4.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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

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

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

Adverse but not significant - Some impacts may result from the project; however, they are judged not to be significant. Impacts are frequently considered insignificant when the changes are minor relative to the size of the available resource base or would not change an existing resource. For example, the addition of an industrial structure within an existing industrial facility complex would probably not produce a significant impact on visual resources.

Potentially significant but mitigatable to insignificance - Significant impacts may occur; however, with proper mitigation, the impacts can be reduced to insignificance. For example, a project affecting traffic flow during construction may have mitigation calling for temporary traffic controls that will keep the impacts within acceptable limits.

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

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

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

4.1 Air Quality

Project-related air quality impacts calculated in this environmental analysis will be considered significant if any of the significance thresholds in Table 4.1-1 are exceeded. Additionally, operational NO_x or SO_x emissions from stationary sources regulated by Regulation XX-Regional Clean Air Incentives Market (RECLAIM), will be considered significant if calculated project operational NO_x or SO_x emissions (RECLAIM criteria pollutants) plus the facility's Annual Allocation for the year the project becomes operational, including purchased RECLAIM trading credits for that year, are greater than the facility's Initial 1994 RECLAIM Allocation plus nontradeable credits, as listed in the RECLAIM Facility Permit, plus the maximum daily operation NO_x and SO_x emissions significance thresholds of 55 and 150 pounds per day, respectively, as listed in Table 4.1-1. Since the NO_x and SO_x emissions significance thresholds in the table are expressed in pounds per day, the facility's Initial 1994 RECLAIM Allocation plus nontradeable credits and the facility's Annual Allocation for the year the project becomes operational, including purchased RECLAIM trading credits, have been converted to pounds per day by dividing by 365 days per year. Operational NO_x and SO_x emissions from non-RECLAIM sources will be compared to the 55 and 150 pounds per day significance thresholds, respectively.

This section describes the air quality impacts that are anticipated to be associated with the proposed project. The section begins with a discussion of the activities that are anticipated to occur during the construction phase of the proposed project, the resulting estimated onsite and offsite air pollutant emissions, and the potential significance of those emissions. It then continues with a discussion of the potential sources of air pollutant emissions during the operational phase of the proposed project and the estimated net change in emissions from the Refinery and the terminals. The potential significance of changes in operational criteria pollutant emissions is then evaluated by comparison with emission thresholds, and the potential significance of changes in toxic air contaminant (TAC) emissions is evaluated through a human health risk assessment. The section concludes with a discussion of measures to mitigate potentially significant construction-related and operational air quality impacts.

Table 4.1-1
Air Quality Significance Thresholds

Criteria Pollutants Mass Daily Thresholds			
Pollutant	**Construction**	**Operation**	
		Non-RECLAIM Pollutants	**RECLAIM Pollutants**
NO_x	100 lbs/day	55 lbs/day	15,533 lbs/day[a]
VOC	75 lbs/day	55 lbs/day	
PM_{10}	150 lbs/day	150 lbs/day	
SO_x	150 lbs/day	150 lbs/day	5,181 lbs/day[b]
CO	550 lbs/day	550 lbs/day	
Lead	3 lbs/day	3 lbs/day	
TAC, AHM, and Odor Thresholds			
Toxic Air Contaminants	Maximum Incremental Cancer Risk ≥ 10 in 1 million Hazard Index ≥ 1.0 (project increment) Hazard Index ≥ 3.0 (facility-wide)		
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402		
Ambient Air Quality for Criteria Pollutants			
NO_2 1-hour average annual average	20 μg/m³ (= 1.0 pphm) 1 μg/m³ (= 0.05 pphm)		
PM_{10} 24-hour annual geometric mean	2.5 μg/m³ 1.0 μg/m³		
Sulfate 24-hour average	1 μg/m³		
CO 1-hour average 8-hour average	1.1 mg/m³ (= 1.0 ppm) 0.50 mg/m³ (= 0.45 ppm)		

a Initial 1994 RECLAIM allocation (15,478 pounds per day) + Non-tradeable Credits (0 pounds per day) + 55 pounds per day.

b Initial 1994 RECLAIM allocation (5,031 pounds per day) + Non-tradeable Credits (0 pounds per day) + 150 pounds per day.

μg/m³ = microgram per cubic meter; pphm = parts per hundred million; mg/m³ = milligram per cubic meter; ppm = parts per million; TAC = toxic air contaminant; AHM = Acutely Hazardous Material

pphm = parts per million by weight

mg/m³ = milligrams per cubic meter

4.1.1 Construction Emissions

Construction of the proposed project at the Refinery is scheduled to begin in January 2002 and be completed in September 2003. Construction is anticipated to take place Monday through Friday, from 6:30 a.m. to 5:00 p.m. Occasional night or weekend shifts may be required to maintain the construction schedule. For the most part, construction would occur during process turnarounds when the units would be undergoing scheduled maintenance.

The construction activities at the terminals would occur between January and October of 2002. The maximum duration for construction at an individual terminal would be six months. Construction activities would occur Monday through Friday, from 7:00 a.m. to 6:00 p.m. Occasional night or weekend shifts may be required to maintain the construction schedule.

Construction emissions can be distinguished as either onsite or offsite. Onsite emissions generated during construction principally consist of exhaust emissions (CO, VOC, NO_X, SO_X, and PM_{10}) from construction equipment, fugitive dust (PM_{10}) from grading and excavation, and VOC emissions from asphaltic paving and painting. Offsite emissions during construction typically consist of exhaust emissions from truck traffic and worker commute trips; road dust associated with traffic to and from the construction site; and fugitive dust (PM_{10}) from trucks hauling materials, construction debris, or excavated soils from the site.

Chapter 2 describes the modifications and new equipment that will require construction at the Refinery and at each of the terminals (see Tables 2.5-1 and 2.5-2). Emissions from the construction activities were estimated using anticipated construction equipment requirements along with the following emission estimating techniques:

- SCAQMD CEQA Air Quality Handbook, November 1993;
- U.S. EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition;
- U.S. EPA Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, 1992;
- California Air Resources Board EMFAC 2000 on-road motor vehicle emission factor model;
- California Air Resources Board Emission Inventory Methodology 7.9, Entrained Paved Road Dust, 1997; and
- "Open Fugitive Dust PM10 Control Strategies Study," Midwest Research Institute, October 12, 1990.

Details of the emission calculation methodologies are provided in Appendix B.

Peak daily emissions associated with the construction activities, the anticipated construction schedule, the types of construction equipment, the number of construction equipment, and the peak daily operating time for each piece of equipment were estimated. Additionally, estimates were made of the number and length of daily onsite and offsite motor vehicle trips. Table 4.1-2 lists the anticipated schedule, peak daily construction equipment requirements, and peak daily motor vehicle trips for construction. Several pieces of construction equipment will be used for construction associated with several of the process units at the Refinery, and this equipment is listed under "Common Refinery Construction Activities" in the table. Equipment that is anticipated to be used only for construction associated with individual process units is listed separately. Motor vehicles and trips listed under "Refinery Construction Motor Vehicles" represent the peak daily anticipated motor vehicle usage during construction. The information in the table was developed from previous experience with similar refinery and terminal construction projects.

Table 4.1-2
Construction Schedule, Equipment Requirements, and Motor Vehicle Trips

Equipment/Vehicle Type	Number	Hours per Day Operation/Miles per Day per Vehicle
Common Refinery Construction Activities (1/1/02 - 9/30/03)		
300 Ton Crawler Crane	1	10
Forklift	5	6
Air Compressor, 230 hp	1	10
Concrete Pump	1	6
Scraper	2	10
Bulldozer	3	10
Grader	2	10
Vibratory Roller	2	10
Backhoe	3	10
Front End Loader	4	10
Hoe Ram	2	10
Wacker Packer Plate Compactor	5	6
Refinery Construction Motor Vehicles (1/1/02 - 9/30/03)		
Onsite pickup truck	12	20
Onsite flatbed truck	12	24
Onsite watering truck	2	30
Onsite dump truck	12	30
Onsite bus	8	20
Offsite construction commuter	262	50
Offsite heavy-duty delivery vehicle	40	20
Offsite haul truck	16	30
Offsite haul truck	4	400

Table 4.1-2 (continued)
Construction Schedule, Equipment Requirements, and Motor Vehicle Trips

Equipment/Vehicle Type	Number	Hours per Day Operation/Miles per Day per Vehicle
Alkylate Depentanizer Construction (1/1/02 - 10/31/02)		
200-Ton Crawler Crane	1	10
28-Ton Rough Terrain Crane	2	10
Welding Machine, 20 hp	6	10
Air Compressor, 230 hp	1	10
Isomax Dependanizer Construction (1/1/02 - 10/31/02)		
200-Ton Crawler Crane	1	10
28-Ton Rough Terrain Crane	1	10
Welding Machine, 20 hp	5	10
Air Compressor, 230 hp	1	10
Pentane Storage Sphere Construction (1/1/02 - 10/31/02)		
28-Ton Rough Terrain Crane	1	10
Air Compressor, 230 hp	2	10
Generator, 550 hp	2	10
Pentane Railcar Loading Facility Construction (1/1/02 - 10/31/02)		
100-Ton Rough Terrain Crane	1	10
28-Ton Rough Terrain Crane	1	10
Welding Machine, 20 hp	1	10
Air Compressor, 230 hp	1	10
Generator, 550 hp	1	10
NHT-1 Construction (1/1/02 - 9/30/02)		
230-Ton Crawler Crane	1	10
28-Ton Rough Terrain Crane	1	10
Welding Machine, 20 hp	2	10
Air Compressor, 230 hp	1	10
Additional Gasoline Storage Construction (1/1/02 - 9/30/02)		
55-Ton Rough Terrain Crane	1	10
28-Ton Rough Terrain Crane	4	10
8.5-Ton Carry Deck	1	8
Welding Machine, 20 hp	6	10
Air Compressor, 230 hp	1	10
Generator, 550 hp	4	10
FCC Emissions Reduction System Installation (10/1/02 - 9/30/03)		
140-Ton Crawler Crane	1	10
28-Ton Rough Terrain Crane	1	10
Welding Machine, 20 hp	5	10
Air Compressor, 230 hp	1	10

Table 4.1-2 (concluded)
Construction Schedule, Equipment Requirements, and Motor Vehicle Trips

Equipment/Vehicle Type	Number	Hours per Day Operation/Miles per Day per Vehicle
Alkylation Plant Modifications (10/1/02 - 9/30/03)		
8.5-Ton Carry Deck	1	8
Air Compressor, 230 hp	1	10
Montebello Terminal Construction (3/1/02 - 8/31/02)		
28-Ton Rough Terrain Crane	1	10
Forklift	3	10
Welding Machine, 40 hp	4	10
Air Compressor, 25 hp	3	10
Generator, 22 hp	1	10
Backhoe	2	10
Offsite construction commuter	28	60
Offsite heavy-duty delivery vehicle	7	60
Offsite medium-duty delivery vehicle	5	60
Offsite pickup truck	5	60
Van Nuys Terminal Construction (5/1/02 - 10/31/02)		
28 Ton Rough Terrain Crane	1	10
Forklift	2	10
Welding Machine, 40 hp	4	10
Air Compressor, 25 hp	1	10
Generator, 22 hp	1	10
Backhoe	1	10
Offsite construction commuter	20	60
Offsite heavy-duty delivery vehicle	7	60
Offsite medium-duty delivery vehicle	5	60
Offsite pickup truck	5	60
Huntington Beach Terminal Construction (1/1/02 - 6/30/02)		
28 Ton Rough Terrain Crane	1	10
Forklift	2	10
Welding Machine, 40 hp	4	10
Air Compressor, 25 hp	1	10
Generator, 22 hp	1	10
Backhoe	1	10
Offsite construction commuter	20	60
Offsite heavy-duty delivery vehicle	7	60
Offsite medium-duty delivery vehicle	5	60
Offsite pickup truck	5	60

The information in Table 4.1-2 was used to calculate onsite emissions from construction equipment exhaust and from fugitive dust PM_{10} emissions from grading.

The only major excavation at single locations will be the construction of the pentane railcar loading facilities, the pentane storage tank, and the new gasoline storage tanks. Minor excavation will occur during construction at other process units to install new foundations.

Onsite fugitive dust PM_{10} emission estimates were based on the following estimates of peak daily dust-generating operations:

- Maximum of 2,750 cubic yards of soil excavated per day, based on excavation of 82,500 cubic yards over a total of 30 working days. The total volume to be excavated was estimated from the anticipated areas and depths of the locations where excavation will occur.
- Maximum storage pile surface area of 0.154 acre based on excavation of 202,200 square feet over 30 days and the conservative assumption that the storage pile surface areas are the same as the excavated areas.
- Maximum daily haul truck trips as listed in Table 4.1-2.
- Maximum daily onsite vehicle travel as listed in Table 4.1-2.

All estimates of fugitive dust emissions assume that construction activities will comply with SCAQMD Rule 403 - Fugitive Dust, by watering active sites two times per day, which reduces fugitive dust emissions approximately 50 percent.

In addition to the combustion emissions associated with the operation of paving equipment used to apply asphalt materials, VOC emissions are generated from the evaporation of hydrocarbons contained in the asphalt materials. The maximum daily area anticipated to be paved during construction is 30,000 square feet (0.69 acre).

Architectural coating generates VOC emissions from the evaporation of solvents contained in the surface coatings applied to equipment, piping, storage tanks, etc. A VOC content of 3.5 pounds per gallon (lb/gal) (420 grams per liter) was assumed, based on the VOC limit specified in SCAQMD Rule 1113 for an industrial maintenance coating. The maximum daily volume of coating anticipated to be applied at the Refinery and at each of the three distribution terminals is estimated to be 10 gallons for touch-up purposes. The equipment to be installed at each site will be pre-painted to manufacturer specifications.

The maximum number and length of daily motor vehicle trips anticipated during each construction activity that is listed in Table 4.1-2 were used with the information about those trips in Table 4.1-3 to calculate peak daily emissions from both on- and offsite motor vehicles.

Table 4.1-3
Motor Vehicle Classes and Speeds During Construction

Vehicle Type	Vehicle Class	Speed (mph)
Onsite pickup truck	Medium duty truck (catalytic)	15
Onsite flatbed truck	Medium heavy-duty truck, diesel	15
Onsite watering truck	Medium heavy-duty truck, diesel	15
Onsite dump truck	Heavy heavy-duty truck, diesel	15
Onsite bus	Urban bus, diesel	15
Offsite construction commuter	Light duty truck (catalytic)	35
Offsite heavy-duty delivery vehicle	Heavy heavy-duty truck, diesel	25
Offsite medium-duty delivery vehicle	Medium heavy-duty truck, diesel	25
Offsite pickup truck	Light duty truck (catalytic)	25
Offsite haul truck	Heavy heavy-duty truck, diesel	25

Table 4.1-4 lists the estimated peak daily criteria pollutant emissions during construction for each process unit at the Refinery and for the construction at each terminal.

Table 4.1-4
Peak Daily Construction Emissions by Process Unit/Activity/Terminal

Process/Activity/Terminal	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	Exhaust PM_{10} (lb/day)	Fugitive PM_{10} (lb/day)	Total PM_{10} (lb/day)
Common Refinery Construction Activities	381.7	98.9	578.7	53.7	34.4	234.7	269.1
Refinery Construction Motor Vehicles	475.6	70.3	185.6	0.0	6.2	240.4	246.6
Alkylate Depentanizer Construction	38.5	10.1	81.7	7.8	5.0	0.0	5.0
Isomax Depentanizer Construction	31.9	8.0	65.8	6.4	4.0	0.0	4.0
Pentane Storage Sphere Construction	119.4	22.6	200.6	21.9	11.3	0.0	11.3
Pentane Railcar Loading Facility Construction	73.2	15.6	133.8	13.9	7.8	0.0	7.8
NHT-1 Construction	32.7	8.7	70.5	6.7	4.4	0.0	4.4

Table 4.1-4 (concluded)
Peak Daily Construction Emissions by Process Unit/Activity/Terminal

Process/Activity/Terminal	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	Exhaust PM_{10} (lb/day)	Fugitive PM_{10} (lb/day)	Total PM_{10} (lb/day)
Additional Gasoline Storage Construction	231.6	47.3	410.7	43.5	23.7	0.0	23.7
FCC Stack Emissions Reduction Installation	33.8	8.7	70.7	6.8	4.3	0.0	4.3
Alkylation Plant Modifications	14.5	3.0	25.8	2.7	1.5	0.0	1.5
Huntington Beach Terminal Construction	96.1	50.9	83.7	5.7	4.5	30.6	35.1
Montebello Terminal Construction	127.5	55.6	102.7	7.4	5.7	31.2	36.9
Van Nuys Terminal Construction	96.1	50.9	83.7	5.7	4.5	30.6	35.1

Because the emission generating activities listed in Table 4.1-4 are not anticipated to all take place at the same time, the overall peak daily construction emissions will not be equal to the sum of the peak daily emissions from all of the construction activities. Therefore, the anticipated overlap of construction at the various locations was evaluated to determine overall peak daily emissions. First, it was conservatively assumed that the peak daily emissions during construction at each overlapping location would occur at the same time. Next, the locations where construction is anticipated to be taking place were identified for each month of the entire construction period. The peak daily emissions from the construction activities taking place each month were then added together to estimate the total peak daily emissions during each month. Finally, the months with the highest peak daily emissions were identified.

The resulting peak daily emissions are anticipated to occur during a 2-month period that includes all of the construction activities except installation of the FCC stack emissions reduction facilities and modifications to the alkylation plant. The estimated emissions during this period are summarized in Table 4.1-5 along with the CEQA significance level for each pollutant. As shown in the table, significance thresholds are exceeded for all pollutants during construction. Most of the emissions are associated with construction activities at the Refinery, while emissions associated with construction at each of the terminals are below the significance levels. The emissions estimates represent a “worst-case,” because they incorporate the assumption that construction activities at each location occur at the peak daily levels throughout the construction period. It is unlikely that the peak daily levels would actually occur at all locations where construction is taking place at the same time.

Table 4.1-5
Overall Peak Daily Construction Emissions Summary (Pre-mitigation)

Source	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	Exhaust PM_{10} (lb/day)	Fugitive PM_{10} (lb/day)	Total PM_{10} (lb/day)
Construction Equipment Exhaust	1,049.5	200.0	1,726.9	172.7	102.4	NA	102.4
Onsite Motor Vehicles	27.8	5.2	39.2	0.0	1.6	56.1	57.7
Onsite Fugitive PM_{10}	NA	NA	NA	NA	NA	202.7	202.7
Asphaltic Paving	NA	1.8	NA	NA	NA	NA	0.0
Architectural Coating	NA	140.0	NA	NA	NA	NA	0.0
Total Onsite	**1,077.3**	**346.9**	**1,766.1**	**172.7**	**104.0**	**258.8**	**362.8**
Offsite Haul Truck Soil Losses	NA	NA	NA	NA	NA	32.1	32.1
Offsite Motor Vehicles	627.0	92.1	231.4	0.0	7.5	276.7	284.2
Total Offsite	**627.0**	**92.1**	**231.4**	**0.0**	**7.5**	**308.8**	**316.2**
TOTAL	**1,704.4**	**439.0**	**1,997.5**	**172.7**	**111.5**	**567.6**	**679.1**
CEQA Significance Level	*550*	*75*	*100*	*150*	---	---	*150*
Significant? (Yes/No)	**Yes**	**Yes**	**Yes**	**Yes**			**Yes**

NA = pollutant not emitted by this source
Note: Sums of individual values may not equal totals because of rounding.

4.1.2 Operational Emissions

This section addresses the air quality impacts due to operation of the new and modified equipment associated with the proposed project. Impacts from indirect sources during operation, such as employee traffic, are discussed in Section 4.1.3.

4.1.2.1 Project Emission Sources

The sources of potential emissions resulting from new equipment and modifications to existing units proposed for the project are discussed below.

El Segundo Refinery

At the Refinery, the following equipment changes result in sources of emissions from fugitive components:

- Alkylate Depentanizer
- Isomax Light Gasoline Depentanizer
- FCC Light Gasoline Depentanizer
- FCC Light Gasoline Splitter
- Pentane Storage Sphere
- Pentane Export Railcar Load Rack
- NHT-1
- Additional Gasoline Storage
- FCC Deethanizer
- FCC Debutanizer
- FCC Depropanizer
- FCC C3 Treating
- Refinery Deisobutanizer Reactivation

In addition to these new and modified units, a new tank will be constructed at the Refinery for additional gasoline storage.

Modifications will also be made to the FCC, NHT-1 and cogen trains A and B.

Montebello Terminal

Ethanol will be brought to the Montebello Terminal by tanker truck and by railcar and unloaded into a new 50,000 bbl internal floating roof storage tank. A new two-lane unloading station will be constructed to unload the ethanol from the tanker trucks to the storage tank. A rail spur and rail car unloading facility, capable of unloading 12 rail cars simultaneously, will also be constructed. The existing loading rack will be modified to allow for ethanol blending. Ethanol will be loaded into tanker trucks for transport to the Van Nuys and Huntington Beach Terminals.

The new ethanol storage tank, as well as modifications associated with ethanol unloading and blending, will result in fugitive emissions from various components.

Van Nuys Terminal

Ethanol will be brought to the Van Nuys Terminal by tanker truck and unloaded into two existing gasoline tanks converted to ethanol service. For purposes of estimating emissions, it was assumed that tanks 1 and 2 will be converted to ethanol service. The associated tank and piping modifications are sources of fugitive emissions from these components.

The converted storage tanks, as well as modifications associated with ethanol unloading and blending, will result in fugitive emissions from various components.

The change in service of a tank to ethanol is anticipated to lead to a reduction in emissions because of differences in the vapor pressures between ethanol and the materials currently stored. This potential reduction has been estimated, but is not included in the evaluation of the project's significance.

Huntington Beach Terminal

Ethanol will be brought to the Huntington Beach Terminal by tanker truck and unloaded into one existing diesel fuel storage tank converted to ethanol service. A new two-lane unloading station will be constructed to unload the ethanol from the tanker trucks to the storage tank.

The converted storage tank, as well as modifications associated with ethanol unloading and blending, will result in fugitive emissions from various components.

4.1.2.2 Direct Operational Emission Calculation

Direct operational criteria and toxic air pollutant emission rates were calculated for all new and modified emission sources associated with the project at the Refinery and at the terminals. A further description of emissions estimates is provided in Appendix B.

Chevron provided expected fugitive component counts, stream types, and composition of process fluids to be utilized or produced as intermediates or end products as a result of the project. These composition data, as well as Chevron-provided fugitive emission factors, were used to calculate fugitive VOC and air toxic emissions associated with each of the new and modified units and tanks at the Refinery, three terminals, and the as yet to be identified marine terminal in the Port of Los Angeles. The resulting emissions from the proposed project were calculated by comparing the emissions associated with new components to the baseline emissions minus any emission source components removed as part of the proposed project. Chevron provided estimates of the numbers and types of service for components to be added and removed for each refinery process unit and at the terminals. It was assumed that all of the new valves less than eight inches in size would be bellows valves and that 50 percent of the removed valves less than two inches in size are bellows valves. It was assumed that none of the existing valves between three and eight inches in size are bellows valves.

Chevron has in place an SCAQMD-approved inspection and maintenance program to detect and remedy leaks from existing process components. This program has allowed Chevron to estimate emissions from process components using emission factors derived from actual leak events rather than the SCAQMD default factors.

New emissions from the new gasoline storage tank at the Refinery and the emissions from the new ethanol storage tank at the Montebello Terminal, were estimated using version 4.09 of the U.S. EPA TANKS program. The changes in VOC emissions that are anticipated to occur from changes in service of the two existing tanks at the Van Nuys Terminal and one existing tank at the Huntington Beach Terminal were also estimated using version 4.09 of the TANKS program. Additionally, emissions of TACs from new tanks and tanks changing service were estimated.

