replacing the No. 7 vapor recovery compressor with a new 95,000 to *140,000* ~~150,000~~ SCFH vapor recovery compressor, intercooler, and knockout drum. This proposed modification will restore the compression capacity in the Vapor Recovery Unit to *at least* 355,000 SCFH.

In addition, the SEP requires BP to invest at least $20 million towards achieving the remaining 100,000 SCFH of vapor compression capacity. BP intends to apply the $20 million by proposing the following improvements:

- Install 50,000 to *150,000* ~~150,000,000~~ SCFH of reciprocating compressor capacity for flare gas recovery with exchangers, knockout drums, and a new electrical power supply.

- Install a new water seal on the Coker Flare to allow recovery of flare gas.

- Install a flow meter on the Coker Flare to measure the net flow of gas to the flare.

- Install a tie-in from the compressor discharge to the Coker Gas Plant Amine Treating Unit to remove hydrogen sulfide from the recovered gas.

- Upgrade the existing vapor recovery caustic gas treating system to improve its ability to handle peak loads.

- Add interstage cooling and knock out drums to the existing No. 5 and No. 6 Vapor Recovery Compressor systems to increase the availability of the systems.

- Add pressure, oxygen, and flow measurement instruments to monitor the operation and performance of the vapor recovery system.

This SEP will reduce emissions from the Refinery by increasing the capability of the Refinery's existing vapor recovery system to collect and treat vent gases and will add the capability to collect and treat gases that previously would vent to the Refinery's flares.

2.6.9 INSTALL NEW NORTH AREA FLARE GAS RECOVERY SYSTEM

BP is proposing modifications to the North Area Flares to comply with SCAQMD Rule 1118 - Control of Emissions from Refinery Flares. The proposed modifications will recover flare gas from the flares located in the north area of the Refinery (e.g., FCCU, Hydrocracker Unit, FFHDS, and No. 5 flares). To reduce the overall sulfur emissions from the Refinery, BP proposes to install the following:

- Reciprocating compressors with total capacity between 100,000 to *300,000* ~~200,000~~ SCFH for flare gas recovery with associated coolers and knock out drums;

- New piping connections from the FCCU, Hydrocracker Unit, FFHDS, and No. 5 flares;

- Water seals for the FCCU and Hydrocracker Unit flares to enable flare gas recovery;

- A tie-in to the existing amine regeneration system for the removal of hydrogen sulfide; and,

- Electrical, controls, and utilities required to operate the system.

2.6.10 MODIFY PRESSURE RELIEF DEVICES

BP has been reviewing the compliance status of certain pressure relief devices (PRDs) with the SCAQMD permit conditions. The SCAQMD has indicated for some PRDs that currently vent to atmosphere, BP will need to connect these PRDs to a closed system for

vapor recovery. Currently, pursuant to Rule 1173, BP will be required to connect a total of 13 PRDs to a closed system in the FCCU, Reformer, Crude, Alkylation, Alky Merox, Supercritical Fractionation and Isomerization Area (SFIA), 52 Vacuum Unit, and Coker Unit. For all 13 PRDs, piping will need to be installed so that in the event of an overpressure situation, the emissions will be connected to control equipment instead of venting directly to the atmosphere. As BP is currently negotiating with SCAQMD staff regarding the extent of these requirements, detailed engineering has not been completed on this portion of the proposed project. The environmental impacts of this portion of the proposed project are expected to result in emission decreases from controlling a previously uncontrolled source of emissions.

Modification of the PRD in the 52 Vacuum Unit feed surge drum will require additional changes other than piping. BP operators are proposing to construct a new pressure relief system, a closed system, that connects the PRD in the feed surge drum to the 52 Vacuum Tower. To accomplish this change, the following replacements will be required: (1) the existing PRD with a new PRD; and (2) the existing feed surge drum in the 52 Vacuum Unit with a new vessel rated for a high pressure to prevent large quantities of hot liquid being relieved. The new vessel will have the exact same size and dimensions as the current vessel. A new feed surge drum will be constructed near the location of the existing vessel, which will be demolished. The modifications to the PRDs for other units are not expected to require the replacement of any other equipment.