VOC emissions will be generated by ethanol loading of tanker trucks at a third-party terminal at the Port of Los Angeles. Because the specific terminal has not yet been identified, the vapor recovery unit control efficiency is not yet known. Therefore, it was assumed that the emissions would be at the 0.08 lb/1,000 gal-limit specified in SCAQMD Rule 462.

The ethanol that will be loaded into tanker trucks at the Port of Los Angeles contains five percent gasoline as a denaturant. Emissions of TACs during tanker truck loading were also estimated.

Pentanes will be loaded into railcars for transport out of the Refinery. The quantities of butanes and propane loaded into railcars will also increase. However, these loading operations will be conducted under pressure, with vapors from the railcar vapor space returned to the storage vessels. Therefore, these loading operations will not generate additional emissions.

Additional sulfur will be removed in order to meet the CARB Phase 3 specifications for gasoline sulfur content. Most of this sulfur will be recovered by the Refinery sulfur plant, but a small fraction will be emitted as sulfur oxides. The additional sulfur to be removed is estimated to be 131 pounds per day, based on expected production rates and feed sulfur content. Based on the 1999 emission report, the recovery efficiency was 99.94 percent.

Additional CO, VOC, NO_x, SO_x, and PM_{10} emissions from the combustion units, the FCC, the NHT-1, and cogen trains A and B were evaluated. Control equipment consisting of an SCR and a CO catalyst will be added onto the existing FCC unit. CO, VOC, and NO_x emissions will be maintained at or below current levels to comply with current permit limits. However, SO_x and PM_{10} emissions will increase due the increase in throughput. Additional PM_{10} emissions are created by the conversion of SO_2 to SO_3 in the SCR and subsequent reaction with water vapor and ammonia slip to form ammonia sulfate. The sulfate emissions are included in the total PM_{10} emissions for the FCC. The NHT-1 will have an increased firing rate capacity, as well as modifications that will result in lower emissions. The changes to the NHT-1 will result in an increase in CO, VOC, SO_x, and PM_{10} emissions and a decrease in NO_x emissions. The cogen trains A and B are not anticipated to have any changes in emissions caused by the use of pentanes for fuel.

The direct operational criteria pollutant emissions are summarized in Table 4.1-6.

Table 4.1-6
Peak Daily Project Operational Emissions Summary

Source	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)
Direct Emissions					
El Segundo Refinery					
Fugitive VOC from process components	0.0	-46.7	0.0	0.0	0.0
Modified equipment (FCC)	0.0	0.0	0.0	153.4	268.8
Modified equipment (NHT-1)	12.2	6.6	-29.4	7.3	13.7
Cogen Trains A and B	0.0	0.0	0.0	0.0	0.0
New tank 1016	0.0	34.3	0.0	0.0	0.0
Sulfur recovery plant	0.0	0.0	0.0	0.2	0.0
Total	**12.2**	**-5.9**	**-29.4**	**160.9**	**282.5**
Montebello Terminal					
Fugitive VOC from components	0.0	40.2	0.0	0.0	0.0
New ethanol storage tank	0.0	5.0	0.0	0.0	0.0
Total	**0.0**	**45.2**	**0.0**	**0.0**	**0.0**
Van Nuys Terminal					
Fugitive VOC from components	0.0	46.7	0.0	0.0	0.0
Converted ethanol storage tanks	0.0	-9.1	0.0	0.0	0.0
Total	**0.0**	**37.6**	**0.0**	**0.0**	**0.0**
Huntington Beach Terminal					
Fugitive VOC from components	0.0	32.3	0.0	0.0	0.0
Converted ethanol storage tank	0.0	-0.1	0.0	0.0	0.0
Total	**0.0**	**32.2**	**0.0**	**0.0**	**0.0**
Port of Los Angeles					
Ethanol tanker truck loading	0.0	31.7	0.0	0.0	0.0
Total	**0.0**	**31.7**	**0.0**	**0.0**	**0.0**
Total Direct Emissions	**12.2**	**140.7**	**-29.4**	**160.9**	**282.5**

Table 4.1-6 (concluded)
Peak Daily Project Direct Operational Emissions Summary

Source	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)
Indirect Emissions					
Refinery switch engine	2.2	1.2	21.3	0.2	0.5
Montebello Locomotive	2.3	1.2	21.5	0.2	0.5
Ethanol tanker truck deliveries	21.5	5.2	95.0	0.0	71.4
Ethanol marine tanker deliveries	355.4	199.3	3,000.7	2,336.2	488.4
Total Indirect Emissions	**381.4**	**207.0**	**3,138.4**	**2,336.6**	**560.8**
Note: Sums of individual values may not equal totals because of rounding.					

Anticipated changes in annual operational emissions of TACs at the Refinery and terminals are listed in Table 4.1-7. The table shows that both increases and decreases in TAC emissions are anticipated at the Refinery, depending on the individual species. When components (valves, flanges, pumps, etc) are removed during modification of a process unit, emissions of TACs in the process streams associated with those components will not occur. When components are added to a modified unit, emissions of TACs in the process streams associated with those new components will be introduced. These decreased and increased TAC emissions caused by the removal and addition of components can result in either a net increase or a net decrease in emissions of individual TACs, depending on the number of components added and removed and the TACs in the streams associated with those components.

Overall, net decreases in emissions of 1,3-butadiene, methanol, and MTBE are anticipated. Emissions of acetaldehyde, ammonia, benzene, hexavalent chromium, copper, formaldehyde, hydrogen cyanide, hydrogen sulfide, manganese, mercury, naphthalene, nickel, phenol, PAH, toluene, xylenes, zinc, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(123cd)pyrene, sulfuric acid, ethyl benzene, and hexane are anticipated to increase. Potential effects on human health of these changes in TAC emissions have been estimated as described below in Section 4.1.3.2.

Table 4.1-7
Changes in Direct Operational Toxic Air Contaminant Emissions

Species	Emissions (lbs/year)			
	El Segundo Refinery	Huntington Beach Terminal	Montebello Terminal	Van Nuys Terminal
Toxic Air Contaminants for Which Health Risk Factors Exist				
Acetaldehyde	12.9	0.0	0.0	0.0
Acrolein	0.0	0.0	0.0	0.0
Ammonia	1,550.0	0.0	0.0	0.0
Benzene	6.8	7.3	9.2	-6.9
1,3-Butadiene	-18.6	0.0	0.0	0.0
Hexavalent Chromium	0.0	0.0	0.0	0.0
Copper	0.0	0.0	0.0	0.0
Formaldehyde	35.1	0.0	0.0	0.0
Hydrogen Cyanide	0.0	0.0	0.0	0.0
Hydrogen Sulfide	3.3	0.0	0.0	0.0
Manganese	0.4	0.0	0.0	0.0
Mercury	0.1	0.0	0.0	0.0
Methanol	-5,523.4	0.0	0.0	0.0
Naphthalene	7.7	0.0	0.0	0.0
Nickel	0.0	0.0	0.0	0.0
Phenol	3.6	0.0	0.0	0.0
PAH	0.0	0.0	0.0	0.0
Toluene	58.5	22.2	29.3	-43.9
Xylenes (Mixed)	25.8	29.0	39.5	-22.9
Zinc	0.6	0.0	0.0	0.0
Benzo(A)anthracene	0.0	0.0	0.0	0.0
Benzo(B)Fluoranthene	0.0	0.0	0.0	0.0
Benzo(K)Fluoranthene	0.0	0.0	0.0	0.0
Indeno(123cd)Pyrene	0.0	0.0	0.0	0.0
Sulfuric Acid	20.3	0.0	0.0	0.0
Other Toxic Air Contaminants				
Ethyl Benzene	4.6	1.0	1.4	-11.2
Hexane	-14.8	49.6	64.4	-41.8
MTBE	-65.7	0.0	0.0	0.0

4.1.2.3 Indirect/Mobile Source Operation Emissions

In addition to the process-related changes in emissions that will result from the modifications at the Refinery and terminals, emissions from indirect sources will increase. The indirect sources that were evaluated include:

- Tanker truck trips to deliver ethanol to distribution terminals
- Additional locomotive activity moving additional rail cars transporting pentane and delivering ethanol to the Montebello distribution terminal
- Additional marine tanker calls for importing ethanol

Appendix B provides further discussion of the emission estimating methodologies.

To calculate peak daily tanker truck emissions, it was assumed that all ethanol received at the Montebello, Van Nuys, and Huntington Beach Terminals would come from a third-party terminal(s) at the Port of Los Angeles by tanker truck. It was estimated that the peak daily number of tanker truck round trips would be 23, 10, and 13 to the Montebello, Van Nuys, and Huntington Beach Terminals, respectively. Although ethanol may also be transported to the Van Nuys and Huntington Beach terminals from the Montebello terminal, where it will be received by railcar, peak daily emissions from the tanker truck trips would be lower, because deliveries would be made to only two terminals from the Montebello terminal instead of to all three terminals from the Port of Los Angeles.

Pentane will be transported out of the Refinery by rail car. Based on the construction of 10 new rail loading spots, the maximum daily number of rail car shipments would increase by 10. This increase in rail car movement will require additional switch engine operating time at the Refinery. Additionally, approximately 28 minutes of locomotive activity will be required each day that ethanol is delivered to the Montebello terminal by railcar.

Chevron currently imports MTBE, FCC feed, and toluene by marine tanker to Chevron's El Segundo marine terminal. MTBE will no longer be imported when the project becomes operational, resulting in a reduction in the number of marine tanker trips importing MTBE to the El Segundo marine terminal. Imports of FCC feed and toluene will increase. Chevron will also begin importing isooctane and isooctene by marine tanker to the El Segundo marine terminal. Chevron will also import ethanol by marine tanker to a third-party terminal(s) in the Port of Los Angeles. The increase in annual ship calls to import ethanol to the Port of Los Angeles and to import FCC feed, toluene, isooctane, and isooctene to the El Segundo marine terminal will exceed the decrease in MTBE marine tanker calls at the El Segundo marine terminal by an estimated 12 ship calls per year. Because ship calls will be made to two locations instead of only one, it is possible that the peak daily number of ship calls could increase by one, from one to two.

4.1.3 Significance of Project Operational Emissions

Two types of significance criteria are used to determine the air quality impacts from the emissions of criteria pollutants from operation of the project. First, the project operational emissions are compared to specific significance thresholds established for project emissions; and second, the project operational emissions are analyzed through air dispersion modeling to determine if the project may create changes in localized concentrations of air pollutants above the identified human health risk significance criteria. Risk assessments were conducted at the Refinery and three terminals because TACs are anticipated to increase at each of these locations due to new equipment. Although Table 4.1-7 shows a decrease in TAC emissions due to the project, such decreases were not accounted for in Tier 1 or 2 emissions screening.

4.1.3.1 Operational Emissions Summary

A summary of the project's daily emissions from RECLAIM sources is shown in Table 4.1-8. Table 4.1-9 includes the daily totals for both direct project emissions and offsite indirect emissions from non-RECLAIM sources. The summarized project operational emissions are compared to the CEQA significance thresholds. The project operational emissions for non-RECLAIM sources exceed the significance thresholds for VOC, NO_x, SO_x, and PM_{10}.

Table 4.1-8
Project Operational Criteria Pollutant Emissions Summary for RECLAIM Sources

Pollutant	Project Emissions (lb/day)	RECLAIM Allocations[a] (lb/day)	Total (lb/day)	SCAQMD CEQA Threshold (lb/day)	Significant?
NO_X	-29	5,668	5,639	15,533	No
SO_2	161	2,602	2,763	5,181	No

(a) The 1998 facility Allocation for NO_x and SO_x includes purchased RECLAIM trading credits and is converted to pounds per day by dividing 365 days per year.

Table 4.1-9
Project Operational Criteria Pollutant Emissions Summary for Non-RECLAIM Sources

Pollutant	Direct Emissions (lb/day)	Indirect Emissions (lb/day)	Total (lb/day)	SCAQMD CEQA Threshold (lb/day)	Significant?
CO	12	381	393	550	No
VOC[a]	141	207	347	55	**Yes**
NO_X	NA	3,138	3,138	55	**Yes**
SO_2	NA	2,337	2,337	150	**Yes**
PM_{10}	283	561	843	150	**Yes**

(a) Does not include emission reduction from changes in tank service.

4.1.3.2 Operational Emissions Modeling

Atmospheric dispersion modeling was conducted to determine the localized ambient air quality impacts from PM_{10} emissions due to the proposed project at the Refinery. PM_{10} emissions are the only direct criteria pollutant emissions that require modeling per SCAQMD Rule 1303 to determine impacts on ambient air. The atmospheric dispersion modeling methodology used for the project follows generally accepted modeling practice and the modeling guidelines of both the U.S. EPA and the SCAQMD. All dispersion modeling was performed using the Industrial Source Complex Short-Term 3 (ISCST3) dispersion model (Version 00101) (EPA, 2000).

This section provides details of the modeling performed and the results of the modeling. Model output listings of model runs are provided in the Air Quality Technical Attachment (Appendix B).

Model Selection

The dispersion modeling methodology used follows U.S. EPA and SCAQMD guidelines. The ISCST3 model (Version 00101) is an U.S. EPA model used for simulating the transport and dispersion of emissions in areas of both simple, complex, and intermediate terrain. Simple terrain, for air quality modeling purposes, is defined as a region where the heights of release of all emission sources are above the elevation of surrounding terrain. Complex terrain is defined as those areas where nearby terrain elevations exceed the release height of emissions from one or more sources. Intermediate terrain is that which falls between simple and complex terrain. Simple terrain exists in the vicinity of the Refinery.

Modeling Options

The options used in the ISCST3 dispersion modeling are summarized in Table 4.1-10. U.S. EPA regulatory default modeling options were selected except for the calm processing option. Since the meteorological data set developed by the SCAQMD is based on hourly average wind measurements, rather than airport observations that represent averages of just a few minutes, the SCAQMD's modeling guidance requires that this modeling option not be used.

Meteorological Data

The SCAQMD has established a standard set of meteorological data files for use in Basin air quality modeling. For the area in which the Refinery is located, the SCAQMD requires the use of its Lennox 1981 meteorological data file, which is consistent with the data used for previous air quality and health risk assessment modeling studies at the Refinery. To ensure consistency with this prior modeling methodology, and SCAQMD guidance, the 1981 Lennox meteorological data set was used for this modeling study at the Refinery.

In the Lennox data set, the surface wind speeds and directions were collected at the SCAQMD's Lennox monitoring station, while the upper air sounding data used to estimate hourly mixing heights were gathered at Los Angeles International Airport. Temperatures and sky observation (used for stability classification) were taken from Los Angeles International Airport data.

Receptors

Appropriate model receptors must be selected to determine the “worse-case” modeling impacts. For this modeling, a routine grid of receptors was used. In addition, residential receptors were located on the north and south sides of the property. No receptors were placed within the Refinery property line. Terrain heights for all receptors were obtained from the existing Refinery HRA.

Table 4.1-10
Dispersion Modeling Options for ISCST3

Feature	Option Selected
Terrain processing selected	Yes
Meteorological data input method	Card Image
Rural-urban option	Urban
Wind profile exponents values	Defaults
Vertical potential temperature gradient values	Defaults
Program calculates final plume rise only	Yes
Program adjusts all stack heights for downwash	Yes
Concentrations during calm period set = 0	No
Aboveground (flagpole) receptors used	No
Buoyancy-induced dispersion used	Yes
Surface station number	52118

Source Parameters

Table 4.1-11 summarizes the source parameter inputs to the dispersion model. The source parameters presented are based upon the parameters of the existing and proposed equipment at the facility. Three combustion source stacks were modeled using actual emission rates. The new NHT #1 Furnace 4531 stack will be located approximately 50 feet east of the existing stack. This location change is reflected in the coordinates listed for Model ID 90052 below. The emission rate used in the ISCST3 model run for the point sources is in units of g/s.

Table 4.1-11
Point Source Locations and Parameters Used in Modeling

Model ID/Equipment	UTM X [m]	UTM Y [m]	Stack Base Elevations Above MSL Z [m]	Release Height Above Ground Level [m]
90026/No. 39 Boiler Main Stack	369746	3752659	31.3	46.9
90027/No. 39 Boiler Auxiliary Stack	369746	3752654	31.4	42.6
90052/NHT#1 Furnace 4531 Stack (current)	370149	3752437	32.9	31.1
90052/NHT#1 Furnace 4531 Stack (proposed)	370164	3752437	32.9	31.1

Emissions

Modeling was performed using direct operational PM_{10} emissions associated with the proposed project. These emissions result from modifications to the FCC and modifications to the NHT-1. Two model runs were created, one for the current emission rates and stack parameters, and one for the proposed emission rates and stack parameters.

Results

The ambient air significant thresholds for PM_{10} project impacts are 2.5 $\mu g/m^3$ and 1.0 $\mu g/m^3$ for the 24-hour and annual impacts, respectively, as indicated in Table 4.1-1. The modeling indicates that the 24-hour impact at the property boundary is 1.98 $\mu g/m^3$ and the annual impact is 0.43 $\mu g/m^3$. Therefore, this project does not have significant impacts on PM_{10} ambient air concentrations.

4.1.3.3 Risk Assessments

Risk assessments procedures for SCAQMD Rule 1401 were followed for the Refinery, the three distribution terminals, and the third-party Port of Los Angeles marine terminal. SCAQMD Rule 1401 risk assessment procedures consist of four tiers, or levels of effort to assess impacts, from a quick look-up table (Tier 1) to a detailed risk assessment involving air quality modeling analysis (Tier 4). For the Refinery, a health risk assessment (Tier 4) was prepared and is described in detail below. The emissions of TACs at the terminals exceed Tier 1 thresholds. Therefore, a Tier 2 analysis was performed for the Huntington Beach, Montebello, and Van Nuys terminals. Results of the Tier 2 analysis are presented below.

The Tier 2 screening risk assessment consists of calculating the MICR, as well as the acute and chronic hazard index (HIA and HIC), due to all TACs at each terminal. Table 4.1-12 summarizes the calculated values for the MIC and compares them to the thresholds for each terminal.

Table 4.1-12
Tier 2 Analysis Results and Comparison to Significance Threshold for MICR

Terminal	MICR	Significance Threshold	Exceeds Threshold
Huntington Beach	0.11	1.0	No
Montebello	0.21	1.0	No
Van Nuys	0.19	1.0	No

Table 4.1-13 presents the HIA by target organ and compares this result to the threshold for each terminal.

Table 4.1-13
Tier 2 Analysis Results and Comparison to Threshold for HIA

Target Organ	Huntington Beach	Montebello Terminal	Van Nuys Terminal	Significance Threshold	Exceeds Threshold
Cardiovascular	3.11E-05	7.54E-05	NA	1.0	No
Central nervous system	3.84E-06	9.60E-06	NA	1.0	No
Endocrine	0.00E+00	0.00E+00	NA	1.0	No
Eye	1.22E-05	3.14E-05	NA	1.0	No
Immune	3.11E-05	7.54E-05	NA	1.0	No
Kidney	0.00E+00	0.00E+00	NA	1.0	No
Gastrointestinal system/liver	0.00E+00	0.00E+00	NA	1.0	No
Reproductive	3.50E-05	8.50E-05	NA	1.0	No
Respiratory	1.22E-05	3.14E-05	NA	1.0	No
Skin	0.00E+00	0.00E+00	NA	1.0	No

Table 4.1-14 presents the HIC by target organ and compares this result to the threshold for each terminal.

Table 4.1-14
Tier 2 Analysis Results and Comparison to Threshold for HIC

Target Organ	Huntington Beach	Montebello Terminal	Van Nuys Terminal	Significance Threshold	Exceeds Threshold
Cardiovascular	6.14E-05	1.22E-04	0.00E+00	1.0	No
Central nervous system	1.25E-04	2.51E-04	0.00E+00	1.0	No
Endocrine	2.55E-07	5.42E-07	0.00E+00	1.0	No
Eye	0.00E+00	0.00E+00	0.00E+00	1.0	No
Immune	0.00E+00	0.00E+00	0.00E+00	1.0	No
Kidney	2.55E-07	5.42E-07	0.00E+00	1.0	No
Gastrointestinal system/liver	2.55E-07	5.42E-07	0.00E+00	1.0	No
Reproductive	9.96E-05	2.00E-04	0.00E+00	1.0	No
Respiratory	6.13E-05	1.24E-04	9.35E-06	1.0	No
Skin	0.00E+00	0.00E+00	0.00E+00	1.0	No

An estimate of the cancer burden is only required when the MICR exceeds one in one million. As shown in Table 4.1-12, the Rule 1401 threshold value for the MICR is not exceeded at any of the terminals. Thus, the cancer burden has not been estimated. Additionally, the Rule 1401 threshold values of the HIA and the HIC have not been exceeded at any of the terminals. Therefore, further analysis was not required for the terminals.

The TAC emissions at the as-yet undetermined marine terminal in the Port of Los Angeles are due to the loading of ethanol at a third-party marine terminal into tanker trucks. Since the vapor recovery unit efficiency at the as-yet unidentified third-party marine terminal is not known, a conservative "worse-case" assumption was made, and the SCAQMD maximum emission factor per Rule 462 was used to estimate emissions. Estimated daily benzene emissions due to loading of 45 tanker trucks with ethanol at the marine terminal are less than the total project benzene emissions at either the Montebello or Huntington Beach Terminals. Since the third-party marine terminal has not yet been selected and information, such as distance to receptors and the property line, are not known, a site-specific detailed analysis has not been performed.

While the third-party marine terminal will be responsible for reporting the emissions from the ethanol tanker truck loading and performing any associated risk assessments that may be required, the TAC emissions can be compared to those from the Chevron distribution terminals to obtain a better understanding of the potential risks. Greater benzene emissions from the Montebello and Huntington Beach Terminals result in a maximum individual cancer risk (MICR) that is approximately one order of magnitude less than the threshold for this project, as shown in Table 4.1-12. Therefore, it is assumed that the lower emissions from ethanol loading at the third-party marine terminal will not result in a risk that is significant.

Atmospheric dispersion modeling was conducted to determine the localized ambient air quality impacts from the proposed project at the Refinery. The health risk assessment (HRA) modeling was prepared based on the most recent HRA for the Refinery. The atmospheric dispersion modeling methodology used for the project follows generally accepted modeling practice and the modeling guidelines of both the U.S. EPA and the SCAQMD. All dispersion modeling was performed using the Industrial Source Complex Short-Term 3 (ISCST3) dispersion model (Version 00101) (EPA, 2000). The outputs of the dispersion model were used as input to a risk assessment using the Assessment of Chemical Exposure for AB2588 (ACE2588) risk assessment model (Version 93288) (California Air Pollution Control Officers Association [CAPCOA] 1993). The updates to the ACE2588 model based on the most recent risk exposure levels as established by Office of Health, hazard Assessment (OEHHA, 2000) are consistent with those used in the most recent HRA for the Refinery.

This section provides additional details of the modeling performed not included in Section 4.3.2, as well as the results of the modeling. Model output listings of model runs are provided in the Air Quality Technical Attachment (Appendix B).

Source Parameters

Tables 4.1-15 and 4.1-16 summarize the source parameter inputs to the dispersion model. The source parameters presented are based upon the parameters of the existing and proposed equipment at the facility. Fifteen sources composed of 11 sources of components with fugitive emissions, one new storage tank, and three combustion source stacks were modeled. The 11 sources of components with fugitive emissions were modeled as rectangular area sources. The tank was modeled as an area source. The emission rate used in the ISCST3 model run for the area sources is in units of grams per second-square meters (g/s-m^2). A unit emission rate of 1.0 g/s was used, so that the emission rate is the inverse of the area in units of g/s-m^2. Table 4.1-15 details modeling parameters for the area sources and Table 4.1-16 details modeling parameters for the point sources.