2.6.11 ENVIRONMENTAL BENEFITS OF THE PROPOSED PROJECT

The environmental benefits of the proposed project include the following:

- The proposed project will increase the capability of the BP Refinery to produce low sulfur gasoline by about 20,000 gallons per day without an increase in crude throughput. This will be accomplished by producing additional gasoline blending components at the Hydrocracker, FCC, and Alkylation Units. The use of low sulfur gasoline results in lower emissions of sulfur oxide and particulate matter from vehicles that use the fuels.

- The proposed project will increase the production of ultra low sulfur diesel and jet fuel (less than 15 ppm sulfur) by about 29,000 gallons per day and 121,800 gallons per day respectively, without increasing the crude throughput. This will be accomplished by producing additional blending components from the Hydrocracker Unit.

- The proposed project is expected to reduce particulate emissions from the FCCU due to the installation of new air pollution control equipment (new ESP).

- The proposed project is expected to reduce emissions from flaring by capturing gas flows to the flare in the flare gas recovery system. This will reduce the combustion of gases from the flare.

- Two pressure relief devices in the Coker Gas Debutanizer Unit will be tied into the flare system improving the safety of the system and reducing potential VOC emissions.

2.7 CONSTRUCTION OF THE PROPOSED PROJECT

Construction activities for the BP Carson Refinery Safety, Compliance and Optimization Project are expected to begin in the fourth quarter of 2006 and be complete by the second quarter of 2009. As shown in Figure 2-5, the construction schedule for each component of the BP Carson Refinery Safety, Compliance and Optimization Project varies and the construction activities for most of the components are expected to overlap in the third and fourth quarters of 2007 and the first quarter of 2008. The construction activities for the proposed modifications to the Vapor Recovery System and Flare Gas Recovery Projects are expected to begin during the second quarter of 2007 and be completed in the second quarter of 2009. Note that there have been minor changes to the project schedule since the preparation of the NOP/IS. The schedule outlined in Figure 2-5 is based on a more complete engineering design review. Construction work shifts are expected to last about 10.5 hours per day during most portions of the construction schedule. However, during certain refinery unit turnaround periods (e.g., first quarter of 2008), two construction shifts are expected. The first shift is scheduled to operate from 7 a.m. to 5:30 p.m. and the second shift is scheduled to operate from 6:30 p.m. to 5:00 a.m. Construction activities include the delivery of project-related equipment to the Refinery. Large project-related equipment (e.g., reactors) will be delivered directly to the Refinery. Smaller project-related equipment (e.g., control valves and electrical parts) that needs to be stored inside is expected to be delivered to an off-site warehouse for temporary storage.