The coordinates listed in Tables 4.1-15 and 4.1-16 are the first vertex of the rectangle, the center of the tank, or the location of the point source. The new NHT #1 Furnace 4531 stack will be located approximately 50 feet east of the existing stack. This location change is reflected in the coordinates listed for Model ID 90052 below.

Table 4.1-15
Area Source Locations and Parameters Used in Modeling the Proposed Project

Model ID/Equipment	UTM X [m]	UTM Y [m]	Elevation Z [m]	Area [m^2]	Q [g/s-m^2]
100/Fugitives for Additional Gasoline Storage	368585	3753275	46.8	455,000	2.20E-06
254/Fugitives for Alky Modifications	369671	3753040	33.3	11,751	8.51E-05
258/Fugitives for FCC Modifications consisting of Light Gasoline Depentanizer, Light Gasoline Splitter, Debutanizer, Depropanizer, C3 Caustic/Monoethanol Amine Treating	369723	3752628	31.2	12,210	8.19E-05
330/Fugitives for Deisobutanizer Reactivation	369671	3753040	33.3	6,300	1.59-04
346/Fugitives for FCC Modifications consisting of WGC Interstage System, Deetathanizer, Main Air Blower, Upgrade, Stack Emission Reduction, Relief/Vapor Recovery System	369740	3752588	32.4	10,000	1.00E-04
834/Fugitives for Isomax Depentanizer	370312	3752388	33.6	11,990	8.34E-05
837/Fugitives for NHT #1	370114	3752212	33.9	7,200	1.39E-04
1001/Fugitives for Pentane Storage Sphere	370592	3752666	32.0	600	1.67E-03
1002/Fugitives for Pentane Export Railcar Load Rack Facility	370875	3753230	32.0	153,000	6.54E-06
1016/Fugitives for Tank 1016	369730	3752221	32.0	4,933	2.03E-04

Table 4.1-16
Point Source Locations and Parameters Used in Modeling

Model ID/Equipment	UTM X [m]	UTM Y [m]	Stack Base Elevations Above MSL Z [m]	Release Height Above Ground Level [m]	Q [g/s]
90026/No. 39 Boiler Main Stack	369746	3752659	31.3	46.9	1.00E+00
90027/No. 39 Boiler Auxiliary Stack	369746	3752654	31.4	42.6	1.00E+00
90052/NHT#1 Furnace 4531 Stack (current)	370149	3752437	32.9	31.1	1.00E+00
90052/NHT#1 Furnace 4531 Stack (proposed)	370164	3752437	32.9	31.1	1.00E+00

Emissions

Modeling was performed using only direct operational emissions associated with the proposed project. These emissions consist of toxic emissions resulting from the removal and addition of components with fugitive emissions in various process streams at the Refinery, as well as the proposed new storage tank, increased usage of the No. 39 boiler, and modifications to the NHT #1 Furnace 4531.

Since the components with fugitive emissions are associated with a variety of streams, the emissions for some toxic pollutants increased at a specific location, whereas other toxics decreased. Thus, two model runs were created, one for the increase in toxic emissions and one for the decrease. For the components, the annual emission rate was based on the calculated annual emissions, and the peak hourly emission rate was derived from the annual emission rate assuming continuous operations at 8,760 hours per year. The emission rates used in the ACE2588 model run were in units of g/s.

For the point sources, two model runs were created, one for the current emission rates and stack parameters, and one for the proposed emission rates and stack parameters.

Model Runs

Four modeling files were created to assess the potential health risks from this project. The details of the runs are summarized in Table 4.1-17.

Table 4.1-17
Details of Model Runs

Model Run	Area Sources	Point Sources	Receptors
1	Positive emission values	Proposed emissions and proposed stack parameters	Residential receptors
2	Negative emission values	Current emissions and current stack parameters	Residential receptors
3	Positive emission values	Proposed emissions and proposed stack parameters	Routine grid receptors
4	Negative emission values	Current emissions and current stack parameters	Routine grid receptors

Health Risks

The potential health risk impacts addressed in this section are carcinogenic, chronic noncarcinogenic, and acute noncarcinogenic.

The ACE2588 Risk Assessment Model was used to evaluate the potential health risks from TACs. The ACE2588 model, which is accepted by the CAPCOA, has been widely used for required HRAs under the CARB AB2588 toxic hotspots reporting program. The model provides conservative algorithms to predict relative health risks from exposure to carcinogenic, chronic noncarcinogenic, and acute noncarcinogenic pollutants. This multipathway model was used to evaluate the following routes of exposure: inhalation, soil ingestion, dermal absorption, mother's milk ingestion, and plant product ingestion. Exposure routes from animal product ingestion and water ingestion were not assumed for this analysis.

The 93288 version of ACE2588 incorporates revised toxicity and pathway data recommended in the Toxic Air Pollutant Source Assessment Manual for California Air Pollution Control Districts and Applicants for Air Pollution Control District Permits (CAPCOA, 1993). The pathway data in ACE2588 were modified to include site-specific fractions of homegrown root, leafy, and vine plants. These site-specific fractions were used to maintain consistency with assumptions previously accepted for this particular site by SCAQMD.

The results obtained based on the CAPCOA HRA guidance are considered to be consistent with those which would be obtained following SCAQMD's Risk Assessment Procedures for Rules 1401 (SCAQMD, 2000) and 212 (SCAQMD, 1997).

Only TACs identified in the CAPCOA HRA guidance with potency values or RELs have been included in the HRA. The 25 TACs emitted from the proposed project consist of acetaldehyde, acrolein, ammonia, benzene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, 1,3-butadiene, copper, formaldehyde, hexavalent chromium, hydrogen cyanide, hydrogen sulfide, indeno(123cd)pyrene, manganese, mercury, methanol, naphthalene, nickel, phenol, polyaromatic hydrocarbons, sulfuric acid, toluene, xylenes, and zinc.

The dose-response data used in the HRA were extracted from the October 1993 CAPCOA HRA guidance. The pertinent data are located in Tables III-5 through III-10 of the CAPCOA guidance.

Following CAPCOA guidance, the inhalation, dermal absorption, soil ingestion, and mother's milk pathways were included in a multipathway analysis. Pathways not included in the analysis are water ingestion, fish, crops, and animal and dairy products because these pathways were not identified as a potential concern for the project setting.

Inhalation pathway exposure conditions were characterized by the use of the ISCST3 dispersion model, as previously discussed.

Significance criteria for this Draft EIR are an increased cancer risk of 10 in one million or greater. The established SCAQMD Rule 1401 limits are one in one million cancer risk for sources without toxics –best available control technology (T-BACT) and 10 in one million for those with T-BACT. The Refinery will implement T-BACT in the form of bellows or other leakless valves where appropriate. The significance criteria for noncarcinogenic acute and chronic hazard indices are 1.0 for any endpoint.

The net predicted cancer risks at each of the modeled receptors were reviewed by combining runs 1 and 2, as well as runs 3 and 4 as detailed in Table 4.1-17 above. The maximum increased cancer risk at any receptor is 0.005 per million. The peak receptor is a routine grid receptor and is located on the southeastern side of the property. The peak risk at a residential receptor is a negative value. Therefore, the modeling indicates that the proposed project is not anticipated to impact any residential receptors. The results of the HRA indicate that the potential impact of the project is well below the significance level of 10 per one million.

The maximum noncarcinogenic acute and chronic hazard indices from the model runs 1 and 3, as detailed in Table 4.1-17, were 0.03 and 0.03, respectively. These values are well below the significance level of 1.0. Thus, the HRA results indicate that impacts are not only below the SCAQMD significance criteria, but they indicate that there are minimal impacts as a result of the project.

4.1.4 Potential Health Risks from Diesel Exhaust Particulate Matter

The project will lead to increased emissions of diesel exhaust particulate matter during construction and operation. In 1998, CARB listed particulate matter in the exhaust from diesel-fueled engines (diesel particulate matter) as a TAC and concluded that it is probably carcinogenic to humans. Significant impacts associated with exposure to diesel particulate emissions are not expected during operation of the proposed project. Total tanker truck exhaust PM_{10} emissions from the 45 daily truck round trips are estimated to be only three pounds per day, which occur over a total distance of about 1,300 miles. Therefore, the exposure to exhaust diesel particulate matter resulting from the project at any single location is anticipated to be negligible.

4.1.5 Carbon Monoxide Impacts Analysis

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

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

As indicated in the transportation/traffic impacts analysis (Section 4.11), the volume-to-capacity ratio at the Sepulveda/SR-1 and El Segundo Boulevard intersection, which currently is rated E, may increase by 0.023 from construction worker traffic leaving the Refinery at the end of the working day. The construction period will be less than one year. This is the only intersection that meets either of the above criteria during the construction phase. None of the intersections affected by this project meet the above criteria during operation. Therefore, a CO Hot Spots Analysis for operational traffic impacts was not required.

The "no project" ambient background CO concentration was obtained from Table 3.1-5. As shown in the table, the peak one-hour and eight-hour CO concentrations for Station No. 094 for 1999 were 10 ppm and 8.4 ppm, respectively.

The dispersion model CALINE4 was used to perform a site-specific analysis and estimate the potential for CO hotspots. The model is based on continuous line source emissions and estimates roadway impacts. Three roadway segment links were identified for the analysis:

- El Segundo Boulevard between Gate 8 and Sepulveda/SR-1
- El Segundo Boulevard between Sepulveda/SR-1 and Aviation Boulevard

- Sepulveda/SR-1 between El Segundo Boulevard and Imperial Highway/105

The volume-to-capacity increase is a result of 79 additional vehicles leaving the Refinery from Gate 8 and driving eastbound on El Segundo Boulevard. At the subject intersection, 71 of these vehicles are expected to drive in the eastbound direction on El Segundo Boulevard and eight vehicles are expected to drive in the northbound direction on Sepulveda/SR-1. Since the workers will leave the site at 5 p.m., a peak traffic 1-hour period from 5 p.m. to 6 p.m. was used in this analysis. To be conservative, the 8-hour period was assumed to have the same vehicle per hour volumes as the 1-hour peak.

Consistent with the air quality analysis of indirect emission sources, it was assumed that the vehicles are light duty trucks traveling at 35 miles per hour. An EMFAC2000 CO emission factor of 12.06 grams per mile was used as input into CALINE4.

Figure 5-1 of the SCAQMD CEQA Air Quality Handbook (1993) defines sensitive receptors as:

- Long-term health care facilities
- Rehabilitation centers
- Convalescent centers
- Retirement homes
- Residences
- Schools
- Playgrounds
- Child care centers
- Athletic facilities

Potential sensitive receptors located along the three identified roadway segments were reviewed. Although there do not appear to be any sensitive receptors directly along the roadway, it was assumed for a "worse-case" that a person may be as close as five meters (16.5 feet) to the roadway. Thus, to be conservative for these short-term exposure analyses (1-hour and 8-hour), it was assumed that the receptors were located five meters (16.5 feet) from the edge of the roadways.

The CALINE4 analyses were performed with the peak traffic volume, the "worse-case" wind angle option, and with receptors located five meters off the roadway. The results of both the 1-hour and 8-hour runs indicate no change in ambient CO concentrations as a result of this project.

The significance criteria for ambient CO impacts are 1.0 ppm and 0.45 ppm for the 1-hour and 8-hour standards, respectively, as shown in Table 4.1-1. As shown in Table 4.1-18, the project impact is below the significance threshold for both the 1-hour and 8-hour standards.

In addition, the state and federal ambient air quality standards are summarized in Table 3.1-4. As shown in the Table 3.1-4, the state ambient 1-hour and 8-hour ambient CO standards are 20 ppm and 9 ppm, respectively. The federal ambient CO standards are 35 ppm and 9 ppm, respectively. The sum of the project and ambient background concentrations are below the state and federal ambient 1-hour and 8-hour standards as shown in Table 4.1-18. Therefore, the potential increase in congestion at this intersection during construction is not anticipated to lead to adverse CO impacts on sensitive receptors.

Table 4.1-18
CO Hot Spots Analysis

Time Period	Ambient Concentration	Project Impact	Significance Threshold	Total Concentration	Significant
1-hour	10 ppm	0.2 ppm	1.0 ppm	10.2 ppm	NO
8-hour	8.4 ppm	0.1 ppm	0.45 ppm	8.5 ppm	NO

4.1.6 Mitigation Measures

4.1.6.1 Construction Mitigation Measures

As indicated in the previous summary tables, construction activities may have significant unmitigated air quality impacts for CO, VOC, NO_X, SO_X, and PM_{10}. Construction emissions are primarily from: 1) onsite fugitive dust from grading and excavation; 2) onsite exhaust emissions (CO, VOC, NO_X, SO_X, and PM_{10}) from construction equipment; 3) onsite VOC emissions from asphaltic paving and painting; 4) offsite exhaust emissions from truck traffic and worker commute trips; 5) offsite road dust associated with traffic to and from the construction site; 6) and offsite fugitive dust (PM_{10}) from trucks hauling materials, construction debris, or excavated soils from the site.

Table 4.1-19 lists mitigation measures for each emission source and identifies the estimated control efficiency of each measure. As shown in the table, no feasible mitigation has been identified for the emissions from architectural coating or from on-road vehicle trips. Additionally, no other feasible mitigation measures have been identified to further reduce emissions. CEQA Guidelines §15364 defines feasible as ". . . capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

Table 4.1-20 presents a summary of overall peak daily mitigated construction emissions. The table includes the emissions associated with each source and an estimate of the reductions achieved with mitigation. The implementation of mitigation measures, while reducing emissions, does not reduce the construction-related CO, VOC, NO_X, SO_X, or PM_{10} impacts below significance.

Table 4.1-19

Construction-Related Mitigation Measures and Control Efficiency

Mitigation Measure Number	Mitigation	Source	Pollutant	Control Efficiency (%)
AQ-1	Increase watering of active site by one time per day[a]	Onsite Fugitive Dust PM_{10}	PM_{10}	16
AQ-2	Wash wheels of all vehicles leaving unimproved areas	Onsite Fugitive Dust PM_{10}	PM_{10}	Not Quantified
AQ-3	Remove visible roadway dust tracked out onto paved surfaces from unimproved areas by sweeping at the end of the workday	Onsite Fugitive Dust PM_{10}	PM_{10}	Not Quantified
AQ-4	Prior to use in construction, evaluate the feasibility of retrofitting the large off-road construction equipment that will be operating for significant periods. Retrofit technologies such as SCR, oxidation catalysts, air enhancement technologies, etc. will be evaluated. These technologies will be required if they are commercially available and can feasibly be retrofitted onto construction equipment.	Construction Equipment Exhaust	CO VOC NO_X SO_X PM_{10}	Unknown Unknown Unknown Unknown Unknown
AQ-5	Use low sulfur diesel (as defined in SCAQMD Rule 431.2) where feasible.	Construction Equipment	SO_X PM_{10}	Unknown
AQ-6	Proper equipment maintenance	Construction Equipment Exhaust	CO VOC NO_X SO_X PM_{10}	5 5 5 5 0
AQ-7	Cover haul trucks with full tarp	Haul Truck Soil Loss	PM_{10}	90
	No feasible measures identified	Architectural Coating	VOC	N/A
	No feasible measures identified[b]	On-Road Motor Vehicles	CO VOC NO_X PM_{10}	N/A N/A N/A N/A

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

[b] Health and Safety Code §40929 prohibits the air districts and other public agencies from requiring an employee trip reduction program making such mitigation infeasible. No feasible measures have been identified to reduce emissions from this source.

Table 4.1-20
Overall Peak Daily Construction Emissions (Mitigated)

Source	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	Exhaust PM_{10} (lb/day)	Fugitive PM_{10} (lb/day)	Total PM_{10} (lb/day)
Onsite Construction Equipment Exhaust	1,049.5	200.0	1,726.9	172.7	102.4	NA	102.4
Mitigation Reduction (%)	0%	5%	5%	5%	5%	---	
Mitigation Reduction (lb/day)	0.0	-10.0	-86.3	-8.6	-5.1	---	-5.1
Remaining Emissions	**1,049.5**	**190.0**	**1,640.6**	**164.1**	**97.3**	---	**97.3**
Onsite Motor Vehicles	27.8	5.2	39.2	0.0	1.6	56.1	57.7
Mitigation Reduction (%)	0%	0%	0%	0%	0%	0%	
Mitigation Reduction (lb/day)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Remaining Emissions	**27.8**	**5.2**	**39.2**	**0.0**	**1.6**	**56.1**	**57.7**
Onsite Fugitive PM_{10}	NA	NA	NA	NA	NA	202.7	202.7
Mitigation Reduction (%)	---	---	---	---	---	16%	
Mitigation Reduction (lb/day)	---	---	---	---	---	-32.4	-32.4
Remaining Emissions	---	---	---	---	---	170.3	170.3
Asphaltic Paving	NA	1.8	NA	NA	NA	NA	NA
Mitigation Reduction (%)	---	0%	---	---	---	---	---
Mitigation Reduction (lb/day)	---	0.0	---	---	---	---	---
Remaining Emissions	---	**1.8**	---	---	---	---	---
Architectural Coating	NA	140.0	NA	NA	NA	NA	NA
Mitigation Reduction (%)	---	0%	---	---	---	---	---
Mitigation Reduction (lb/day)	---	0.0	---	---	---	---	---
Remaining Emissions	---	**140.0**	---	---	---	---	---
Total Onsite	**1,077.3**	**336.9**	**1,679.8**	**164.1**	**98.9**	**226.4**	**325.3**
Offsite Haul Truck Soil Loss[a]	NA	NA	NA	NA	NA	64.1	64.1
Mitigation Reduction (%)	---	---	---	---	---	90%	
Mitigation Reduction (lb/day)	---	---	---	---	---	-57.7	-57.7
Remaining Emissions	---	---	---	---	---	6.4	6.4
Offsite Motor Vehicles	627.0	92.1	231.4	0.0	7.5	276.7	284.2
Mitigation Reduction (%)	0%	0%	0%	0%	0%	0%	
Mitigation Reduction (lb/day)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Remaining Emissions	**627.0**	**92.1**	**231.4**	**0.0**	**7.5**	**276.7**	**284.2**
Total Offsite	**627.0**	**92.1**	**231.4**	**0.0**	**7.5**	**283.1**	**290.6**
TOTAL	**1,704.4**	**429.0**	**1,911.2**	**164.1**	**106.4**	**509.5**	**615.9**
Significance Threshold	*550*	*75*	*100*	*150*			*150*
Significant? (Yes/No)	**Yes**	**Yes**	**Yes**	**Yes**			**Yes**

Note: Sums of individual values may not equal totals because of rounding.
[a] Does not include 50% control from freeboard, since tarp is being used instead to achieve 90% control.

4.1.6.2 Operational Mitigation Measures

The projected operational CO emissions increase is less than the mass daily CO emissions significance threshold identified in Table 4.1-1. However, operational VOC, NO_x, SO_x, and PM_{10} mass daily emissions from sources that are not subject to RECLAIM are anticipated to exceed each relevant significance criterion. These increased VOC, NO_x, SO_x, and PM_{10} emissions are primarily due to ethanol deliveries by marine vessel at the Port of Los Angeles.

Project operational VOC emissions at the Refinery will be substantially reduced through the application of BACT, which, by definition, is the lowest achievable emission rate. For example, except for valves larger than eight inches, the new valves to be installed will be of the bellow-seals (leakless) variety.

The VOC exceedance does not include the actual emission reductions that will result from the storage of lower vapor pressure CARB Phase 3 reformulated gasoline at the Refinery and terminals. Although the actual VOC emission reductions will occur, the refinery has elected not to change the current maximum potential to emit permit conditions. This means that the Refinery will not be required to limit emissions to the new lower levels, but could, theoretically, continue to emit up to the maximum potential to emit. Therefore, no credit for reducing emissions due to the lower vapor pressure of CARB Phase 3 reformulated gasoline will be allowed for the proposed project. It also should be noted that the specific VOCs that increase as a result of the project were evaluated as part of a HRA (Section 4.1.3.2) and, based on their composition, are not anticipated to create localized human health risks.

NO_X, SO_X, and PM_{10} are of local, as well as regional concern. As seen from the summary in Table 4.1-20, anticipated peak daily emissions of these pollutants are primarily associated with a marine tanker ship calls to deliver ethanol at the Port of Los Angeles. Additionally, locomotive operations at the Refinery and Montebello Terminal contribute to NO_X emissions, and tanker trucks delivering ethanol to the terminals contribute to both NO_X and PM_{10} emissions.

No feasible mitigation measures have been identified to reduce emissions from marine tankers, locomotives, or the tanker trucks. No feasible technologies to reduce emissions to levels that would reduce operational emissions below the significance thresholds were identified. Additionally, the U.S. EPA has the authority to regulate emissions from locomotives and ocean-going vessels, and the U.S. EPA and CARB have the authority to regulate emissions from motor vehicles. The SCAQMD has limited authority to regulate emissions from on-road mobile sources. The SCAQMD, however, has no authority to regulate off-road mobile sources. In particular, the SCAQMD evaluated potential measures to mitigate marine vessel emissions for another project and concluded that the SCAQMD has no jurisdictional authority to impose conditions that affect marine vessel emissions. Further, the SCAQMD is prohibited from imposing mitigation measures that may hinder or impair safety at the Port of Los Angeles. For a complete discussion demonstrating that the SCAQMD has no jurisdictional authority to regulate emissions from marine vessels, the reader is referred to the Mobil Torrance Refinery Fuels Project Volume VII – Revised Draft EIR (SCAQMD, 1998).

Potential alternatives for importing ethanol would be by railcar or by tanker truck, but these modes could lead to emissions similar to those from marine tankers. Importing ethanol by pipeline is not feasible because of the risk of contamination with water.

Similarly, potentially feasible alternatives to exporting pentanes by railcar, such as by marine tanker, would lead to emissions similar to those from import of ethanol by marine tanker. Exporting pentanes by pipeline is not feasible without construction of new pipelines, which is not economically feasible.

The only potentially technically feasible alternative to ethanol delivery to the terminals by tanker truck would be delivery by pipeline. However, pipeline delivery would require dedicated pipelines to avoid contamination by water, and pipelines that could be dedicated to ethanol distribution do not exist.

Therefore, operational NO_X, SO_X, and PM_{10} emissions cannot be mitigated to levels below the significance thresholds. However, it should be noted that marine tanker calls to deliver ethanol are intermittent, so the peak daily emissions will not occur every day. Furthermore, in Table 4.1-21, SO_X and PM_{10} emissions from other sources that are not subject to RECLAIM are anticipated to be 0.2 and 121 pounds per day, respectively, which are below the significance thresholds. Additionally, total NO_X emissions from sources at the Refinery, including sources subject to RECLAIM, are anticipated to decrease by about 8 pounds per day, and NO_X emissions from non-refinery indirect sources are anticipated to be about 53 pounds per day, which is below the significance criterion.