2.8 OPERATION OF THE PROPOSED PROJECT

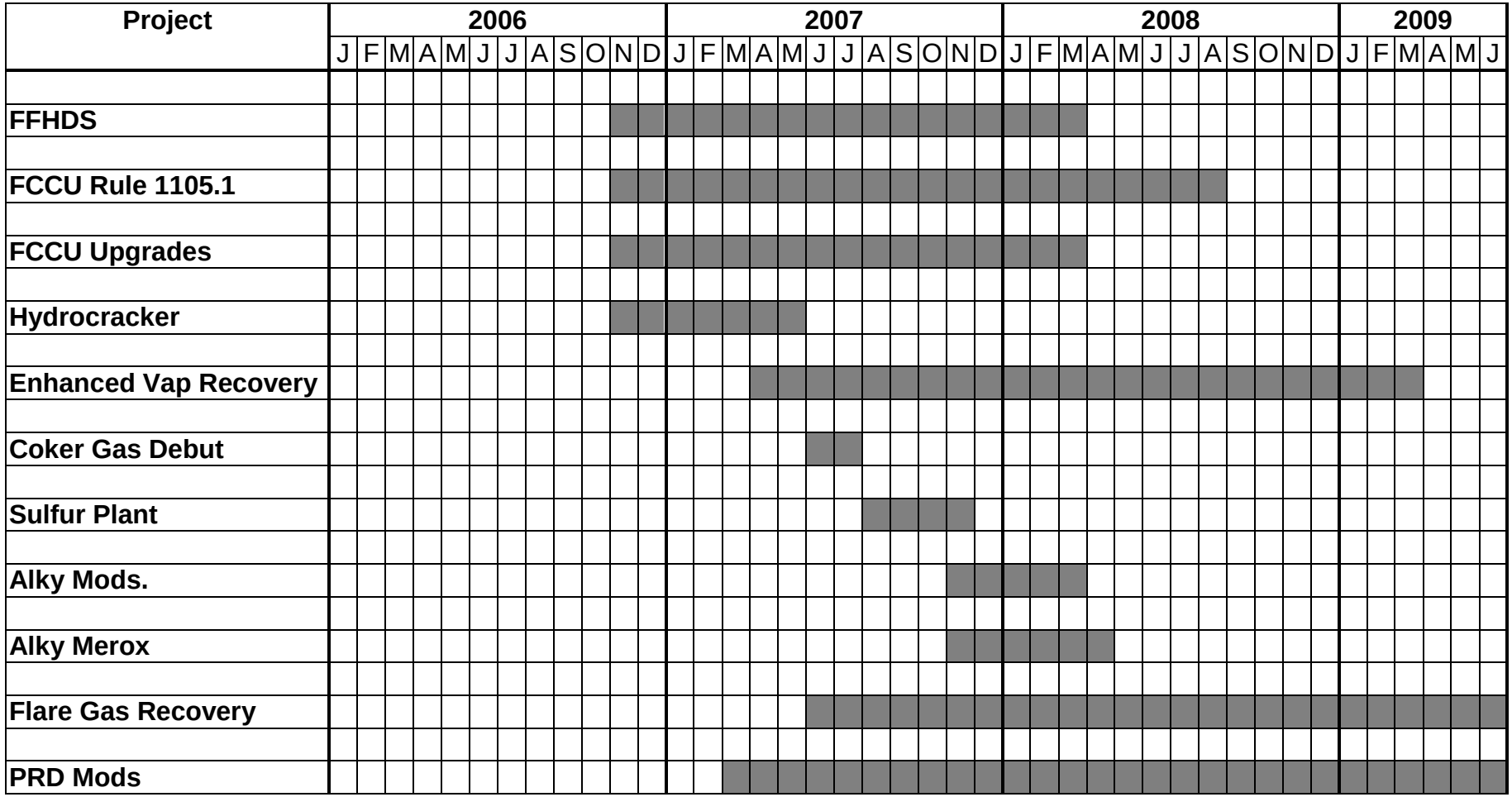
The permanent work force at the Refinery is expected to increase by about four additional workers as a result of the proposed project. The proposed project is expected to incrementally increase traffic by about eight trucks per day associated with the delivery or transport of additional materials including sulfur, oxygen, and particulate matter from the FCCU (Rule 1105.1 compliance). In addition, about one additional railcar per year will be required to transport catalyst to the FCCU.

2.9 PERMITS AND APPROVALS

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

FIGURE 2-5
BP Carson Refinery
Safety, Compliance and Optimization Project

Construction Schedule



Federal Approvals

No federal agency approvals for the proposed project are expected to be required. Many of the U.S. Environmental Protection Agency (U.S. EPA) regulations and requirements are implemented by state or local agencies. For example, New Source Performance Standards are implemented by the SCAQMD and hazardous waste regulations are enforced by the California Department of Toxic Substances Control (DTSC). The Spill Prevention Control and Countermeasure (SPCC) Plan may require modifications to assure that all new and modified Refinery units are included in the Plan. The U.S. EPA also has authority over the Prevention of Significant Deterioration (PSD) Program and the proposed project may require review to assure compliance with the PSD program for the proposed modifications.

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

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 proposed project may require a Notice of Intent and preparation of a Stormwater Pollution Prevention Plan (Construction) under the statewide general storm water National Pollutant Discharge Elimination System (NPDES) permit from the State Regional Water Quality Control Board. DTSC regulates the generation, transport, treatment and disposal of hazardous wastes. Hazardous wastes generated by the proposed project activities and related to refining activities will be governed by rules and regulations enforced by DTSC. The existing PSM program and hazard communication program may require updating with CalOSHA due to the proposed project revisions.

Local Approvals

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

plan approvals also may be required by SCAQMD Rule 1166 for soil remediation activities and demolition activities.

The Los Angeles County Sanitation Districts (LACSD) and the County of Los Angeles Department of Public Works has responsibility for issuance of industrial wastewater discharge permits which are required for discharges into public sewers. No modifications are expected to be required to the Refinery's existing industrial wastewater discharge permits due to the proposed project.