Table 4.1-21
Peak Daily Operational Emissions Summary (Pre-mitigation)

Source	**CO (lb/day)**	**VOC (lb/day)**	**NO_X (lb/day)**	**SO_X (lb/day)**	**PM_{10} (lb/day)**
Direct Emissions					
El Segundo Refinery					
Fugitive VOC from process components	0.0	-46.7	0.0	0.0	0.0
Modified equipment (FCC)	0.0	0.0	0.0	153.4	268.8
Modified equipment (NHT 1)	12.2	6.6	-29.4	7.3	13.7
Cogen Trains A and B	0.0	0.0	0.0	0.0	0.0
New tank 1016	0.0	34.3	0.0	0.0	0.0
Sulfur recovery plant	0.0	0.0	0.0	0.2	0.0
Total	**12.2**	**-5.9**	**-29.4**	**160.9**	**282.5**

Table 4.1-21 (concluded)
Peak Daily Operational Emissions Summary (Pre-mitigation)

Source	CO (lb/day)	VOC (lb/day)	NO_X (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)
Direct Emissions					
Huntington Beach Terminal					
Fugitive VOC from components	0.0	32.3	0.0	0.0	0.0
Converted ethanol storage tank	0.0	-0.1	0.0	0.0	0.0
Total	**0.0**	**32.2**	**0.0**	**0.0**	**0.0**
Montebello Terminal					
Fugitive VOC from components	0.0	40.2	0.0	0.0	0.0
New ethanol storage tank	0.0	5.0	0.0	0.0	0.0
Total	**0.0**	**45.2**	**0.0**	**0.0**	**0.0**
Van Nuys Terminal					
Fugitive VOC from components	0.0	46.7	0.0	0.0	0.0
Converted ethanol storage tanks	0.0	-9.1	0.0	0.0	0.0
Total	**0.0**	**37.6**	**0.0**	**0.0**	**0.0**
Port of Los Angeles					
Ethanol tanker truck loading	0.0	31.7	0.0	0.0	0.0
Total Direct Emissions	**12.2**	**140.7**	**-29.4**[a]	**160.9**[a]	**282.5**
Indirect Emissions					
Refinery switch engine	2.2	1.2	21.3	0.2	0.5
Montebello locomotive	2.3	1.2	21.5	0.2	0.5
Ethanol tanker truck deliveries	21.5	5.2	95.0	0.0	71.4
Ethanol marine tanker deliveries	355.4	199.3	3,000.7	2,336.2	488.4
Total Indirect Emissions	**381.4**	**207.0**	**3,138.4**	**2,336.6**	**560.8**

Note:
[a] Emissions from RECLAIM sources.
Sums of individual values may not equal totals because of rounding.

4.1.7 AQMP Consistency

Pursuant to CEQA Guidelines, CCR, Title 14, § 15125 (d), an EIR shall discuss any inconsistencies between the proposed project and applicable general plans and regional plans, which include air quality management plans. The 1997 AQMP and the 1999 amendments to the AQMP demonstrate that applicable ambient air quality standards can be achieved within the timeframes required under federal law. This project must comply with applicable SCAQMD requirements and control measures for new or modified sources. It must also comply with prohibitory rules, such as Rule 403, for the control of fugitive dust. By meeting these requirements, the project will be consistent with the goals and objectives of the AQMP. Furthermore, the production of CARB Phase 3 reformulated gasoline will result in emission reductions from motor vehicles throughout the South Coast Air Basin, which will further the

SCAQMD's efforts to attain and maintain the applicable ambient air quality standards with a margin of safety for sensitive receptors.

4.2 Biological Resources

The proposed project will result in the installation and modification of process equipment and storage tanks at the Refinery and terminals. Construction will occur within exiting disturbed areas at each facility. Impacts to biological resources would be considered significant if areas of vegetation are removed or if special-status species or their habitats are substantially affected by the proposed activities.

As indicated in Section 3.2, the discussion of potential impacts to biological resources is limited to the Refinery and the Huntington Beach Terminal. No potential significant biological resources were identified at or in the immediate vicinity of the Montebello or Van Nuys Terminals.

4.2.1 Refinery

El Segundo blue butterfly

Population occurrences of the El Segundo blue butterfly are limited to the butterfly sanctuary at the Refinery. The butterfly sanctuary (Figure 3.2-1) is approximately 0.5 mile from the nearest project modification/addition location proposed at the Refinery. Direct impacts, such as changes in water quality, are not expected because construction would occur on previously disturbed land approximately 0.5 mile away from the butterfly sanctuary. Indirect impacts, such as changes to ambient noise or lighting, are also expected to be minimal due to the distance between the park and the proposed construction areas and the large amounts of noise and light already present in the area.

Pacific pocket mouse

The Pacific pocket mouse inhabits coastal strand, coastal dunes, river alluvium, and coastal sage scrub on marine terraces. Historically, the Pacific pocket mouse inhabited areas of the Refinery property, but it has not been sighted since 1938. Due to the disturbed nature of the Refinery property and the fact that the Pacific pocket mouse has not been seen in over 60 years, this species is not expected to exist at the Refinery property and therefore would not be impacted by the proposed activities.

Beach spectaclepod

The beach spectaclepod is a California native plant that occurs in foredunes and active sand and dune scrub. The historic range for this species includes portions of the Refinery property, although the last sighting in 1884 was reported in 1979. Due to the disturbed nature of the Refinery property and the fact that the beach spectaclepod has not been sighted since 1884, this species is not expected to occur on the Refinery property and therefore would not be impacted by the proposed activities.

4.2.2 Huntington Beach Terminal

<u>Monarch butterfly</u>

The closest habitat, including feeding sites, for the monarch butterfly is approximately 0.25 mile from the Huntington Beach Terminal. There are no trees located on the property; therefore, this species is not expected to be present on the property and would not be impacted by the proposed activities.

4.2.3 Mitigation Measures

No significant impacts to biological resources are expected to occur as a result of construction or operation of the proposed project. Therefore, no biological mitigation is necessary or proposed.

4.3 Cultural Resources

Impacts to cultural resources would be considered significant if:

- The project results in the disturbance of a significant prehistoric or historic archaeological site or a property of historic or cultural significance to a community or ethnic or social group.
- Unique paleontological resources are present that could be disturbed by construction of the proposed project.

4.3.1 Project Impacts

Project implementation will result in minor ground-disturbing activities, but no significant adverse impacts to equipment and structures over 50 years of age, which may be culturally significant, are anticipated to occur at the Refinery or at Montebello, Van Nuys, and Huntington Beach Terminals. Therefore, no impact to prehistoric or historic cultural resources is anticipated for these project sites.

Ground disturbance will occur at the project sites as a result of the construction of storage tanks and spheres, rail-loading facilities, and other equipment requiring foundations. As discussed in Section 3.3, a SCCIC records search was performed for the Refinery and three distribution terminals. The SCCIC record search identified one archaeological site, CA-ORA-372 (also known as CA-ORA-595 and CA-ORA-363), within the Huntington Beach Terminal boundaries. This archaeological site is described as highly disturbed; however, an archaeological reconnaissance to evaluate this site's condition relative to current professional standards has not been conducted. No archaeological sites were identified within a 0.25-mile radius of the Refinery, the Montebello Terminal, or the Van Nuys Terminal. The NAHC sacred lands file did not list any sacred lands within or adjacent to the four Chevron facilities.

Based on the SCCIC record search, it is unlikely that ground disturbances related to the proposed project would significantly adversely affect cultural resources. However, none of the four Chevron facilities has been subject to site reconnaissances to evaluate the presence or absence of archaeological resources. Therefore, prior to mitigation, impacts to cultural resources are considered to be significantly adversely affected by the proposed project.

4.3.2 Mitigation Measures

Based on the record search results and the lack of previous archaeological investigation within the four Chevron facilities, the following measures are proposed to alleviate potential impacts to cultural resources, if they are encountered, to a less than significant level.

<u>Mitigation Measures for the Huntington Beach Terminal</u>

CR-1: If project implementation will result in ground disturbance within CA-ORA-372's recorded boundaries, a limited Phase II evaluation of the archaeological site shall first be conducted. A Gabrielino/Tongva consultant shall be retained to monitor any such archaeological excavation.

<u>Mitigation Measures for All Stages Of Project Construction for All Four Facilities</u>:

CR-2: In the event that archaeological resources are unearthed during project construction, all earth-disturbing work within the vicinity of the find must be temporarily suspended or redirected until an archaeologist has evaluated the nature and significance of the find. After the find has been appropriately evaluated and if necessary catalogued and/or removed, work in the area may resume. A Native American representative will be retained to monitor any mitigation work associated with prehistoric cultural material.

CR-3: If human remains are unearthed, State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the NAHC.

With the implementation of these mitigation measures, the potential for impacts to cultural resources can be reduced to an insignificant level.

4.4 Geology and Soils

Geologic and seismic conditions will be considered significant if any of the following conditions are met:

- Earthquake-induced ground motion occurs that is capable of inducing catastrophic structural failure of the major components of the proposed project.
- Secondary seismic effects occur, (i.e., earthquake-induced ground failure or liquefaction-related failure).
- Topographic alterations occurs that result in significant changes that may include alterations such as visual degradation, soil erosion, and drainage alteration.
- Disturbance of large volumes of soil contaminated by petroleum hydrocarbons or other hazardous constituents occurs.

4.4.1 Construction Impacts

Construction will require grading and excavation at all four of the project sites. Grading and excavation activities have the potential to cause topographic alterations and secondary seismic effects.

4.4.1.1 Expansive Soil

In general, the uppermost four to 10 feet of soil materials at the Refinery and three distribution terminals are comprised of granular alluvial materials and sandy, silty artificial fills, none of which tends to show significant soil expansion. Accordingly, these soil types do not typically create soil expansion problems. Therefore, construction-related activities at the project sites are not expected to create significant soil expansion impacts.

4.4.1.2 Erosion

Erosion from wind or water could occur during construction activities (such as grading, trenching, backfilling, or other surface soil disruptions). A construction plan will be prepared for the proposed project construction and will include guidance on erosion control measures. In addition, a project SWPPP will be prepared to comply with the requirements of the RWQCB to minimize stormwater and sediment from the project sites. These plans will be designed to prevent or minimize erosion, sedimentation, water runoff, and fugitive dust generation. The procedures to be outlined in these plans will complement, and are compatible with, the air quality requirements for control of fugitive dust.

In general, erosion does not occur at the Refinery as most of the exposed ground surface has been sprayed with an asphalt emulsion to control erosion from wind and water. However, temporary control measures to minimize soils erosion will be implemented during construction (Section 4.4.3).

4.4.2 Operational Impacts

4.4.2.1 Seismicity - Ground Rupture

Some areas in southern California are noted for earthquake-induced ground rupture and are identified as part of the Alquist-Priolo Special Study Act. Although located nearby, the project sites are not included within the earthquake fault zones delineated. Therefore, the risk to the project sites due to earthquake-induced ground rupture is considered insignificant.

4.4.2.2 Seismicity - Ground Shaking

The use of standard engineering practices for building within any seismically active area, such as the areas which encompass the four project sites, requires that the project design and construction practices adhere to appropriate earthquake safety codes. Chevron will adhere to the current Uniform Building Code (UCB). With implementation of the proper design and construction practices, no seismic (e.g., ground shaking) significant impacts are expected from the proposed project.

4.4.2.3 Seismicity - Liquefaction

Liquefaction is a mechanism of ground failure whereby earthquake-induced ground motion transforms loose, water-saturated granular material to a liquid state. Of the four project sites, only the Van Nuys Terminal has been identified by the CDMG as an area that has the potential for permanent ground displacements due to liquefaction. Previous geotechnical investigations at the site demonstrate that the site is underlain by unconsolidated sands and silts, with a shallow groundwater table (less than 40 feet deep). These subsurface conditions, combined with the regional active seismicity, support the probability of liquefaction occurring at the site. Therefore, appropriate measures are necessary to mitigate the potential liquefaction hazard at the Van Nuys Terminal.

4.4.2.4 Seismicity - Slope Stability

None of the four project sites is identified by the CDMG as being in an area that has the potential for permanent ground displacements due to earthquake-induced landslides or heavy precipitation events. From the CDMG Guidelines, this means that regional information suggests that the probability of a seismic hazard requiring mitigation is not great enough to warrant further action. Therefore, no significant adverse landslide hazards at the project sites are anticipated and mitigation measures will not be necessary.

4.4.2.5 Subsidence

The four project sites have not been affected by significant historic ground subsidence, nor are they expected to experience significant subsidence in the future. The typical geologic conditions leading to subsidence, such as under-consolidated materials, collapsible soils, Karst terrain, etc., are not present at the proposed project sites, with the exception of the Van Nuys Terminal. The Van Nuys Terminal has the potential to experience subsidence due to the potential for liquefaction, as discussed in Section 4.4.2.3.

4.4.3 Mitigation Measures

There is the potential for adverse impacts from geological hazards as a result of construction and operation of the proposed project. Specifically, there is the potential for erosion from wind or water during construction activities (such as grading, trenching, backfilling, or other surface soil disruptions); the potential for significant earthquake-induced ground motion from earthquakes; and the potential for liquefaction/subsidence at the Van Nuys Terminal.

The following mitigation measures have been identified to address the potential for erosion during construction.

- GS-1: Erosion control measures will include limiting the size of soil stockpiles, minimizing disturbed soil surface area, and compacting soils as soon as practicable after surface preparation. Exposed soil areas will be covered or watered at least twice daily. In addition, approved soil stabilizers/binders will be applied in accordance with manufacturer's instructions.
- GS-2: Trucks hauling gravel, sand, or soil will be covered and will maintain adequate freeboard (i.e. vertical distance between the top of the load and the top of the trailer) to prevent the release of wind-entrained particles.

The following mitigation measure has been identified to address the potential for liquefaction at the Van Nuys Terminal, and the potential at the project sites for significant earthquake-induced ground motion.

- GS-3: All project components will employ project design and construction practices that adhere to appropriate earthquake safety codes and the current UCB. Some UBC suggested mitigation methods for liquefaction include ground stabilization, selection of appropriate foundation types and depths, selection of appropriate structural elements to accommodate anticipated displacements, or any combination of these methods.

With proper design and construction, it is expected that the potential hazard due to liquefaction and ground motion can be mitigated to insignificance.

4.5 Hazards

This section addresses potential hazards and risk of upset scenarios associated with the proposed project, and it documents the incremental potential adverse impacts that the project may have on the community or environment if an upset were to occur. The major potential hazards that proposed project reviewed include toxic releases, explosions, and fires. Appendix D provides the hazard modeling technical attachment.

The potential for a risk of upset being deemed significant for the project would be dependent on the likelihood of any of the following conditions being met:

<u>Codes and Standards</u>

- Noncompliance with any applicable design code or regulation
- Nonconformance to National Fire Protection Association standards
- Nonconformance to regulations or generally accepted industry practices related to operating policies and procedures concerning the design, construction, security, leak detection, spill containment, or fire protection

<u>Design Criteria</u>

- Increased risk of offsite fatality or serious injury
- Substantial exposure to a hazardous chemical
- Significant exceedance of the U.S. EPA risk management exposure endpoints offsite

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

Examples of regulations and standards governing equipment design include:

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

The standards noted above and other applicable design standards will govern the design of mechanical equipment, such as pressure vessels, tanks, pumps, piping, and compressors, and do not need to be analyzed further in the hazard analysis. Adherence to codes will be verified by the appropriate local city building inspector for each city in which project construction or modification is occurring before the improvement becomes operational. These include:

- City of El Segundo for the Refinery;
- City of Montebello for the Montebello Terminal;
- City of Los Angeles for the Van Nuys Terminal; and
- City of Huntington Beach for the Huntington Beach Terminal.

The following hazard analyses concentrate on potential upset scenarios that may result in risk of serious injury or substantial chemical exposure. The analyses present the estimated likelihood of occurrence and the potential consequences associated with each scenario. The primary focus is on potential impacts to the environment or the community outside of the facility. The range of the impact beyond the fence line is estimated for each scenario.

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

The proposed project will allow Chevron to phase out MTBE from reformulated gasoline and to produce gasoline that complies with CARB Phase 3 fuel specifications. The project will involve the installation of new units and the modification of existing units at the Refinery. Also, the project will change the methods of delivery for fuel additives (such as ethanol) and change the operations at three distribution terminals. The project will require that ethanol blending be performed at the terminal facilities and pentane storage be done at the Refinery. Ethanol will arrive by ship at the Port of Los Angeles and will be off-loaded at a third-party marine terminal. Ethanol will then be shipped to three Chevron distribution terminals by tanker truck from the third-party marine terminal. Additionally, ethanol will be transported into the area by train to the Montebello Terminal and then sent by tanker truck to the Huntington Beach and Van Nuys Terminals.

A hazards analysis is site-specific and depends upon the type of equipment that could generate the hazard, the hazardous materials used, the location of sensitive receptors, etc. Since the third-party marine terminal site is currently not known, the offsite exposure to a release at the third-party marine terminal cannot be computed at this time. If required, the analysis of hazards associated with delivery by ship and offloading at the third-party terminal will be the responsibility of the owner/operator of the third-party marine terminal. Hazards associated with the transfer of ethanol to Chevron by tanker truck from the third-party marine terminal have been analyzed by Chevron.

For the risk of upset analysis, primary consideration was given to the effect of changes related to the proposed project and its incremental impacts. Incremental impacts were estimated by comparing the results of worst-case upsets for the proposed systems with the estimated impacts that could have resulted from upsets for current gasoline production. Increments were estimated for chemical substitutions that were proposed for use in existing pipelines or processes and when new products were proposed for storage in tanks that formerly contained other products. For completely new units or operations, the estimated impact of the new elements was compared to a zero baseline.

4.5.1 Overview of Approach

The hazard analysis addresses only processes that are being added or modified as a result of the proposed project. The analysis has been conducted in five steps:

1. Review Potential Hazards
2. Categorize Risk
3. Select Specific Scenarios
4. Estimate Likelihood of Accidents
5. Assess Consequences

Each step is described in detail in Sections 4.5.3 through 4.5.7.

4.5.2 Hazards Associated with the Project

The primary hazardous chemicals associated with the project are pentane, ethanol, and assorted catalysts. Pentane is a regulated substance under the federal RMP and the CalARP programs. There are several other chemicals used onsite, such as hydrogen, butane, ammonia, gasoline, and the like, but these would not increase significantly or be changed in the location of their storage, use, or mode of transport due to this project. The hazard analysis is concerned with the potential increase of risk due to modifications or new equipment related to the proposed project.

One of the main objectives of the proposed project is the replacement of MTBE with ethanol. MTBE is more flammable and reactive than ethanol and almost twice as much MTBE is required to accomplish oxygenation of the fuel as would be required with ethanol. Operations, storage, and processes that substitute MTBE with ethanol would be less hazardous than before due to smaller volume, lower flammability, and lower reactivity of the ethanol. This would include ship or barge operations, loading, off-loading, and transfer by tanker truck, and storage at the terminals. For substituted operations, detailed hazard assessments are unnecessary since ethanol has a lower impact than MTBE. For new operations, such as shipping pentane to or storing pentane at a new location that did not receive pentane before, the incremental risk of the transfer and storage has been estimated. For storage of ethanol in tanks converted from hydrocarbon service, a comparison has been made between the risk of ethanol and the risk of storing the former products. In general, ethanol has about half the radiant energy output of diesel or gasoline in a fire and up to 18 percent less range to the explosion endpoint than diesel or gasoline. Operations involving hazardous chemicals at the Refinery and terminals have been reviewed to define scenarios in order to estimate incremental impacts.

4.5.2.1 Refinery

The proposed project at the Refinery consists almost entirely of new equipment and modifications to existing processing units. The modifications can be categorized into the following four components:

- Elimination of Ether Blending (Phasing Out MTBE)
- Gasoline Vapor Pressure Reduction
- Gasoline Sulfur Reduction
- Maintain Gasoline Volume

Each of these areas and the related proposed project modifications are discussed in the following subsections.

Elimination of Ether Blending (Phasing Out MTBE)

MTBE and TAME are currently produced in the Refinery for oxygenate blending. Additional MTBE is imported by ship. Ether blending would cease and would be replaced by ethanol blending at the distribution terminals. Ether production would also cease. The MTBE plant would be shut down and portions of the equipment converted to other uses. The TAME plant would be shut down and converted to other uses.

The purpose of the TAME Plant modifications is to remove idled equipment from service in response to the gasoline ether ban. Some of the equipment would be reused in other services and the remaining equipment would be dismantled to make room for new equipment. Methanol, which is currently used in the TAME process, would no longer be used. No incremental risk will be produced by these modifications. New processes located to the TAME area should produce risks that are comparable to the TAME processes.

Gasoline Vapor Pressure Reduction

Alkylate and Isomax light gasoline are currently blended directly into gasoline. Pentanes would be separated from the Alkylate and Isomax light gasoline and routed to a new storage sphere. The pentanes would be blended directly into gasoline when allowable, mixed with heavy gasoline, stored or shipped out of the Refinery by rail, or sent to a local power plant or used in the Refinery as fuel. The following projects are related to gasoline vapor pressure reduction. The potential for hazard risks from specific modifications are discussed in the following sections.

Alkylate Depentanizer

The purpose of the Alkylate Depentanizer is to remove pentanes from alkylate to meet the lower gasoline vapor pressure requirements. The Alkylate Depentanizer would utilize an existing distillation column, located in the TAME Plant area, which would be retrofitted for the new service. The retrofit distillation column would be in the same service as the existing columns in the TAME area. While the risks associated with individual columns may vary within a given operating unit, the incremental variation in risk between columns is typically less than the ability of the modeling technique to resolve those differences in risk. For the model used (RMP*Comp), the resolution is to the nearest 0.1 mile (160 meters) with a minimum reportable distance of 0.1 mile. Therefore, the risk for the modified distillation column is assumed to be comparable to that for the existing facility and no incremental risk was estimated for the modification.

Isomax Light Gasoline Depentanizer

The purpose of the Isomax Light Gasoline Depentanizer is to remove pentanes from light gasoline to meet the lower gasoline vapor pressure requirements. The Depentanizer column would be an existing column located in the MTBE plant. The incremental risk of the new column has been estimated (Section 4.5.7).

FCC Light Gasoline Depentanizer

The purpose of revamping the FCC Light Gasoline Depentanizer is to improve its removal efficiency of pentanes and pentenes from light gasoline to meet lower gasoline vapor pressure requirements. The FCC Light Gasoline Depentanizer, an existing distillation column, separates pentanes and pentenes from FCC Light Gasoline for feed to the TAME Unit. Modifications would be made to improve the separation efficiency of the distillation column. A second reboiler would be added in parallel with the existing reboiler, and the existing trays would be replaced with higher efficiency trays. The new reboiler would have a risk comparable to that for the existing reboiler. Since both reboilers would be unlikely to fail simultaneously, the addition of the second reboiler does not change the potential risk associated with the reboiler failure, but rather the probability of that failure. However, the probability of failure is very small and the addition of the second reboiler does not significantly change that probability.

Pentane as a Cogeneration Turbine Fuel

Excess pentanes would be used as a fuel in the Cogeneration Trains A and B. Using pentanes as fuel would replace an equivalent amount of natural gas that is presently consumed by the cogeneration trains. The incremental risk of using pentanes as a fuel in the cogeneration trains has been compared to a natural gas baseline (Section 4.5.7).

Pentane Storage Sphere and Export Railcar Load Rack

The purpose of the Pentane Storage Sphere is to provide intermediate storage for pentanes removed from gasoline for vapor pressure control. The purpose of the rail facilities is to facilitate movement of excess pentanes from the Refinery in the event pentanes are not used as fuel in the cogeneration turbines. Pentanes separated from their source streams would be stored in a pressure storage sphere. Excess pentanes would be exported from the Refinery by rail.

The new pentane storage sphere would have the capacity to store 30,000 bbls of pentane, and would include pumps for rail car loading, pipeline shipment, and blending. The rail loading rack would include loading spots for 10 rail cars. The risk of fires and explosions has been estimated for the pentane storage tank, for a pentane pipeline rupture, and for a pentane railcar accident. Since these are new operations involving pentane, the risks have been compared with a zero baseline (Section 4.5.7).

Additional Gasoline Storage

In order to minimize the volume of pentanes exported from the Refinery, some pentanes would be blended with Isomax heavy gasoline and stored in conventional floating roof tankage. Blending with heavy gasoline reduces the vapor pressure of the pentane-gasoline mix to the point where it can be stored in non-pressurized aboveground storage tankage. An existing MTBE tank would be converted to gasoline storage, and an additional storage tank would be constructed. The incremental risk of the MTBE tank and the MTBE tank after conversion to gasoline have been compared with each other. The risk of the newly constructed gasoline tank has been compared with a zero baseline (Section 4.5.7).