The County of Los Angeles, Petro/Chemical Division, Fire Planning and Prevention Division is responsible for issuing permits for storage tanks and for review and approval of Risk Management Plans which will be required as part of the proposed project. The Fire Department also is responsible for assuring that the City fire codes are implemented. Building and grading permits for the proposed project will be required from the City of Carson to assure that the proposed project complies with the Uniform Building Code.

TABLE 2-1

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.	Modifications to Refinery facilities/operations involving listed air toxics or use of extremely hazardous substances. Requires the preparation of a Risk Management Plan (RMP).
	Title III of the Superfund Amendments and Reauthorization Act of 1986, including Section 313 – Annual Release Reporting (Form R)	Modifications to Refinery facilities/operations involving use of storage of extremely hazardous substances or other regulated hazardous materials.
	Prevention of Significant Deterioration	Air quality requirements for modifications to stationary sources in attainment areas.
	New Source Performance Standards (NSPS) 40 CFR Part 60 General Provisions (Subject A)	Requires facilities subject to an NSPS to provide notification, maintain and submit records, and in some cases undertake performance tests.
	NSPS for VOC equipment leaks in Synthetic Organic Chemicals Manufacturing Industry, 40 CFR Part 60 Subpart GGG/VV	Contains performance standards for equipment leaks from fugitive components.
Occupational Safety and Health Administration (OSHA)	Compliance with 29 CFR 1920, including preparation of an Emergency Response Plan, a Fire Prevention Plan, Process Hazards Safety Review, and employee training. Compliance with 40 CFR Part 1910, Section 119, that requires a PSM Program/	Modifications to Refinery facilities involving materials that are acutely toxic, flammable, or explosive.
U.S. Department of Transportation (DOT)	Compliance with DOT regulations regarding transportation of hazardous substances (41 CFR Part 172)	Project-related transportation (import/export) of hazardous substances.

TABLE 2-1 (continued)

Federal, State and Local Agency Permits and Applications

Agency Permit or Approval	Requirement	Applicability to Project
State		
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.
	Proposition 65 – California's Safe Drinking Water and Toxic Enforcement Act of 1986.	Project-related exposure of the public to listed carcinogens or reproductive toxins due to proposed modifications. Public notification is required under certain specified conditions.
State Water Resources Control Board (SWRCB)	National Pollutant Discharge Elimination System (NPDES) Permit/Waste Discharge requirement.	Project-related modifications to applicable storm water 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.
	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: Permit to Construct and Regulation XXX: Title V Permits. Applications are required to construct, operate or modify air emission sources.
	Permits to Operate	SCAQMD Rule 203: Permit to Operate. Applications are required to operate air emissions sources.
	California Environmental Quality Act (CEQA) Review	The SCAQMD is the lead agency for preparation of the environmental document (Public Resources Code § 21067).

TABLE 2-1 (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: Standards for Approving Permits. Permits cannot be issued if air contaminants create a public nuisance or exceed capacity limits. Also requires public notification of a 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 XIII - New Source Review and Rule 2005 – New Service Review for RECLAIM: New source review rules require new or modified permit units to apply BACT, obtain offsets, and perform modeling of new emissions increases.
	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.
	Emissions from FCCUs	SCAQMD Rule 1105.1: Regulates PM10 and ammonia emissions from FCCUs.
	Emissions from Flares	SCAQMD Rule 1118: Places limitations on emissions from refinery flares.
	Asbestos Emissions	SCAQMD Rule 1403: Asbestos Emissions from Demolition/Renovation Activities. Controls emissions from certain demolition and renovation activities.
	Soil Contamination	SCAQMD Rule 1166: VOC Emissions from Decontamination of Soil. Requires the control of VOC emissions from soil remediation activities.

TABLE 2-1 (concluded)

Federal, State and Local Agency Permits and Applications

Agency Permit or Approval	Requirement	Applicability to Project
City of Carson	Building Permits	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.
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.
County of Los Angeles Dept. of Public Works	Industrial Wastewater Discharge Approval	Required when discharging into sewer.
County of Los Angeles, Petro/Chemical Div., Fire Planning and Prevention Div.	Permits for Above Ground Storage Tanks (AST) 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.
	Risk Management and Prevention Program (RMPP) revision approval	Required to revise the RMPP (combined with federal RMP).

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