Alkylation Unit

The purpose of the Alkylation Unit modification would be to provide capacity to process the increased olefin available from the FCC to reduce gasoline production losses due to the production of CARB Phase 3 gasoline. Oxygenate phaseout would increase the feed to the Alkylation Unit by shutting down the reaction portion of the TAME Plant. An increase in FCC feed rate would increase the available Alkylation Plant feed, which could be used to reduce gasoline production losses from production of CARB Phase 3 gasoline. The following two modifications would be made to handle the increased feed rate.

- **Retray the Deisobutanizer and Debutanizer**

  Retraying the Deisobutanizer and Debutanizer would involve replacing the existing trays with higher capacity trays. No external modifications would be required. No potential incremental offsite impact is expected from this change as the incremental change in risk is less than the ability of the modeling technique to resolve differences in risk. The trays in the existing Alkylation Plant Deisobutanizer would be replaced to provide additional Alkylation Unit capacity. The Alkaline Water Wash exchangers would be modified or replaced to compensate for the increased alkylate production. No potential incremental offsite hazard impact is expected from this change.

- **Reactivate C-1 (existing column) as a Utility Deisobutanizer**

  Currently, mixed butanes are fed to the front end of the Alkylation Unit, and the Butamer product is fed to the Alkylation Unit Deisobutanizer. These streams increase the fractionation load on the Alkylation Unit Deisobutanizer and Debutanizer, as well as the Alkylation Unit reaction section. An idle deisobutanizer would be returned to service to help unload the Alkylation Unit by removing normal butane for recycle directly to the Butamer Unit. The column and associated equipment would be refurbished, and a new cooling tower would be installed to supply cooling water to this equipment. The refurbished distillation column would be in similar service to the other columns in the Alkylation Unit. While the risks associated with individual columns may vary within a given operating unit, the incremental variation in risk between columns is typically less than the ability of the modeling technique to resolve those differences in risk. Therefore, the risk for the refurbished distillation column is assumed to be comparable to that for the existing facility, and no incremental risk was estimated for the modification.

Gasoline Sulfur Reduction

FCC light gasoline is currently blended directly into gasoline. The FCC light gasoline would be separated into light and heavy fractions, with the heavy fraction going to NHT-3 for hydrotreating to remove sulfur compounds and the light fraction going directly to gasoline blending.

Currently, NHT-3 shares the straight-run naphtha-treating load with NHT-1. (NHT-2 treats a small mixed butane-pentane-hexane stream.) Refinery naphtha from the crude units and Coker would be routed to NHT-1 for processing, freeing up NHT-3 for FCC gasoline hydrotreating service. The existing feed furnace at NHT-1 would be replaced with a larger, more efficient furnace, and additional heat exchangers would be installed.

The following projects are related to reducing the sulfur content of the Refinery gasoline. Their potential for risks are discussed in the following subsections.

FCC Light Gasoline Splitter

The purpose of the FCC Light Gasoline Splitter is to segregate the highest sulfur portion of the light gasoline for subsequent sulfur removal to meet the lower gasoline sulfur requirements. Currently, FCC light gasoline is blended directly into gasoline. The FCC Light Gasoline Splitter would separate the light gasoline into two streams, with the bottoms product containing most of the sulfur. The bottoms product would be sent to NHT-3 for hydrotreating.

The FCC Light Gasoline Splitter would consist of a new distillation column located in the TAME area. The new column would be in the same service as the existing columns in the TAME area. While the risks associated with individual columns may vary within a given operating unit, the incremental variation in risk between columns is typically less than the ability of the modeling technique to resolve those differences in risk. Therefore, the risk for the new distillation is assumed to be comparable to that for the existing facility and not incremental. In the same manner, the treatment of the bottoms from the new distillation column would be similar to that for the existing column to be removed. Given the similar nature and service of the columns, the incremental risk is expected to be less than the ability of the modeling technique to resolve those differences in risk. Therefore, the incremental risks from the bottoms processing is assumed to be comparable to that for the existing facility. No incremental impact has been estimated.

NHT-1

The purpose of upgrading the NHT-1 is to allow it to process the Refinery naphtha and permit NHT-3 to process FCC gasoline for sulfur removal. Currently, NHT-1 and NHT-3 share the Refinery naphtha-treating load. Because NHT-3 will be in FCC gasoline treating service, all of this naphtha would need to be processed in NHT-1. NHT-1 operating time would increase with CARB

Phase 3 gasoline, but the total amount of refinery naphtha treated would remain the same. The fire and explosion impact of the hydrotreater unit should be comparable with the pre-upgrade impact of NHT-1. The total contents at any time should be approximately the same before and after the upgrade, even though the capacity has increased. No incremental impact has been estimated.

A major modification to NHT-1 would be replacement of an existing feed furnace with a new, larger, more efficient furnace. Environmental controls would include SCR control for NO_x reduction on the furnace flue gas. Additional fin-fan heat exchangers would also be added. The SCR of the upgraded furnace will utilize aqueous ammonia injection, which is a new application for this unit. The unit would utilize aqueous ammonia that is currently produced from anhydrous ammonia generated at the plant. No increase in ammonia production would be caused by this project. Aqueous ammonia has a lower hazard risk than the existing anhydrous ammonia from which it is produced, so the toxic impact of an accidental release of aqueous ammonia for the SCR has not been estimated.

NHT-3

The purpose of the change in service for NHT-3 is to remove sulfur from the FCC gasoline to meet lower gasoline sulfur requirements. NHT-3 operation would change with CARB Phase 3 gasoline. Currently, NHT-3 receives feed naphtha from the crude units. NHT-3 would be dedicated to hydrotreating FCC gasoline and will normally be unavailable for processing crude unit naphtha. No modifications to NHT-3 would be required to meet the new operation. While the service in the NHT-3 column would change from naphtha to gasoline, the risks from failure of the distillation columns are roughly comparable. The incremental change in risk hazard (as defined by the distance to threshold) is expected to be less than the 0.1-mile resolution of the RMP*Comp model. Therefore, the risk for the modified distillation column is assumed to be comparable to that for the existing facility and no incremental risk was estimated for the modification.

Maintain Gasoline Volume

Expansion of the FCC from the current capacity of about 65 MBPD to 71 MBPD would allow the Refinery to produce additional intermediate FCC gasoline products that would help to reduce the gasoline production shortfall resulting from MTBE and pentane removal. To minimize the loss of gasoline production volume from ether phaseout and vapor pressure reduction, the Refinery is proposing a number of changes at the FCC and Alkylation Unit.

FCC Expansion

The FCC would be modified to increase the current feed rate from about 65 MBPD to 71 MBPD. The elements of the FCC expansion would include FCC air blower modifications, FCC WCG interstage system modifications, FCC Gas Recovery Unit revamp (including new Debutanizer, Depropanizer, and propane/propylene treating), and modifications at the Alkylation Unit. Each of these modifications is discussed in the following subsections.

- **FCC WGC Interstage System**

  The FCC WGC interstage cooling and separation facilities would be modified or replaced to accommodate the higher FCC feed rate. The new compressor interstage system would include coolers, a knockout drum, and pumps to replace the existing equipment. The modified WGC interstage cooling and separation facilities are expected to have roughly comparable risks to that of the existing equipment. The incremental change in risk hazard (as defined by the distance to threshold) is expected to be less than the 0.1-mile resolution of the RMP*Comp model. Therefore, the risk for the modified distillation column is assumed to be comparable to that for the existing facility and no incremental risk was estimated for the modification.

- **FCC Deethanizer**

  The capacity of the existing deethanizer would be supplemented by adding a second deethanizer in parallel with the existing deethanizer by modifying an existing column, which is currently in debutanizer service and was formerly the main deethanizer. The overhead condensers, reflux drum, and related equipment associated with this column would be removed from service. While there are small differences in risk between distillation columns in deethanizer and debutanizer service, the risks from failure of the distillation columns are roughly comparable. The incremental change in risk hazard (as defined by the distance to threshold) is expected to be less than the 0.1-mile resolution of the RMP*Comp model. Therefore, the risk for the modified distillation column is assumed to be comparable to that for the existing facility and no incremental risk was estimated for the modification.

- **FCC Debutanizer**

  A new debutanizer would be installed to accommodate the higher FCC feed rate and improve fractionation. This column would replace three smaller columns currently in this service, and would be located in the existing TAME Plant area. The associated equipment will include a condenser, reflux drum, reboiler, feed/effluent exchangers, and associated product coolers, pumps, and piping. One of the idled columns would be reused as a deethanizer. The incremental impact of the new column has been compared with the three columns that would be replaced (Section 4.5.7).

- **FCC Depropanizer**

  A new depropanizer would be installed to accommodate the higher FCC feed rate. The new depropanizer would replace three smaller columns currently in this service, and would be located in the existing TAME Plant area. The associated equipment would include a condenser, reflux drum, reboiler, and associated product coolers, pumps, and piping. The incremental impact of the new column has been compared with the three columns that would be replaced (Section 4.5.7).

- **FCC C3 Treating**

  The new FCC C3 (propane/propylene) caustic treating facilities would replace existing treating facilities, and would be located in the existing TAME Plant area. They would use the same treating configuration as the existing facilities, which includes amine treating for H_2S removal followed by batch caustic treating for mercaptan removal and water washing for trace caustic removal. The existing caustic treating facilities, located in the FCC area, would be dismantled. The new caustic treatment facilities are comparable to the old and would not pose an incremental offsite impact.

- **FCC Main Air Blower Rotor Upgrade**

  The existing FCC main air blower rotor would be upgraded to provide additional air flow to the FCC regenerator to accommodate the higher FCC feed rate. No potential offsite impact is expected from this change because it does not involve hazardous, flammable, or explosive materials.

- **FCC Stack Emissions Reduction**

  An SCR emissions reduction system would be installed to process the FCC flue gas to reduce NO_x and CO emissions. The SCR unit would utilize aqueous ammonia that is currently produced from anhydrous ammonia generated at the plant. No increase in ammonia production would be caused by the project. Aqueous ammonia has a lower hazard risk than the existing anhydrous ammonia from which it is produced, so the toxic impact of an accidental release aqueous ammonia for the SCR has not been estimated.

- **FCC Relief System/Vapor Recovery System**

  The FCC relief system would be modified to accommodate the relocated (TAME area) FCC Gas Recovery Unit equipment. This modification would include new relief system piping and new vapor recovery compressors. The new piping for the FCC relief and vapor recovery system would be similar to that currently in service. The amount of vapor recovered in the system would not change significantly, and therefore the potential hazard from explosion or fire does not change significantly. No potential offsite hazard impact is expected from this change.

4.5.2.2 Terminal Improvements

The properties of MTBE are such that the MTBE can be blended into gasoline at the Refinery and distributed through a pipeline distribution system. Unlike MTBE, ethanol has a high affinity for water so the gasoline and ethanol must remain separated until the point of retail delivery. The following sections describe the addition of ethanol storage and blending facilities that are required at Chevron's three distribution terminals in the Los Angeles Basin to keep the ethanol and gasoline separate until retail delivery.

Montebello Terminal

Improvements planned for the Montebello Terminal include new piping, new ethanol loading and off-loading pumps, a new ethanol storage tank and foundation, two new 12-foot by 70-foot concrete pads for containment and drainage, and two new ground systems for the ethanol unloading area. Additionally, a new rail spur with storage for 12 rail cars will be constructed. The loading rack and existing tanks have fire protection installed. However, new foam piping would be installed on the new ethanol tank.

- Blending gasoline with ethanol does not create a significant risk. Ethanol is less flammable than the gasoline it is added to. No risk estimates are required for this the project component.
- Pumping ethanol-blended gasoline internally via pipeline to local truck loading equipment has a comparable risk relative to pumping MTBE gasoline internally. No risk estimates are required for this project component.
- Shipping ethanol-blended gasoline to retail facilities has a comparable risk relative to the current shipping of MTBE gasoline. No risk estimates are required for this project component.
- Shipping of ethanol via tank truck to the terminal is a new operation and the new risk of fire has been estimated (Section 4.5.7).
- Shipping of ethanol via rail car to the terminal is a new operation and the new risk of fire has been estimated (Section 4.5.7).
- The new ethanol storage tank introduces a new risk that was not at the terminal previously; and thus, the risk has been estimated (Section 4.5.7).

Van Nuys Terminal

The improvements at the Van Nuys Terminal include new piping and new ethanol off-loading pumps to off-load the ethanol from tanker trucks into two existing storage tanks. The storage tanks would be converted from gasoline service to ethanol service. New ethanol loading pumps would also be required to blend ethanol into tanker trucks along with CARB Phase 3 gasoline blendstock. No modifications to vapor recovery units or fire protection systems would be required at the Van Nuys Terminal.

- Blending gasoline with ethanol does not create a significant risk. Ethanol is less flammable than the gasoline it is added to. No risk estimates are required for this the project component.
- Pumping ethanol blended gasoline internally via pipeline to local truck loading equipment has a comparable risk relative to pumping MTBE gasoline internally. No risk estimates are required for this project component.
- Shipping ethanol-blended gasoline to retail facilities has a comparable risk relative to current shipping of MTBE gasoline. No risk estimates are required for this project component.
- Shipping of ethanol via tank truck to the terminal is a new operation and the new risk of fire has been estimated (Section 4.5.7).
- Gasoline storage tanks converted to ethanol storage have lower risk than gasoline storage tanks. No risk estimates are required for this project component.

Huntington Beach Terminal

Improvements at the Huntington Beach Terminal include new piping, ethanol loading and off-loading pumps, and conversion of one existing diesel storage tank to ethanol service. Ethanol unloading would not be metered. The loading system and existing storage tank at the terminal have fire protection installed.

- Blending gasoline with ethanol does not create a significant risk. Ethanol is less flammable than the gasoline it is added to. No risk estimates are required for this project component.
- Pumping ethanol-blended gasoline internally via pipeline to local truck loading equipment has a comparable risk relative to pumping MTBE gasoline internally. No risk estimates are required for this project component.

- Shipping ethanol-blended gasoline to retail facilities has a comparable risk relative to current shipping of MTBE gasoline. No risk estimates are required for this project component.
- Shipping of ethanol via tank truck to the terminal is a new operation and the new risk of fire has been estimated (Section 4.5.7).
- Diesel storage tanks converted to ethanol storage have lower risk than diesel storage tanks. No risk estimates are required for this project component.

4.5.3 Review Potential Hazards

Most industrial accidents may be classified within one of several broad categories that have been developed by the American Institute of Chemical Engineers (AIChE, 1989 and AIChE, 1993). These broad categories and their applicability to the proposed project are described in the following subsections.

4.5.3.1 Toxic Gas Release

Toxic gas releases are usually a concern in evaluating potential accidents at petrochemical facilities. Toxic gas releases are evaluated in terms of possible acute exposures, taking into account the potential for the gas to be transported offsite by the wind. The consequences of such potential releases depend on the specific gas released, the rate of release, the duration of the release, and the atmospheric dispersion and transport conditions. For the proposed project, no direct toxic gaseous release scenarios have been identified. Although toxic chemicals, such as ammonia, hydrogen sulfide, sulfuric acid, etc., are typically present at the Refinery, this project does not introduce any new chemicals or modify existing equipment that would incrementally increase the toxic gas risk above the existing risk.

A number of catalysts are associated with the new project. The compositions of individual catalysts used in a given process are typically trade secrets and are therefore not available for review. Catalysts tend to contain heavy metals and other hazardous substances in small quantities and would pose a threat of toxic gas exposure if released. However, catalysts are typically in the form of solid pellets that are not flammable. Therefore, the significant release of catalysts to the air would require a catastrophic failure of a piece of equipment or unit by fire or explosion. The risk from the catastrophic failure itself would be a more severe scenario than would the release of the small amount of AHM in the catalyst associated with the catastrophic failure. For these reasons, toxic gas releases are not applicable to this project.

4.5.3.2 Toxic Liquids Release

Toxic liquid can be released in two forms, as a liquid spill or as aerosol droplets. Liquid spills are typically contained within berms, dikes, or similar containment designed to prevent runoff. Potential offsite hazards could result from evaporation of spilled products and transport of these gases offsite. Consequences of such a spill depend upon several factors such as the location of the spill within the property, the surface area of the spill, the surface on which the spill occurs, the concentration of the liquid, and atmospheric conditions such as wind and temperature. Liquids primarily used in this project are flammable and explosive. Ammonia is currently produced onsite; some ammonia would be diluted and piped as 28-percent aqueous ammonia for use with the new NO_x control units that are associated with this project. An accidental release of aqueous ammonia is less severe than the release of a similar amount of anhydrous ammonia. As no increase in ammonia production will be caused by the proposed project, the conversion of ammonia from anhydrous to aqueous is consistent with a reduction in risk of a spill as aqueous ammonia has a lower hazard risk potential than anhydrous ammonia. Therefore, no toxic liquids incremental impacts have been estimated for this project.

4.5.3.3 Toxic Solids Release

A spill of toxic solids would have little potential to affect people outside the boundaries of the project facilities, as there are few reasonable transport mechanisms for solids. A potential for offsite hazards could occur if the spilled materials were to catch fire, be introduced to the storm water system, or be carried by wind. Consequences would be determined by characteristics and quantity of the released material and atmospheric conditions. A number of catalysts are associated with the new project. The compositions of individual catalysts used in a given process are typically trade secrets and are therefore not available for review. Catalysts tend to contain heavy metals and other hazardous substances in small quantities and would pose a threat of toxic gas exposure if released. However, catalysts are typically in the form of solid pellets that are not flammable. Therefore, the significant release of catalysts to the air would require a catastrophic failure of a piece of equipment or unit by fire or explosion. Such a failure would not result in a toxic solid release. In any case, the risk from the catastrophic failure itself would be a more severe scenario than would the release of the small amount of AHM in the catalyst associated with the catastrophic failure. For these reasons, toxic solid releases are not applicable to this project.

4.5.3.4 Gas Fire

Several combustible, potentially gas-phased materials would be present in the various components of the project, including propane, butane (which is a gas at normal temperatures and pressures), refinery gas, natural gas, and hydrogen. The “worse-case” quantities of gas associated with this project are comparable with the existing systems. Because a refinery is such a large, complex facility, and the potential failure modes so numerous, only the most significant or catastrophic risks of failure can be assessed. The risks from smaller failures, while real, will in almost all cases be less than the risk from catastrophic failures of entire process units, storage systems, or major components.

The "worse-case" quantities of gases associated with the project are comparable to those at the existing refinery and risks are assessed for these "worse-case" quantities for specific gases and release scenarios. In general, the hazards associated with the rupture of a single large storage container, such as a pentane or butane storage sphere, are much greater than that from the rupture of a small-diameter line or a smaller capacity piece of process equipment containing the same substance. Therefore, the "worse-case" fire or explosion risks associated with a given gas typically are assessed for major component failure rather than for individual small pieces of equipment. Depending upon the scenario, the incremental risks are either negligible or are compared against a zero baseline.

4.5.3.5 Liquid Pool Fire

Combustible, liquid-phase materials that would be present in components of the project include gasoline, pentane, and ethanol. However, the risk of a liquid pool fire would be present only if a major storage tank rupture or pipeline rupture occurred and formed a pool. Pentane boils at 98^{o}F (37^{o}C). MTBE, which is being replaced by ethanol, boils at 130^{o}F (54.4^{o}C). Ethanol, which is replacing MTBE, boils at 170.6^{o}F (77^{o}C). A liquid fire would pose impacts to health and the environment due to thermal radiative effects and smoke. Radiative effects might include burns to humans and/or the ignition of nearby structures. The degree of such impacts depends on the proximity to the fire and the shelter available. Large storage tanks from which a prolonged fire could occur are usually surrounded with containment dikes and are usually located at a distance from process units (with ignition sources). The containment and distance serves to minimize the likelihood of a liquid spill igniting. Liquid fires have been modeled for storage tank ruptures into containment areas, for confined and unconfined tank truck ruptures, and for unconfined pipeline ruptures (Section 4.5.7).

4.5.3.6 Solids Fire

The potential for fire involving combustible solids is much lower than for liquids and gases, as solids combustion occurs only within a relatively narrow range of conditions. In the event of a fire, consequences are also typically less severe than a gas or liquids fire due to the smaller volumes involved. No solids fires have been considered in this analysis because the proposed project does not include the use of new or increased amounts of flammable solids.

4.5.3.7 Confined Explosion

A confined explosion would involve the presence of explosive conditions internal to the process equipment or storage tanks. The pentane storage tank at the Refinery is a pressurized spherical tank and does not contain sources of oxygen or ignition. Consequently, it has not been considered as a candidate for confined explosions. Most refinery systems are closely monitored with alarms or other warnings, which are triggered when the system conditions occur outside predefined tolerances. Process equipment explosions generally require failure in multiple safeguards. Process equipment also contains substantially less product than the storage tanks and so the magnitude of such explosions would be much less than for the non-process unconfined explosions. Confined explosions have been eliminated from consideration in this analysis.

4.5.3.8 Unconfined Explosion

An unconfined explosion may occur if a large mass of combustible material is released prior to ignition. These types of explosions occur following the release of flammable gases or mixtures of gases and liquid droplets, which subsequently evaporate. Unconfined explosions occur in ambient air when a release under proper conditions comes in contact with an ignition source. If the ignition occurs shortly after the release, the explosive effects are lessened and the result is a gas or liquid fire. Explosive effects include both thermal radiation effects (described also under fires) and blast effects. Depending on the severity of the explosion and proximity to the source, offsite effects can range from a loud noise to broken windows to possible structural damage. Persons within or near a building suffering such damage are at risk of injury.

Unconfined explosions have been modeled for scenarios involving tank ruptures of pentane and tank truck ruptures for ethanol with associated vapor cloud explosions (Section 4.5.7).

4.5.3.9 Dust Explosion

Combustible solids may also lead to explosions if a sufficient mass of fine particles are dispersed in the air and exposed to an ignition source. However, for refinery and petrochemical plants, these risks are much smaller than for potential releases and consequences of liquid and/or gaseous products. No dust explosion potential is associated with the project because the quantities of solid materials are limited compared to the amount of combustible liquid that is present, and because the proposed project does not include the use of new dust-producing solids with explosion potential, nor does it increase the use of flammable solids.

4.5.3.10 Boiling Liquid Expanding Vapor Explosion (BLEVE)

A BLEVE is a potentially catastrophic event usually associated with sudden, massive failure of a pressurized storage vessel. The resulting explosion may generate a blast overpressure wave with fragments of the vessel being projected long distances. If the material in the exploding tank is flammable, it may cause an immediate fireball or may form a vapor cloud that later ignites. The thermal radiation generated by a fireball can be considerable, and can be the predominant cause of potential offsite impacts. BLEVE cases have been considered for the pentane storage tank proposed for the project (Section 4.5.7).

4.5.4 Categorize the Risk

Risk is judged by identifying both the severity of the potential consequences and the likelihood of occurrence. Criteria for each of these components of risk are discussed in more detail in the following subsections.

4.5.4.1 Severity

Severity criteria must be defined separately for each type of consequence due to the physical differences in the effect of each event. The types of accidents considered in this evaluation include toxic releases, fires, and explosions. These hypothetical accidents could result in potential toxic gas exposure, heat impacts, and blast consequences. For each of these accidents, use was made of the U.S. EPA Risk Management Program Offsite Consequence Analysis Guidance to determine the endpoint. Endpoints for each accident category considered in this study are described in this section. The distance that had to be traversed away from the center of the upset to reach the endpoint was calculated for each accident scenario. This distance represents the maximum separation distance required to reach the edge of the critical zone of the impact. The edge of the critical zone is the outer limit of potentially serious injuries.

Toxic Exposure Endpoint

Toxic exposures are of concern when a process containing an AHM releases the material or when an upset causes the formation and subsequent release of a toxic material. For toxic compounds, the U.S. EPA has selected the Emergency Response Planning Guidelines (ERPG) (AIHA/ORC, 1988) Level II as its significance criterion. The ERPG II level is defined as follows:

> The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

Heat Evaluation Endpoint

Radiant heat is a potential hazard that can be associated with either fires or explosions. Radiant heat exposures are measured in units of kilowatts per square meter (kw/m^2). A level of five kw/m^2 was selected by the EPA Guidance document as a significance criterion. A heat level of five kw/m^2 for 40 seconds is capable of causing a second-degree burn. The same heat dosage produced by five kw/m^2 for 40 seconds was used to determine the endpoint for BLEVEs and pool fires.

Blast Evaluation Endpoint

Blast impacts are of concern wherever flammable materials and ignition sources are present, or where processes operate under high temperatures and pressures. Blast impacts are described in terms of overpressure (i.e., shock waves) and are presented in the American Institute for Chemical Engineering Guidelines for Hazard Evaluation Procedures (AIChE, 1993) and V.J. Clancey's Diagnostic Features of Explosion Damage (Clancey, 1972). The endpoint selected by the EPA as a significance criterion is an overpressure of one psi. An overpressure of one psi may cause partial demolition of houses, which can result in serious injuries to people and shattering of glass windows, which may cause skin laceration from flying glass.

4.5.4.2 Likelihood

The likelihood of an occurrence can be expressed as "Frequent," "Periodic," "Occasional," "Improbable," and "Remote." In qualitative terms, a "Frequent" likelihood is an event that would occur more than once a year. A "Periodic" likelihood is one that occurs once per decade. An "Occasional" likelihood is defined as an event that is likely to occur during the lifetime of the project, assuming normal operation, inspection, and maintenance programs (once in 10 to 100 years). An "Improbable" likelihood is considered to occur every 100 to 10,000 years (a major earthquake capable of rupturing pipelines and storage tanks would fall into this category). A "Remote" likelihood represents an event that is not likely to occur at all. Estimates of likelihood for specific scenarios are discussed in Section 4.5.7.

4.5.5 Select Specific Scenarios

The parameters for each upset scenario were selected based on previous experience with similar projects and using design information provided by Chevron. The parameters included pressure, temperature, composition, flow rates, piping and equipment sizes, and size and description of containment, including location within the Chevron facility. If information was missing for specific parameters (e.g., the area of containment dikes for storage tanks that have not been constructed yet), assumptions were made based on typical industry practice.

4.5.6 Estimate Likelihood of Accidents

Table 4.5-1 lists qualitative likelihood estimates for the events that can contribute to the selected hazard scenarios. The table also lists published data when available. The likelihood estimates were developed based on experience with similar projects. The likelihoods are categorized as Frequent, Periodic, Occasional, Improbable, and Remote as defined in Section 4.5.4.2.

Table 4.5-1
Qualitative and Quantitative Estimates of Failures that may Contribute to Hazardous Releases

Scenario	Likelihood (Qualitative)	Frequency
Tank failure from earthquake	Improbable/ Remote	The time between maximum earthquakes (approximately 6.9 Richter on the Newport-Inglewood fault) is about one per 1,000 years[1]. This applies to the Refinery and the Huntington Beach Terminal. For Montebello (approximately 6.6 Richter on the Whittier fault) and Van Nuys (approximately 7.1 Richter on the Oak Ridge fault or 6.9 Richter on the Sierra Madre-San Fernando fault), the time is about 300 years. Conservatively assume that all are about 300 years. Approximately one in ten spherical vessels fail for lateral accelerations >0.2g, which can be generated in such an earthquake[2]. (Bullets/tanks are less vulnerable and would fail less frequently.) The number of ruptures that result in explosions is approximately one in 40 based on relating data for catastrophic tank failures with explosions from catastrophic tank failures[3,4]. The combined tank failure and explosion probability is estimated to be one per 120,000 years. Fires would be of higher probability but less than one per rupture. (The combined tank failure and fire frequency is approximately one per 3,000 years to one per 120,000 years.)
Tank failure (catastrophic)	Improbable/ Remote	The catastrophic pressurized tank failure rate[4] is approximately one per 2,500 years. Failures are primarily due to cracks. Catastrophic failures that result in explosions are estimated to be one in 40 for a combined one per 100,000 years[3]. Fires would be of higher probability but less than one per rupture. (The combined fire and failure rate is approximately one per 2,500 years to one per 100,000 years.)
Pipe failure from earthquake	Improbable	The event frequency is approximately once per 300 years but the pipe may not rupture[1]. Assume the pipe failure rate in a maximum probable earthquake is one in ten as for tanks. The number of pipe failures that result in unconfined explosions is estimated to be one in ten (by relating failures and failures plus explosions) for a combined estimate of one per 30,000 years[3,4]. Fires would be of higher probability but less than one per rupture. (The combined fire and pipe failure rate is approximately one per 3,000 years to one per 30,000 years.)
Pipe failure (catastrophic)	Improbable	The catastrophic pipe failure rate[4] is approximately one per 1,000 years. The number of explosions for pipeline failures is estimated to be an average of one per ten failures (by relating failures with failures plus explosions) for a combined one per 10,000 years[3,4].
Truck accident	Improbable	Truck accident rates are approximately one per 8.7 million miles[5]. Assuming 14,235 truck deliveries of ethanol per year of an average 28 miles, the expected number of truck accidents will be about one per 22 years. The likelihood of release is one in ten and of a major release one in 407. The expected major release frequency is approximately one per 865 years.

Table 4.5-1 (concluded)
Qualitative and Quantitative Estimates of Failures that may Contribute to Hazardous Releases

Scenario	Likelihood (Qualitative)	Frequency
Rail car accident pentane	Occasional	The rail car accident rate is approximately four accidents per one million miles. Of those accidents, the number that result in the release of hazardous materials are about one in 360. The combined likelihood for hazardous material release is one per 90 million miles. Assume that a maximum of 1,714 tank cars of pentane are shipped per year and travel an average of 1,000 miles per trip. The likelihood of a tank car accident resulting in a hazardous release is approximately one per 153 years.
Railcar accident ethanol	Occasional	The railcar accident rate is approximately four accidents per one million miles. Of those accidents, the number of rail accidents that result in the release of hazardous materials are about one in 360. The combined likelihood for hazardous material release is one per 90 million miles. The Montebello Terminal will have about 3,120 railcars per year. Assuming a travel distance of 2,000 miles, the likelihood of a tank car accident resulting in a hazardous release is approximately one per 14 years for the terminal.
Truck Connect/ Disconnect Accident	Periodic	Human error rate[6] is about one per 2,000 operations. For 39 ethanol tankers per day, there are 78 connect/disconnects or 28,470 per year. A bad connect/disconnect would be expected about 14 times per year. Assume the same release rate as for truck accidents. The likelihood of any connection release (small spill) is one in 10 and of a larger (200-gallon) release is one in 405. The approximate larger release rate for connections is about one per 28 years.

Frequent - More than once per year (0 to 1 year)
Periodic - Once per decade (1 to 10 years)
Occasional- During the facility lifetime (10 to 100 years)
Improbable - 100 to 10,000 years
Remote - Not likely to occur at all

1 Bul. Seismic. Soc. of Am., Vol. 85, 1995
2 A.I.Ch.E. "Chemical Process Quantitative Risk Analysis"
3 F. Lees, "Loss Prevention in Process Industries," Vol. 1, 1992
4 A.I.Ch.E. "Process Equipment Reliability Data," 1989
5 ENSR 1994 in "Risk of Upset Evaluation, Unocal San Francisco Refinery, Reformulated Gasoline Project
6 T. Kletz, "An Engineers View of Human Error," 1985
7 USDOT, Federal Railroad Administration, Accident/Incident Bulletin No. 164, CY 1995, Aug. 1996

4.5.7 Assess Consequences

Consequence modeling has been performed for the scenarios identified below. The purpose of the modeling was to estimate the offsite consequences of releases of toxic and flammable materials from units that are proposed for installation or modification as the result of the project.

The modeling was based on U.S. EPA's RMP Guidance worst-case estimates for explosions, fires, and BLEVEs. The U.S. EPA equations for these events were programmed into an EXCEL™ spreadsheet and used to determine the size of the impact zone.

The upset scenarios modeled for the project are detailed in this section. Appendix D discusses the methodology used to calculate the impacts. The descriptions contain scenario assumptions. Final modeling results of the distance to reach the radiant heat flux, overpressure, or chemical concentration endpoints are listed immediately following the detailed scenario descriptions.

The following accident scenarios were considered in the analysis of offsite impacts:

- Case 1: Rupture of the pentane pipeline at the Refinery between the storage sphere and the loading rack. The pipeline is assumed to be ruptured due to a digging accident or earthquake. The pipeline releases pentane at the flow rate of the pipe for 10 minutes and forms a pool that spreads to a one centimeter depth until the pump is shut down. (The maximum flow rate of the pipeline is about 1,500 bbl per hour.) The released pool is assumed to ignite and burn after 10 minutes of spreading. Since this is a new pipeline, the incremental risk is estimated by comparing to a zero baseline.

- Case 2: A pentane pipeline to the cogeneration trains fails, releasing pentane that vaporizes, followed by an explosion. Pentane usage will be approximately 6,400 gallons per hour or 213 gallons for an assumed two-minute release before the pentane explodes. This scenario is compared to the rupture of a natural gas pipeline releasing a comparable amount of natural gas.

- Case 3: A catastrophic failure of the new pentane storage tank at the Refinery is assumed to release 30,000 bbl of pentane as a vapor cloud that explodes (U.S. EPA worst-case assumption). The catastrophic failure is assumed to be caused by a major external event such as an earthquake. The incremental risk of 30,000 bbl of pentane is compared to a zero baseline.

- Case 4: The contents of the pentane tank (30,000 bbl) are spilled into a dike that is 10 feet high and capable of containing the entire contents of the tank plus 20 percent. The liquid in the dike then catches fire. The storage tank failure is assumed to be caused by an external event or degradation of the equipment. The incremental risk is compared to a zero baseline.

- Case 5: A fire in the vicinity of the pentane tank causes the tank to fail catastrophically resulting in a "fireball" or BLEVE. Ten percent of the contents explode as a vapor cloud. The incremental risk is compared to a zero baseline.

- Case 6: A 30,000-gallon rail car of pentane ignites and burns. The pentane fire is compared to a zero baseline.

- Case 7: A 30,000-gallon rail car of pentane explodes. The pentane explosion is compared to a zero baseline.

- Case 8: The contents of an ethanol tank truck are spilled in a vehicle accident. The entire 8,800 gallons spread in an unconfined manner to a depth of one centimeter and ignite.

- Case 9: An ethanol truck is improperly connected/disconnected and releases 200 gallons of ethanol before the emergency shut-off can be activated. The spill spreads in an unconfined manner to a depth of one centimeter and ignites.

- Case 10: The contents of the ethanol tank (50,000 bbl) at the Montebello Terminal are spilled into a dike that is 1.8 feet high and 73,000 square feet in area. It is capable of containing the entire contents of the tank plus 17 percent. The liquid in the dike then catches fire. The storage tank failure is assumed to be caused by an external event or degradation of the equipment. The incremental risk is compared to a zero baseline.

- Case 11: The pentane pipeline at the Refinery ruptures between the storage sphere and the loading rack. The pipeline is assumed to be ruptured due to a digging accident or earthquake. The pipeline releases pentane at the flow rate of the pipe (1,500 bbl per hour for two minutes) when it reaches an ignition source and explodes. The incremental risk is estimated by comparing to a zero baseline.

- Case 12: The contents of the new gasoline tank (493,000 bbl) at the Refinery are spilled into a dike that is 10 feet high and capable of containing the entire contents of the tank plus 20 percent. The liquid in the dike then catches fire. The storage tank failure is assumed to be caused by an external event or degradation of the equipment. The incremental risk is compared to a zero baseline.

- Case 13: The contents of the converted gasoline tank (393,000 bbl) at the Refinery are spilled into a dike that is 10 feet high and capable of containing the entire contents of the tank plus 20 percent. The liquid in the dike then catches fire. The storage tank failure is assumed to be caused by an external event or degradation of the equipment. The incremental risk is compared with a similar release for MTBE (the former contents of the tank before conversion).

- Case 14: The contents of an ethanol tank truck are spilled during unloading. The entire 8,800 gallons are contained on the loading pad and ignite.

- Case 15: A catastrophic failure of the new Isomax Depentanizer at the Refinery is assumed to release 15,050 gallons of pentane as a vapor cloud that explodes. The catastrophic failure is assumed to be caused by a major external event such as an earthquake. The incremental risk of 15,050 gallons of pentane is compared to a zero baseline.

- Case 16: A catastrophic failure of the FCC Debutanizer at the Refinery is assumed to release 38,817 gallons of butane as a vapor cloud that explodes. The catastrophic failure is assumed to be caused by a major external event such as an earthquake. The incremental risk of 38,817 gallons of butane is compared with the contents of three smaller columns that were replaced (15,169 gallons).

- Case 17: A catastrophic failure of the FCC Depropanizer at the Refinery is assumed to release 23,689 gallons of propane as a vapor cloud that explodes. The catastrophic failure is assumed to be caused by a major external event such as an earthquake. The incremental risk of 23,689 gallons of propane is compared to the contents of three smaller columns that were replaced (12,103 gallons).

- Case 18: A catastrophic failure of the new FCC propane/propylene unit at the Refinery is assumed to release 19,306 gallons of propane as a vapor cloud that explodes. The catastrophic failure is assumed to be caused by a major external event such as an earthquake. The incremental risk of 19,306 gallons of propane is compared to the pre-project contents of 6,006 gallons.

- Case 19: A 30,000-gallon railcar of fuel ethanol ruptures, spills and ignites. The ethanol fire is compared to a zero baseline.

The results of the model runs are summarized in Table 4-5-2.

- Case 1 considered a pentane pipeline rupture with a resulting fire. Table 4.5-2 shows that the size of the impact zone for an unconfined release and fire is about 395 meters, which may have a significant offsite impact, depending on where it occurs in the Refinery. (The closest that the pipeline comes to the fence line of the Refinery is about 250 meters). This scenario is based on the very conservative assumption that pentane spreads over an impervious, flat surface for 10 minutes and forms a pool that is one centimeter deep before it ignites and burns. The pool would have an area of about 3,968 square meters (more than an acre).

- Case 2 assumes that the pentane pipeline from the sphere to the cogenerations units is ruptured and releases a cloud of vapor for two minutes, at which time it reaches a source of ignition and then explodes. The impact is estimated to extend for 137 meters in any direction surrounding the breach, which is insignificant as there would be no offsite impact.

- Case 3 assumes a vapor cloud explosion of the entire 30,000-bbl contents of the pentane storage tank. This is a highly unlikely event, but it is the U.S. EPA worst-case assumption for pentane. The pentane tank is a new application. The impact distance for the pentane explosion scenario is approximately 2,484 meters, which is significant.

- Case 4 examines the pentane tank with a more realistic but improbable scenario of a complete tank rupture and spill to containment with subsequent fire. The containment dike is assumed to be 10 feet deep and have sufficient volume to contain the tank contents plus an additional 20 percent. (The pentane sphere is about 400 meters from the property line of the Refinery.) The impact distance was calculated to be 337 meters, which is not significant for this scenario.

Table 4.5-2
Distance (meters) to Endpoint from Center to Upset*

Case	Event	Explosion	Pool Fire	BLEVE
1[1]	Rupture Pentane Pipeline (10 min)	NA	395	NA
2	Rupture Pentane Pipeline (2 min)	137	NA	NA
3,4,**5**	Pentane Sphere Failure (30,000 bbl)	2,484	337	1,410
6,**7**	Pentane RR Car Accident (30,000 gallons)	715	669	NA
8	Ethanol Truck Accident	NA	137	NA
9	Bad Connect/Disconnect	NA	21	NA
10	Ethanol Tank Failure (50,000 bbl)	NA	196	NA
11	Rupture Pentane Pipeline (2 min)	295	NA	NA
12	Gasoline Tank Failure (493,000 bbl)	NA	928	NA
13	Gasoline Tank Failure (393,000 bbl)	NA	828	NA
13	MTBE Tank Failure (393,000 bbl)	NA	785	NA
14	Ethanol Contained on Pad (8,800 gal)	NA	21	NA
15	Isomax Depentanizer Fail (15,050 gal)	568	NA	NA
16	FCC Debutanizer (38,817 gal)	761	NA	NA
16	FCC Debutanizer (15,169 gal)	556	NA	NA
17	FCC Depropanizer (23,689 gal)	620	NA	NA
17	FCC Depropanizer (12,103 gal)	496	NA	NA
18	FCC Propane/Propylene Unit (19,306 gal)	579	NA	NA
18	FCC Propane/Propylene Unit (6,006 gal)	392	NA	NA
19	Ethanol RR Car Accident (30,000 gallons)	NA	250	NA

[1] Case numbers in **BOLD** have the potential for significant offsite impacts
* Endpoint – U.S. EPA RMP
Explosion endpoint – one psi
Fire/BLEVE source endpoint – 5 kw/m^2 for 40 seconds or equivalent
NA = Not Applicable

- Case 5 assumes that the pentane tank fails catastrophically due to a nearby tank fire that causes the pentane to boil and explode. This calculation assumes that 10 percent of the pentane in the tank was vaporized and exploded. Using the U.S. EPA Guidance equations, the impact of the BLEVE was calculated to be 1,410 meters, which is significant.

- Case 6 estimates the impact of the unconfined release of 30,000 gallons of pentane from a railroad tank car. The contents are assumed to spread in an unconfined manner over a flat impervious surface to form a pool with a one-centimeter depth. The area would be approximately 11,338 square meters (about three acres) and is very unlikely. The pool then ignites and burns. The impact distance from a pool fire was estimated to be 669 meters, which is significant.

- Case 7 estimates the impact of the release of 30,000 gallons of pentane from a railroad tank car. The entire 30,000 gallons are assumed to vaporize and explode. This is a high unlikely event, but it is the U.S. EPA worst-case assumption. The impact distance from the explosion is estimated to be 715 meters, which is significant.

- Case 8 estimates the impact of the unconfined release of 8,800 gallons of ethanol. It spreads over a flat, impervious surface and forms a pool of 3,326 square meters (about 0.9 acre) and is very unlikely. The pool then ignites. The impact distance from the pool fire was estimated to be 137 meters. This could be significant depending on the location of the truck release.

- Case 9 estimates the impact of a partial spill of ethanol due to a bad hose connection or hose rupture during loading or unloading. About 200 gallons are assumed to be released in an unconfined manner, spreading over about 76 square meters of flat, impervious surface and then igniting. The impact distance is calculated to be approximately 21 meters. This risk would be confined to the local area and is not considered to be significant.

- Case 10 examines the Montebello Terminal ethanol tank with an improbable scenario of a complete tank rupture and spill to containment with subsequent fire. The containment dike is 1.8 feet deep and has sufficient volume to contain the tank contents plus an additional 17 percent. The impact distance is calculated to be 196 meters, which may be significant.

- Case 11 assumes that the pentane pipeline from the sphere to loading is ruptured and releases a cloud of vapor for two minutes, at which time it reaches a source of ignition and then explodes. The impact is estimated to extend for 295 meters in any direction surrounding the breach and may have a significant offsite impact, depending on where it occurs in the Refinery. The closest the pipeline approaches to the property line is about 250 meters.

- Case 12 considers the new gasoline storage tank (493,000 bbl) with a scenario (improbable) of a complete tank rupture and spill to containment with subsequent fire. The containment dike is assumed to be 10 feet deep and have sufficient volume to contain the tank contents plus an additional 20 percent. The impact is compared with a zero baseline since this is a new tank. The impact distance is calculated to be 928 meters, which is significant.

- Case 13 examines the impact of the MTBE tank converted to gasoline storage for the scenario of a complete tank rupture and spill to containment with subsequent fire. The containment dike is assumed to be 10 feet deep and have sufficient volume to contain the tank contents plus an additional 20 percent. The incremental impact of the gasoline fire was compared with the identical release of MTBE with resulting fire. The impact distance is calculated to be 785 meters for MTBE and 828 meters for gasoline. The gasoline impact is about five percent higher than the former MTBE impact, but is not significantly different than the former risk of this tank.

- Case 14 estimates the impact of the confined release of 8,800 gallons of ethanol. It spreads over a concrete containment area that is 12 feet by 70 feet (76 square meters) and ignites. The impact distance from the pool fire is estimated to be 21 meters, which is not significant.

- Case 15 assumes a vapor cloud explosion of the entire 15,050-gallon contents of the new Isomax Depentanizer at the Refinery. This is a highly unlikely event, but it is the U.S. EPA worst-case assumption. To approximate the impact, the contents are assumed to be all pentane. The unit is located about 500 meters from the property line. A large existing berm located at the nearest property line would direct a portion of the blast wave upward, which means there would be no offsite consequences. The impact distance for the pentane explosion scenario (the distance to an overpressure of one psi) is approximately 568 meters, which is significant.

- Case 16 assumes a vapor cloud explosion of the entire 38,817-gallon contents of the new FCC Debutanizer at the Refinery. This is a highly unlikely event, but it is the U.S. EPA worst-case assumption. To approximate the incremental impact, the contents are assumed to be all butane. The impact distance for the butane explosion is compared with the impact of an explosion of the three replaced debutanizers (15,169 gallons). The impact distance for the new debutanizer is 761 meters as compared with the impact of the three former debutanizers at 556 meters. The unit is located about 750 meters from the property line. A large berm located at the nearest property line would direct a portion of the blast wave upward, which means there would be no offsite consequences. The incremental impact is about 37 percent greater for the new debutanizer, which is not significant due to the distance to the property line and the effect of the berm.

- Case 17 assumes a vapor cloud explosion of the entire 23,689-gallon contents of the new FCC Depropanizer at the Refinery. To approximate the incremental impact, the entire contents are assumed to be propane. The impact distance for the propane explosion is compared with the impact of an explosion of the replaced depropanizers (12,103 gallons). The impact distance for the new depropanizer is 620 meters as compared with the impact of the former depropanizers at 496 meters. The unit is located about 750 meters from the property line. The incremental impact is about 25 percent greater for the new depropanizer, but is not significant since the blast wave with an overpressure of one psi would not extend offsite.

- Case 18 assumes a vapor cloud explosion of the entire 19,306-gallon contents of the new FCC Propane/Propylene Treating Unit at the Refinery. To approximate the incremental impact, the entire contents are assumed to be propane. The impact distance for the propane explosion is compared with the impact of an explosion of the pre-project cleaning unit (6,006 gallons) that would be replaced. The impact distance for the new Treating Unit is 579 meters as compared with the impact of the former cleaning unit at 392 meters. The unit is located about 750 meters from the property line. The incremental impact is about 48 percent greater for the new cleaning unit, but is not significant due to the distance to the property line.

- Case 19 assumes that a 30,000-gallon railcar of fuel ethanol ruptures, spills and ignites. The ethanol is assumed to spread in an unconfined manner over an impervious surface to a depth of one centimeter (U.S. EPA worst case assumption). The impact distance of the pool fire was conservatively estimated to be 250 meters, which is significant, in that the accident could occur outside Chevron's facilities.

It should be noted that the upsets that have been modeled are not likely to occur and are very conservatively based on U.S. EPA RMP worst-case and alternate-case assumptions. However, in the unlikely event that upset would occur, most would be significant. The consequences also do not take credit for mitigation measures that Chevron has in place or will have in place when the project is completed. Mitigation measures are discussed in Section 4.5.9.

4.5.8 Potential Risks from Transportation Accidents

The potential for increased risk due to transportation accidents associated with the project has been evaluated for train and truck traffic, which are discussed in the following subsections. It is anticipated that there will be an increase in rail traffic due to this project for transport of pentane from the Refinery, for delivery and removal of isobutane from the Refinery periodically during the year, and for delivery of fuel ethanol to the Montebello Terminal. Also, truck traffic will increase for the distribution of ethanol.

For ship traffic, the increase in deliveries of iso-octene, toluene, and FCC feed for this project total about 2,510,000 bbl per year, which is substantially less than the present shipments of MTBE totaling about 4,215,000 bbls per year. Although there would be a decrease in the total volume of material to be imported via marine tanker, there will be an increase in the number of ship calls due to the differences in the sizes and types of ships that transport the different materials. The additional ship calls would average approximately one ship call per month. The addition of only one ship call per month within the Port of Los Angeles is not considered significant.

4.5.8.1 Train Traffic

It is anticipated that the project would increase the number of rail car shipments, but not the number of train trips into and out of the Refinery for a number of chemicals (primarily pentane and isobutane). Rail car shipments of chemicals, such as pentane, that were not shipped by rail prior to this project would create a new risk. Chemicals, such as propane, that were shipped to the Refinery prior to this project, would have an incremental change in risk. An increase in the number of deliveries of previously shipped chemicals would increase the likelihood of an accident but would not increase the consequence of an accident. For previously shipped chemicals for which the number of shipments would be reduced, the likelihood of an accident would decrease, but the consequence would remain the same.

In addition, there will be railcar shipments of fuel ethanol to the Montebello Terminal. Fuel ethanol will be shipped from a mid-west location, conservatively assumed to be about 2,000 miles away. Montebello will receive 3,120 tank cars per year for an estimated total travel distance of 6.2 million miles. The likelihood of an accident with a chemical release is about one per 14 years. An accident with a major release would be less frequent. Because such accidents would have offsite consequences, the risk is considered significant.

Table 4.5-3 summarizes the number of rail shipments and the likelihood of an accident before and after this project for various chemicals. All rail cars have been conservatively assumed to travel 1,000 miles to estimate the accident likelihood. The likelihood of a hazardous rail car release is about one per 90 million miles traveled.

Table 4.5-3
Likelihood of a Hazardous Rail Car Release per Year

Chemical	Annual Rail Trips Before Project	Annual Rail Trips After Project	Likelihood Before Project	Likelihood After Project	Before/After Comparison
Propane	634	700	0.007	0.008	Similar
Propane/ Propylene	524	314	0.006	0.003	Reduction
Isobutane	653	1,157	0.007	0.013	Increase
Butane	572	428	0.006	0.005	Similar
Pentane	0	1,714	0	0.019	Increase
Ethanol	0	3,120	0	0.071	Increase

Ethanol has the greatest potential rail car risk with an expected accident release rate of approximately one per 14 years. This likelihood would be considered occasional (see Table 4.5−1.) However, the risk posed by a rail car accident is significant since the risk would occur offsite.

4.5.8.2 Truck Traffic

Assuming ethanol delivered by ship ("worse-case"), the project would require the use of approximately 39 tank truck deliveries of ethanol per day. The total number of shipments is expected to be about 14,235 per year. Truck shipment of ethanol represents a potential new risk. The distance traveled by all ethanol trucks per day has been estimated from trip maps to be 1,092 miles per day (an average of 28 miles per trip). The estimated annual accidental release rate for all ethanol truck delivery (assuming 398,580 miles per year) is one major release per 865 years. This likelihood would be considered improbable (see Table 4.5-1). However, the risk would still be considered significant since the risk would occur offsite.

4.5.9 Mitigation Measures

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

Due to the materials used and stored, and the industrial processes that occur onsite, the risk of large-scale upset conditions is always present to some degree. The largest increase of risk from the proposed project is related to potential fires with resulting BLEVEs at the new pentane storage tank at the Refinery. These risks are significant and would be mitigated by planned (and required) containment systems and fire suppression systems at the Refinery.

While not mitigation measures since they are presently implemented and required by regulation, compliance by Chevron with RMP and PSM requirements will help reduce the likelihood of occurrence of significant hazards posed by the proposed project. However, RMP and PSM requirements would not likely affect the consequences of a release since impact significance is based only on consequence. Thus, compliance with RMP and PSM requirements would not mitigate project hazards to insignificance.

RMPs are required under California Health and Safety Code §25534 and 40 CFR Part 68, §112r. These regulations require Chevron to update the Refinery's RMP for any new processes that contain more than 10,000 pounds of pentane or butane. The RMP/CalARP must be completed before the process becomes operational.

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

A PSM that meets the requirements of the regulations and is appropriately implemented is intended to prevent or minimize the consequences of a release involving a toxic, reactive, flammable, or explosive chemical. The primary components of a PSM include the following:

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

The current monitoring system will apply to the existing and modified pipelines related to the proposed project. Pipelines are currently monitored from a central control room that is staffed 24-hours per day. In the event of a pipeline rupture, the response time for shutdown is estimated to be four minutes. Risk of upset calculations for pipeline rupture and fire conservatively assumed a ten-minute release time.

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

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

- Construction and modifications are in accordance with design specifications and applicable codes.
- Safety, operating, maintenance, and emergency procedures are in place and are adequate.
- Process hazard analysis recommendations have been addressed and actions necessary for start-up have been completed.

- Training of each operating employee and maintenance worker has been completed.

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

H-2: The following factors will help to reduce the risk of upset from the new pentane storage tank to be located at the Refinery. They represent the application to new refinery equipment and processes of practices and procedures currently implemented at the Chevron facilities:

- 24-hour per day, seven day per week staffing;
- Fire detectors;
- Manual shutdown of liquid into or out of the pentane tank in case of fire, which will minimize the quantity of release.
- High-pressure fire deluge systems and protective coatings for the pentane storage tank and support structures to reduce the possibility of BLEVEs caused by fires in the vicinity of these facilities.

H-3 The following practices are currently implemented at Chevron's refinery and terminals and will be applied and tailored, as needed, for truck transport of fuel ethanol. These measures are likely to reduce accident rates rather than release rates and quantities.

- Driver hiring and training practices to ensure driver compliance with safe driving practices for transporting fuel ethanol as well as other flammable materials.
- Continued emphasis on vehicle inspection and maintenance programs to ensure their effective implementation for the transport of fuel ethanol as well as other flammable materials.

Virtually all of the existing refinery safety practices discussed above are required in order to comply with laws and regulations for proper facility construction and operation. The mitigation measures represent a continuation of policies and procedures Chevron already uses at its facilities, and will apply to the proposed project as well. Although the various mitigation measures would reduce the likelihood of the occurrence of an upset condition, offsite impacts of such an occurrence still would remain significant. The combined likelihood and consequences would produce overall risk levels that are comparable to current operations at the El Segundo Refinery and terminals.

4.6 Hydrology/Water Quality

Water is an essential resource in southern California. Due to low average annual rainfall in the region, over half of the water supply in the Basin is imported, making water supply and water quality important issues (City of Los Angeles, 2001). Water resources can be affected by either increased water use or disposal, or degradation of water quality. Each of these potential impacts is considered below.

Water quality and supply impacts will be considered significant if any of the following conditions are met:

- The project causes degradation or depletion of groundwater resources and surface water substantially affecting current or future uses.
- The project results in a violation of NPDES permit requirements.
- The project creates a substantial increase in mass inflow to public wastewater treatment facilities.
- The project results in substantial increases in the area of impervious surfaces, such that interference with groundwater recharge efforts occurs.
- The existing water supply does not have the capacity to meet the increased demands of the project, or the project uses a substantial amount of potable water (i.e., greater than five million gallons per day).
- The capacities of existing or proposed wastewater treatment facilities and the sanitary sewer system are not sufficient to meet the needs of the project.

4.6.1 Construction Impacts

4.6.1.1 Water Supply Impacts

Potential hydrology and water supply impacts caused by construction-related activities at the proposed project sites are expected to be minimal. Small quantities of water will be required during the construction phase (e.g., excavation, grading, trenching, stock piling, etc.) for dust control. Watering for dust control purposes would be required pursuant to SCAQMD Rule 403 and/or local government permitting requirements (Brenk, 1993).

It is estimated as a “worse-case” that approximately 745 square yards of soil would be disturbed at the Refinery in any one day. It is not expected that grading activities will take place at the terminals. Using the assumption that it takes 0.2 gallon per square yard per hour for adequate dust suppression, the worst-case water demand can be estimated by the following equation, (EPA, 1992).

Daily Water Usage = 0.2 (gal/yd^2-hr) x 745 yd^2 x 10 hrs/day = 1,490 gal/day

Thus, on a worst-case basis, dust suppression activities at the Refinery would require 1,490 gallons of water per day. This water use is considered minor and will cease following the construction phase. Accordingly, water supply impacts from the proposed project are not significant since the total daily estimated construction-related water demand does not exceed the SCAQMD's significance criterion of 5,000,000 gallons per day.

4.6.1.2 Water Quality Impacts

Potential water quality impacts caused by construction activities are expected to be minimal. Wastewater created from the pressure-testing of vessels and pipelines to ensure integrity at project sites may include minor amounts of oil, scale, and rust. Wastewater resulting from this hydrostatic testing process at the Refinery will be routed to the existing process wastewater treatment systems and recycled, or discharged after treatment along with the process wastewater. Hydrostatic testing water at the terminals will either be discharged under existing Order No. 97-047 (General National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges of Hydrostatic Test Water to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties) or transported to the Refinery for treatment in the process wastewater treatment systems.

Grading during construction is not expected to disrupt soils at depths sufficient to require dewatering. However, if dewatering is required, the wastewater will be treated, if necessary, and discharged under a general NPDES permit for construction dewatering. These construction activities would not affect groundwater resources in the project area. Wastewater generated from these construction activities will be minimal; therefore, no significant impacts are anticipated.

Sanitary wastes at staging areas, such as construction parking areas, will be collected in portable chemical toilets. These wastes will be removed by a private contractor and disposed of offsite. Construction workers will be required to use portable sanitary facilities maintained by the contractor. Effluents from those facilities are discharged to the municipal sewer. Sanitary wastes will be minimal (less than 200 gallons per day) and would not create a significant impact to existing sanitary sewer systems.

The proposed construction area at the Refinery encompasses approximately 4.6 acres. As the area to be disturbed is less than five acres, a NPDES General Permit for Stormwater Discharges Associated with Construction Activity (Stormwater Construction Permit) is not required. However, a CMP will be developed and implemented that will address stormwater runoff and sediment control. Stormwater Construction Permits will also not be required at the terminals as minimal ground-disturbing activities are expected.

Stormwater discharges are expected to be approximately the same as the current discharges; therefore, no significant impacts are expected from the stormwater discharges during construction.

4.6.2 Operational Impacts

4.6.2.1 Water Supply Impacts

Annually, approximately 205 billion gallons of water are provided to the Los Angeles area (City of Los Angeles, 2001). Over the past several years, there has been a reduction in water demand and it is expected that demand for water will drop even further. This reduction is the result of fewer industrial clients due to plant relocations, more efficient use of water through replacement of water-inefficient processes, and increased use of reclaimed water.

Refinery

The Refinery currently uses water from two sources: municipal (raw) water and reclaimed water. The current municipal water use at the Refinery is approximately 8.5 million gallons per day. In addition, 3.5 million gallons of reclaimed water are used per day. It is expected that the proposed project activities will increase water usage at the Refinery by approximately 1,554,000 gallons per day. Boiler feedwater consumption will increase by approximately 176,000 gallons of water per day. Cooling tower water usage will increase by approximately 1,450,000 gallons per day. Process water usage will decrease by approximately 72,000 gallons per day. The additional water will be provided by the Metropolitan Water District of Southern California and the WBMWD.

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

Terminals

No additional water is required for the proposed project activities at the terminals; therefore, significant water supply impacts are not expected at the terminals.

4.6.2.2 Process Wastewater Discharges

This subsection discusses impacts on water resources due to changes in wastewater discharges associated with the proposed project.

Refinery

The Refinery currently discharges approximately seven million gallons per day of treated wastewater to the Santa Monica Bay. It is expected that approximately 100,000 to 200,000 gallons of additional wastewater per day will be discharged as a result of the proposed project, consisting primarily of cooling tower blowdown, boiler blowdown, and steam condensate. It is expected that process water discharges will decrease by approximately 5,700 gallons per day because less process water will be required by refinery operations after the project is implemented. Under NPDES Permit No. CA0000337, the Refinery is authorized to discharge up to 8.8 million gallons per day of treated wastewater during dry weather and up to 23 million gallons per day during wet weather. Therefore, the wastewater discharge volume after project implementation is expected to be well within the existing limits of the NPDES permit and significant impacts associated with wastewater discharges at the Refinery are not expected.

Terminals

Wastewater generated by terminal activities is currently discharged to the municipal sewer at Van Nuys and Montebello under Industrial Wastewater Permits from the City of Los Angeles Department of Public Works (Van Nuys) and the Sanitation Districts of Los Angeles County (Montebello). Wastewater at Huntington Beach is trucked offsite for treatment and/or disposal. The proposed project will not result in additional wastewater generation; therefore, no significant impacts associated with wastewater discharges at the terminals are expected.

4.6.2.3 Stormwater Quality

Stormwater runoff from the project sites will not be adversely affected as a result of the proposed project. Each project site has an existing NPDES Permit for the discharge of stormwater. Stormwater discharges at the sites due to proposed project activities will be in compliance with the existing permit conditions. The existing Storm Water Pollution Prevention Plans will be updated to reflect operational modifications to each site and include additional Best Management Practices, if required. Accordingly, since stormwater discharge of or runoff to local stormwater systems is not expected to change significantly in either volume or water quality, no significant stormwater quality impacts are expected to result from the operation of the proposed project.

Ethanol will be transported to the Los Angeles area by ship, replacing MTBE, which is currently transported to the area by ship. As ethanol is highly soluble in water and biodegrades rapidly, it is less likely to create significant impacts to surface water than MTBE if released. Therefore, significant impacts to surface water associated with the transport of ethanol by ship are not expected. Although the probability of an ethanol release during truck transport is extremely small, in the unlikely event that ethanol enters a storm drain system, the standard practice is to contact a response contractor who specializes in containment of such releases. The contractor would then contain and collect the released ethanol and dispose of it properly. Therefore, no significant impacts to stormwater quality from ethanol truck transport are expected.

Chevron proposes to store ethanol in ASTs at the terminals. The new tank at the Montebello Terminal will be constructed per ASTM standards and within secondary containment. Existing storage tanks will be used to store ethanol at Huntington Beach and Van Nuys Terminals. The tanks will be periodically refilled from tanker trucks. An accidental release of ethanol may occur during delivery or storage. However, the spilled material would be contained in the containment area designed to hold the entire contents of the tank plus 20 percent. Therefore, significant stormwater quality impacts are not expected from the release of ethanol during delivery or storage.

4.6.2.4 Groundwater Quality

The proposed project includes ethanol blending at the terminals. Ethanol will not be stored at the Refinery. As ethanol will replace MTBE, the proposed project eliminates the use of MTBE at the Refinery. MTBE storage facilities will be converted to other uses or decommissioned. In the context of the proposed project, accidental spills of ethanol could occur at the terminals from operational activities such as ethanol storage, transfer by piping within the facility, tanker truck and rail car unloading operations, or during tanker truck and rail car transport. Potential water quality impacts would occur if the ethanol were washed into storm drains, or if the ethanol percolated into the soil.

The terminals are equipped with leak detection systems and level alarms that would identify a release of ethanol when it occurred. Thus, a leak from a tank would be quickly detected. The ASTs at the Montebello Terminal will be installed to comply with current design, construction, and monitoring standards. No new tanks will be constructed at the Van Nuys or Huntington Beach Terminals. Measures that will be in place to prevent and minimize the groundwater quality impacts from accidental spills include:

- Leak detection systems;
- Secondary containment designed to hold the entire contents of a storage tank plus 20 percent; and
- Formal spill response procedures, such as training requirements and spill containment kits.

The rail car unloading area at the Montebello Terminal will also have spill containment (spill pans) at the pump fittings and at the rail car fill ports to prevent releases of ethanol directly to the ground surface.

In the unlikely event that a leak from a storage tank or rail car does occur and ethanol is released to the soil, it is possible that groundwater would be impacted. However, ethanol biodegrades more quickly than MTBE. MTBE has a half-life of approximately 1.6 to 1.9 years, where the expected half-life of ethanol in groundwater is 13 to 52 hours. The EPA has stated that the use of ethanol as a fuel additive is not expected to present the same magnitude of risk to drinking water supplies as MTBE (Malcom Pirnie, 1998). Therefore, a release of ethanol to groundwater is expected to have less of an impact than MTBE.

4.6.3 Mitigation Measures

No significant adverse impacts to water quality and supply are expected as a result of the activities associated with the proposed project. The existing water supply and disposal systems are adequate to meet the demand of the project. No changes to water quality or discharge permits are expected to be required. Stormwater will be controlled, and neither surface water nor groundwater resources will be adversely affected. Therefore, no specific mitigation measures are required. Chevron will continue to use water conservation measures to reduce the use of fresh water and increase the reuse of wastewater. The measures may include the use of reclaimed water. Chevron will also update and modify the SWPPPs and Monitoring Plans, NPDES permits, and industrial wastewater permits, as necessary, prior to project startup.

4.7 Land Use and Planning

Significance criteria for land use are based on the compatibility of the proposed project with existing and future land uses and with established policies and regulations. Impacts are considered significant if:

- Proposed development is neither compatible nor consistent, in terms of use or intensity, with land use plans, regulations, or controls adopted by local, state, or federal governments.
- The project conflicts with the established recreational, scientific, educational, religious, or scientific uses of the area.

4.7.1 Construction

Construction, with the exception of a small portion of the rail spur at the Montebello Terminal, will occur within the existing property boundaries of the Refinery and the terminals. Consequently, construction activities and new facilities will be located within the confines of these facilities. The new equipment and minor modifications to existing equipment are consistent with the existing land uses in the vicinity of the Refinery and terminals, which are generally located in industrialized areas. The components of the project are consistent with the zoning at the project sites, which ranges from light industrial to heavy industrial (see Section 3.7 for zoning and land use designations). Thus, no significant adverse impacts to land use or zoning are expected to occur during construction of the proposed project.

4.7.2 Operation

Operation of the proposed project will not alter existing land uses at the Refinery or terminals. Operation of the proposed project will be consistent with existing Refinery and terminal land uses. The proposed project will not conflict with land-use patterns delineated by the various General Plan designations for the project areas, so no amendments will be needed.

Discussions with the planning departments at the various cities indicate that approvals for the proposed project will be primarily ministerial. Chevron will submit the appropriate permit applications and/or site plans to the various cities to obtain the proper approvals for the proposed project. This will ensure that the applicable construction design standards and/or guidelines will be adhered to.

The following text summarizes the review/planning process required by the various cities for modifications at the project sites.

Modifications and additions proposed at the Refinery would be subject to plan check review during the building permit approval process. The modifications and additions would not be subject to planning commission review (Gerry, 2001). The EIR along with the appropriate permit applications and site plans would be reviewed by the City of El Segundo to ensure that the applicable construction design standards and/or zoning regulations are followed.

Modifications at the Montebello Terminal would include the construction of a new rail spur, a new ethanol storage tank, new concrete pads, and new pumps, piping, and metering systems for ethanol unloading and blending. Because the site use is a conditionally permitted use, modifications and additions proposed at the Montebello Terminal require the filing of a conditional use permit, including plot, circulation, and floor plans (as applicable). Following presentation of a completed application to the Planning Department, the application would be brought before the Planning Commission for review and approval (Duong, 2001).

Modifications at the Van Nuys Terminal would include conversion of existing storage tanks and the addition of new pumps, piping, and metering systems for ethanol unloading and blending. An Application for Development Plan to the Building and Safety Department of the City of Los Angeles would be required for this project as the site is a permitted use in the M2 zone.

Modifications at the Huntington Beach Terminal would include the conversion of an existing diesel tank to an ethanol storage tank, new concrete pads, and new pumps, piping, and metering systems for ethanol unloading and blending. Because the site is a conditionally permitted use, a

Conditional Use Permit would be submitted to the City of Huntington Beach Zoning Administrator for review (Santos, 2001). The Conditional Use Permit would also be subject to review by the City's Design Review Board because terminal is adjacent to Huntington Central Park.

4.7.3 Mitigation Measures

No significant adverse land use impacts are expected to occur as a result of construction or operation of the proposed project. Therefore, no mitigation is necessary or proposed.

4.8 Noise

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

- The project operation increases the existing CNEL at adjoining residential and non-residential receptors above the "normally acceptable" 65 dBA CNEL for residential land uses or 70 dBA for non-residential land uses.
- The project operation increases the existing CNEL by more than three dBA in areas where the existing CNEL already exceeds 65 dBA in adjoining residential land uses or 70 dBA in adjoining non-residential land uses.
- The project operation or construction results in exceedance of noise standards of the local jurisdictions.
- The project operational noise levels exceed the standards designed to address issues related to worker safety.

4.8.1 Incremental Increase Criteria

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

4.8.2 Construction Impacts

The maximum construction noise levels and CNELs during construction are described in the following subsections for the Refinery and terminal locations and were calculated with the following assumptions:

- Construction is eight hours per day, Monday through Friday, beginning at 7 a.m.
- Average sound level of each piece of equipment (Table 4.8-1)
- Construction equipment usage (see “Chevron Maximum Construction Noise Calculation Spreadsheet included in Appendix E)

Because of the nature of this activity, the types, numbers, and loudness of equipment will vary throughout construction. Construction activities are planned to occur between 7:00 a.m. and 5:00 p.m. Monday through Friday and, possibly, but not generally, on a weekend. Allowing for startup, some downtime, and breaks, the analysis assumes that equipment would be operating and potentially generating noise eight hours per day starting at 7:00 a.m.

Table 4.8-1 presents ranges of noise level for various types of construction-related machinery that is expected to be used during the construction phase of the project. Noise levels associated with construction equipment were taken from the Noise Control for Buildings and Manufacturing Plants (Hoover and Keith, 1994).

Table 4.8-1
Noise Levels of Construction Equipment

Equipment Type	Typical Sound Pressure Levels (dBA at 50 Feet)[a]
Tractors/Crawlers/Dozers (up to 450 hp)	78 to 82
Grader (300 hp)	80
Diesel Trucks (100 to 400 hp)	72 to 81
Cranes (28 – 100 ton)	77 to 80
Crapers (350 hp)	81
Hoe Ram (225 hp)	80
Wacker Packer (5 hp)	67
Carry Deck (8.5 ton)	80
Welding Machine (20 hp)	68
Backhoe (85 hp)	76
Forklift (40 hp)	75
Air Compressor (25 hp or 230 hp)	75 or 80
Generator (22 hp or 550 hp)	73 or 85 @ rated hp
Concrete Pump (30 hp to 150 hp)	81 rated hp

Table 4.8-1 (concluded)
Noise Levels of Construction Equipment

Equipment Type	Typical Sound Pressure Levels (dBA at 50 Feet)[a]
Front End Loader (200 hp)	79
Vibratory Roller (150 hp)	77

[a] Predicted sound level (except where noted) is based on average equipment sound level ("off maximum") assumed 5 dBA below rated (maximum) horsepower (hp)

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

Noise from project construction at each terminal will be conducted for an approximately six-month period during 2002. Terminal construction equipment will be similar to the construction equipment used at the Refinery, although modifications at the terminals will require substantially less construction than at the Refinery.

During construction of this project, the Refinery and the terminals will continue normal operations. For the purpose of this evaluation, it is assumed that current major sources of noise within the Refinery and the terminals will continue throughout the construction period. Noise from local street traffic will also continue during construction of the project.

Refinery construction noise levels at the nearest noise receptors were estimated from the equipment and construction site specified for each construction phase at the Refinery. Terminal construction noise levels were estimated based on the construction location at each terminal and assume that construction equipment will be similar at each terminal. Refinery and terminal construction estimates assume that approximately half of the equipment would be in operation at any one time. Equipment sound levels were extrapolated to receptor distances using standard free-field hemispheric sound propagation (six dBA of reduction per doubling of distance). Predicted maximum construction sound levels are conservatively estimated and do not include sound level reductions due to molecular absorption, anomalous atmospheric absorption, or from existing sound barriers.

4.8.2.1 Refinery

The existing and predicted increase in sound levels during Refinery construction are presented in Table 4.8-2. Existing CNEL sound levels are based on measurements conducted at four locations near the Refinery in the vicinity of the nearest residential receptors. These measurements are discussed in detail in Appendix E. As indicated in Table 4.8-2, the Refinery construction noise is predicted to result in a CNEL increase of 2 dBA or less at all residential receptors which is less than the significance criteria.

Table 4.8-2.
Existing and Estimated CNEL Construction Noise Impacts at Refinery (dBA)

Receptor Location	Existing CNEL (dBA)	Estimated Construction Sound Level (L_{50} - dBA)	Estimated Total CNEL During Project Construction (dBA)	Total Increase in CNEL During Project Construction (dBA)
Residential Area. 3600 Pine Ave. - ~500 ft. south of Gate 20	62	58	63	1
Residential Area. Pacific Ave. - ~900 ft. south of Gate 21	61	59	62	1
Residential Area. Armory Ave. - ~200 ft. south of Gate 22	59	61	61	2
Lomita Ave., school behind St. Anthony's Church - ~1,000 ft. north of Refinery	61	61	61	0

In addition, maximum construction noise (as opposed to overall construction CNELs) is predicted to be 61 dBA or less at all residential receptors, which complies with the City of El Segundo limits for maximum construction noise for long-term daytime construction. The City of Manhattan Beach, which borders the Refinery to the south, has no sound level limits imposed on construction noise.

Since construction noise at the Refinery will be within ordinance limits and will not cause a significant increase in existing sound levels, construction activities for the proposed project are predicted to have no significant adverse noise impacts.

4.8.2.2 Montebello Terminal

Construction at the Montebello Terminal consists of a new storage tank, new pumps and associated piping, new concrete pads, new meters, new control valves, a new rail spur and a new rail car unloading area. The Montebello Terminal is located in an industrial/commercial zone, but the nearest receptors are residences in a residential zone 100 feet north of the terminal's north property line. Construction siting for the rail spur and rail car unloading area is assumed to be approximately 100 feet from the nearest residence. Construction siting for the new storage tank, new pumps and associated piping, new concrete pads, new meters, and new control valves is assumed to be approximately 400 feet from the nearest residence.

Maximum construction noise is predicted to be 63 dBA at the nearest residential receptors from the construction of the new storage tank, pumps, concrete pads, etc. in the southern portion of the terminal property. This 63 dBA sound level would result in an average increase to the CNEL during the construction period by one dBA. As a result, construction noise in the southern portion of the terminal property is considered insignificant.

Maximum construction noise is predicted to be 82 dBA at the nearest residential receptors from construction of the rail spur in the northern portion of the terminal property. This 82 dBA sound level is approximately 20 dBA over the existing CNEL. As a result, Montebello Terminal construction noise impacts are expected to be significant based on the incremental increase criteria that states "a change of over five dBA is readily noticeable and would be considered a significant increase" (see Section 4.8.1). However, rail spur construction activities will occur Monday through Friday from 7:00 AM to 6:00 PM and are expected to last four to five weeks. Because the construction will be temporary (no more than four to five weeks in duration) and limited to daytime hours between Monday and Friday, the noise impacts from rail spur construction would be mitigated to less than significant.

4.8.2.3 Van Nuys Terminal

Construction at the Van Nuys Terminal consists of storage tank conversion, new pumps and associated piping, new meters, and new control valves. The Van Nuys Terminal is located in an industrial/commercial zone more than a ¼-mile away from the nearest residential receptors. Maximum construction noise is predicted to be 52 dBA at the nearest residential receptors. The predicted construction noise level complies with the "normally acceptable" residential land use class of 60 to 65 dBA and causes no increase in the existing ambient noise levels. As a result Van Nuys Terminal construction noise impacts are predicted to be insignificant.

4.8.2.4 Huntington Beach Terminal

Construction at the Huntington Beach Terminal consists of storage tank conversion, new pumps and associated piping, new meters, and new control valves. The Huntington Beach Terminal is located in a mainly industrial zone. The nearest receptor is the Huntington Central Park, which surrounds the terminal to the north, south and west. Construction siting is assumed to be 300 feet from the nearest border of Huntington Central Park. Maximum construction noise at the Huntington Central Park is predicted to be 65 dBA and result in an average increase in the CNEL during the construction period by one dBA. As a result, Huntington Beach Terminal construction noise impacts are expected to be insignificant.

4.8.3 Operational Impacts

Stationary noise sources for the project include the new and modified mechanical and process equipment that will operate 24 hours per day, seven days per week. The Chevron Safety Design Manual will be adhered to for all new mechanical and electrical equipment to the extent feasible. The specification was primarily designed to address issues related to employee noise exposure and is reviewed by Chevron on a project-by-project basis. This specification limits equipment noise to 85 dBA at a distance of three feet. In addition, for this project, when practical, instruments will also be designed to meet a limit of 80 dBA at a distance of three feet.

Project operational noise levels at the nearest noise receptors were estimated from the new project equipment specified for all new or modified operational processes at the Refinery or terminals. Operational sound levels were extrapolated to receptor distances using standard free-field hemispheric sound propagation (six dBA of reduction per doubling of distance). Predicted maximum operational sound levels are conservatively estimated and do not include sound level reductions due to molecular absorption, anomalous atmospheric absorption or from existing sound barriers such as berms or buildings.

4.8.3.1 Refinery

Additional noise from operation at the Refinery is expected to be due to the addition of new and modified equipment and an increase in onsite railway activity by 3.75 hours per day (peak) from a current average of nine hours per day. For the most part, modifications to or replacements of existing operational equipment are not expected to cause noise audible over the existing noise at Refinery. After completion of the Refinery improvements, offsite rail activity will not increase and additional truck traffic will be negligible. Therefore, there is expected to be no measurable noise increase from traffic. Noise levels at the residences along El Segundo Boulevard and Rosecrans Avenue will continue to be dominated by traffic noise.

New and modified operational noise sources at the Refinery are presented in Table 4.8-3 along with their predicted sound level and distance to the nearest residential receptors, which are located along Rosecrans Avenue. Sound levels are based on the equipment horsepower rating (Hoover and Keith, 1981) or the Chevron Safety Design Manual equipment noise limitation of 85 dBA at a distance of three feet from the equipment.

A conservative, “worse-case” prediction was used with the following assumptions: 1) no attenuation of noise from existing refinery equipment and the existing berm located along the Refinery’s southern property line, 2) all of the noise generated from the project would be generated at the same location, and 3) all of the noise would target one receptor location. Based on these assumptions, maximum sound levels are predicted to be up to 52 dBA. The predicted maximum sound level overstates the expected noise levels from the proposed project. It is anticipated that no individual receptor would be adversely affected by project-generated noise above 50 dBA.

As indicated in Table 3.8-2 in Section 3.8, existing average L_{50} sound levels at these receptors, located in Manhattan Beach, are currently 53 to 65 dBA at residences along the Refinery's Rosecrans Avenue property line (Gates 20, 21 and 22), and 49 to 59 dBA at residences along 36th Place and points south (Pine, Pacific and Armory Avenues). Existing L_{50} sound levels at the nearest residential receptors in El Segundo, north of the Refinery, are 47 to 67 dBA.

Sound levels are predicted to comply with the City of El Segundo local ordinance and are considerably less than the existing CNELs indicated in Table 3.8-2. However, the predicted additional Refinery operational sound levels due to the "worse-case" assumptions described above at the nearest residential receptors along Rosecrans Avenue and south of the Refinery exceed the City of Manhattan Beach noise ordinance limitations for the L_{50} of 50 dBA during the daytime and 45 dBA at night. Therefore, operation of the Refinery may, without mitigation, have a significant noise impact on these residences as a result of the project.

Table 4.8-3
Refinery Operational Noise Sources and Receptor Sound Levels

Location	Equipment	Size (hp)	Total Sound Level @ 3 ft[a]	Distance to Residential Receptor (ft)	Sound Level at Residential Receptor (dBA)[b]	Distance to Commercial Receptor (ft)	Sound Level at Commercial Receptor (dBA)[b]
Alkylate	Pump	40	88	2700	29	3400	27
Dependanizer	Air Cooler	25	85	2700	26	3400	24
Isomax	2 Pumps	30,15	89	1900	32	4200	26
Depentanizer	Cooler Fan	30	85	1900	29	4200	22
FCC Depentanizer	Pump	60	90	2700	31	3400	29
FCC Light Gas	2 Pumps	125/40	93	2700	34	3400	32
Splitter	Cooler Fan	40	85	2700	26	3400	24
Pentane Sphere	3 Pumps	15/15/50	91	2700	32	3400	30
Pentane Export	Compressor	60	97	3000	37	3200	36
Naphtha Hydrotreater No. 1	Pump/Fan/ Blowers	F4531 Package	85	1900	29	4200	22
	Air Cooler	25	85	1900	29	4200	22
Addl. Gas Storage	2 Pumps	1500/1500	99	1200	46	5000	34
FCC WGC Interstage	Pump	75	91	2400	33	3800	29
FCC Deethanizer	Pump	25	86	2600	27	3600	24
FCC Debutanizer	Pump	400	94	2900	34	3200	33
FCC Depropanizer	2 Pumps	75/7.5	91	2900	31	3200	31
FCC C3 Treat	4 Pumps	30/130/5/5	93	2900	34	3200	33
FCC Stack Em. Reduction	Fan/Pump/ Stack/FG Fan	MACT2 Package	85	2400	27	3800	23
FCC Relief/Vapor	Compressor	370	82[c]	2500	48	3700	20
Recovery	3 Pumps	3/NA/NA	89	2500	31	3700	27
	2 Compressors	NA/NA	88	2500	30	3700	26
Refinery	Pump	125	92	4400	29	1800	37
Deisobutanizer	Cooling Tower	2800 GPM	85	4400	40	1800	29
Railway Traffic	Diesel Engine	NA	71[d]	2100	45	2200	44

[a]Estimated sound levels were based on empirical data from equipment of similar hp and type such as pump, compressor or fan (Hoover and Keith, 1994). Sound level estimates for equipment with unknown hp or where data from similar equipment was unavailable was based on Chevron Safety Design Manual noise specification of 85 dBA at 3 feet.
[b] Individual equipment sound levels at receptors estimated from free-field hemispherical sound propagation (standard conditions) of 6 dBA per doubling of distance
[c] Sound pressure level at 50 feet
[d] Sound pressure level at 100 feet at idle or Throttle 1

4.8.3.2 Montebello Terminal

The modifications at the Montebello Terminal would include the following new noise sources: one 60 hp and two 40 hp centrifugal electric pumps (each 85 dBA at 3 feet), approximately 23 truckloads of ethanol per day, and approximately 30 minutes of diesel locomotive and rail car operation per day. Since the surrounding land use is mainly industrial and commercial, the additional truck traffic is not expected to cause a significant increase in the overall traffic volume or operational noise.

The new pumps will be located approximately 200 feet from nearest commercial area and 700 feet from the nearest receptors – residences to the north of the terminal. These additional noise sources are predicted to be 49 dBA at the nearest commercial area, and 41 dBA at the nearest residential receptors, which complies with local ordinances and is significantly less than the estimated existing CNELs. Therefore, operational noise from the pumps and tanker trucks at the Montebello Terminal is not expected to result in a significant noise impact.

However, the operation of the rail spur includes the daily delivery and pick-up of up to 12 rail cars in the northern portion of the Montebello Terminal site. Each delivery/pick-up would consist of approximately 20 minutes of operation per day (Monday through Friday) between 10:00 AM and 1:00 PM. Noise generated by this operation would come from the diesel locomotive exhaust and from the rail car wheels on the railroad tracks. Typical sound levels for these combined noise sources travelling at low speeds and a standard muffled locomotive is 75 dBA at 100 feet (Harris, 1979). Because the rail spur would be located approximately 50 feet from the Montebello Terminal property line, the operational noise from the rail cars and locomotive is estimated to be 81 dBA at the Montebello Terminal property line (using the inverse of the standard free-field hemispheric sound propagation formula of six dBA per doubling of distance).

The City of Montebello Municipal Code Chapter 17.22 states that operational noise levels at the lot line of the noise generator must not exceed 65 dBA for more than 30 minutes in any daytime hour (7 a.m. to 10 p.m.) or 70 dBA for more than 15 minutes in any daytime hour (7 a.m. to 10 p.m.). Therefore, the estimated operational sound levels from the rail cars and locomotive exceed the noise limits of the City of Montebello. This is considered a significant impact.

4.8.3.3 Van Nuys Terminal

The modifications at the Van Nuys Terminal are not expected to include new noise sources except for one 60 hp and two 40 hp centrifugal electric pumps (each 85 dBA at three feet), and approximately 15 truckloads of ethanol per day. Since the surrounding land use is mainly industrial and commercial, the additional truck traffic is not expected to cause a significant increase in the overall traffic volume or operational noise. Pumps will be located more than 200 feet from commercial receptors and approximately ¼-mile from residential receptors.

Additional noise is predicted to be 48 dBA or less at commercial receptors and 35 dBA at residential receptors, which complies with local ordinances and is significantly less than the existing CNELs. Therefore, operation of the proposed project at the Van Nuys Terminal is not predicted to increase the estimated existing noise levels or have a significant noise impact.

4.8.3.4 Huntington Beach Terminal

The modifications at the Huntington Beach Terminal are not expected to include new noise sources except for one 60 hp and two 40 hp centrifugal electric pumps (each 85 dBA at three feet) and approximately 12 truckloads of ethanol per day. Since the surrounding land use is mainly industrial and commercial, the additional truck traffic is not expected to cause a significant increase in the overall traffic volume or operational noise. Pumps will be located approximately 300 feet from a nearby public park area that is the nearest receptor to terminal noise. Additional noise is predicted to be 48 dBA at the nearest park property line, which complies with local ordinances and is less than the existing CNELs. Therefore, operation of the Huntington Beach Terminal is predicted to have an insignificant noise impact as a result of the project.

4.8.4 Mitigation Measures

This section describes mitigation measures for potential noise impacts.

4.8.4.1 Construction Mitigation Measures

Temporary noise impacts from project construction activities are not expected to be significant at the Refinery or at the Van Nuys or Huntington Beach Terminals. However, construction impacts of the rail spur in the northern portion of the Montebello Terminal, although temporary, are considered significant.

Guidelines are available, however, for minimizing unforeseen construction noise impacts (Bies and Hansen, 1988). Minimizing construction noise in residential areas requires consideration of the best available equipment during each construction stage. Table 4.8-4 presents the noise minimization measures that will be used to ensure that the potential construction sound is minimized. Noise minimization activities will target the most dominant noise sources, usually the heavy diesel construction vehicles, and assure that they are fitted with adequately functioning mufflers. In addition, air compressors and generators will also have adequate mufflers, and to the extent feasible, will be mitigated by locating them behind barriers that will shield and direct their noise away from the affected residential receptors.

Additionally, construction of the rail spur at the Montebello Terminal will be limited to daytime hours between Monday and Friday for a duration of no more than four to five weeks. Because the construction will be temporary (no more than four to five weeks in duration) and limited to daytime hours between Monday and Friday, the noise impacts from rail spur construction would be mitigated to less than significant.

Table 4.8-4
Noise Minimization Measures for Construction

Measure		Noise Reduction Efficiency
N-1	Specify that quiet equipment, including functioning muffler devices, be used.	Up to 6 dBA
N-2	Shield noise sources from receptor by inserting temporary noise barriers or locating construction equipment behind existing structures and equipment when feasible.	6 to 10 dBA
N-3	Specify that all mufflers be properly maintained throughout the construction period.	NQ
N-4	Use rubber-tired equipment rather than track equipment where feasible.	NQ
N-5	Keep loading and staging areas away from noise-sensitive land uses to the extent feasible.	6 dBA per doubling of distance to receptor
N-6	Minimize truck traffic on streets adjacent to residential uses, to the extent possible.	NQ
N-7	Prohibit routing of truck traffic through residential areas.	NQ
N-8	Rail Spur construction at the Montebello Terminal will be limited to daytime hours (7:00 AM to 6:00 PM) during the weekdays (Monday through Friday).	NQ
NQ - Not Quantified		

4.8.4.2 Operational Mitigation Measures

Refinery

The existing and future noise environment for land uses around Refinery is considered normally acceptable for their respective residential and non-residential uses. The estimated noise from the operation of the proposed project at the Refinery, however, is predicted to potentially exceed the noise ordinance for the City of Manhattan Beach, although it is predicted to be within limits with respect to other noise limits and guidelines and at or below average existing background ambient noise levels. As a result of the predicted noncompliance with the City of Manhattan Beach noise ordinances, however, there is a potential for a significant impact from operational noise.

It is important to note that sound level estimates presented here are conservative. Actual sound levels from the project operation will likely be significantly lower due to additional sound attenuation from existing barriers, molecular absorption, and anomalous atmospheric absorption.

Based on the predicted sound levels, a reduction of seven dBA in overall sound level is estimated to be necessary in order for the project operation to be within the City of Manhattan Beach noise ordinance limits. Mitigation measures that will result in a predicted sound level reduction of seven dBA are presented in Table 4.8-5.

Table 4.8-5
Noise Mitigation Measures for Refinery Operation

Measure		Noise Reduction of Equipment Source
N-9	Specify that all pumps and compressors meet Chevron specification of 85 dBA at 3 feet limit.	Up to 11 dBA, assuming a reduction to 85 dBA from the estimated sound level before the specification.
N-10	Minimize rail traffic noise through proper routine maintenance	2 to 3 dBA

Table 4.8-6 presents the resultant sound levels after these mitigation measures have been applied. It is Chevron's policy to prevent further degradation of the sound environment and to assure worker safety by directing that all new equipment will be specified and purchased with an equipment noise limit of 80 to 85 dBA measured at three feet from the equipment to the extent possible. Exceptions may be evaluated on a case-by-case basis to ensure no degradation of the sound environment.

Sound levels from the onsite rail activity can vary depending upon many factors. Rail traffic noise, however, should be minimized as practical through proper routine maintenance of the engine and rail cars.

With implementation of the mitigation measures, the noise impacts of Refinery operation would be reduced to below significance.

Terminals

Operation of the Van Nuys and Huntington Beach Terminals is predicted to have an insignificant noise impact as a result of the proposed project. Thus, no mitigation measures are required.

Operation of the rail spur at the Montebello Terminal is predicted to have a significant impact on the residences located to the north of the terminal. Several mitigation measures were considered to lessen the impacts to insignificance. However, none of the mitigation measures considered were deemed feasible. Under CEQA Guidelines (§15126.4(a)(1)), "an EIR shall describe feasible measures which could minimize significant adverse impacts." According to §15364 of the CEQA Guidelines, when determining the feasibility of a mitigation measure, it is acceptable to take into account economic, environmental, legal, social, and technological factors.

Table 4.8-6
Refinery Operational Noise Sources and Receptor Sound Levels After Mitigation

Location	Equipment	Size (HP)	Total Sound Level @ 3 ft[a]	Distance to Residential Receptor (ft)	Sound Level at Residential Receptor (dBA)[b]	Distance to Commercial Receptor (ft)	Sound Level at Commercial Receptor (dBA)[b]
Alkylate Depentanizer	Pump	40	85	2700	26	3400	24
	Air Cooler	25	85	2700	26	3400	24
Isomax Depentanizer	2 Pumps	30,15	88	1900	31	4200	25
	Cooler Fan	30	85	1900	29	4200	22
FCC Depentanizer	Pump	60	85	2700	26	3400	24
FCC Light Gas Splitter	2 Pumps	125/40	88	2700	29	3400	27
	Cooler Fan	40	85	2700	26	3400	24
Pentane Sphere	3 Pumps	15/15/50	89	2700	30	3400	28
Pentane Export	Compressor	60	85	3000	25	3200	24
Naphtha Hydrotreater No. 1	Pump/Fan/ Blowers	F4531 Package	85	1900	29	4200	22
	Air Cooler	25	85	1900	29	4200	22
Addl. Gas Storage	2 Pumps	1500/1500	88	1200	35	5000	23
FCC WGC Interstage	Pump	75	85	2400	27	3800	23
FCC Deethanizer	Pump	25	85	2600	26	3600	23
FCC Debutanizer	Pump	400	85	2900	25	3200	24
FCC Depropanizer	2 Pumps	75/7.5	86	2900	26	3200	26
FCC C3 Treat	4 Pumps	30/130/5/5	89	2900	30	3200	29
FCC Stack Em. Reduction	Fan/Pump/ Stack/FG Fan	MACT2 Package	85	2400	27	3800	23
FCC Relief/Vapor Recovery	Compressor	370	85	2500	33	3700	6
	3 Pumps	3/NA/NA	85	2500	26	3700	23
	2 Compressors	NA/NA	88	2500	22	3700	11
Refinery Deisobutanizer	Pump	125	85	4400	22	1800	30
	Cooling Tower	2800 GPM	85	4400	22	1800	29
Railway Traffic	Diesel Engine	NA	69[c]	2100	43	2200	42

[a]Estimated sound levels were based on empirical data from equipment of similar hp and type such as pump, compressor or fan (Hoover and Keith, 1994). Sound level estimates for equipment with unknown hp or where data from similar equipment was unavailable was based on Chevron Safety Design Manual noise specification of 85 dBA at 3 feet.
[b] Individual equipment sound levels at receptors estimated from free-field hemispherical sound propagation (standard conditions) of 6 dBA per doubling of distance
[c] Sound pressure level at 100 feet at idle or Throttle 1

Based on these guidelines, the following mitigation measures were considered, but were deemed infeasible due to economic, environmental, legal, social, and technological factors:

- Erecting a sound barrier along the northern lot line of the terminal property.

  Building a sound wall along the northern lot line of the terminal property may reduce the operational noise from rail spur operation, but a sound barrier is unlikely to reduce the noise impacts below significance because some of the rail spur operation would occur offsite within the railroad right-of-way located adjacent to the north of the terminal. The locomotive that would be used to move the rail cars on and offsite would be located on the railroad tracks in the adjacent railroad right-of-way, thus a sound barrier would likely not be effective in reducing locomotive noise.

Additionally, a break in the sound barrier would be required where the rail spur enters the terminal property from the railroad right-of-way. This would reduce the effectiveness of the sound barrier.

- Using a locomotive that would generate less noise or be equipped with specialized sound muffling equipment.

  This mitigation measure is considered infeasible due to technological considerations. At this time it is impossible to ascertain whether there are alternative types of locomotives available for use that may generate less noise during operation. Additionally, it is uncertain if there is available sound muffling equipment that could effectively reduce the noise generated by a locomotive.

4.9 Public Services

Impacts to public services will be considered significant if:

- Additional service needed from the fire departments requires an increased fire department work force.

4.9.1 Construction and Operation Impacts

As the proposed project would result in only minor modifications to existing industrial facilities, no significant impacts to fire services provided by the City of El Segundo Fire Department, City of Montebello Fire Department, City of Los Angeles Fire Department, or City of Huntington Beach Fire Department are expected to occur as a result of either construction or operation of the proposed project. Chevron maintains its own onsite fire department at the Refinery, as discussed in Section 3.9.2. Additionally, fire stations in the areas near the Refinery and the terminals are equipped to handle emergency response incidents at industrial facilities. Close coordination with local fire departments and emergency services will be continued.

The proposed project will not create the need for additional personnel or equipment. Therefore, no significant adverse impacts to fire services will occur as a result of the project.

4.9.2 Mitigation Measures

Because no significant impacts to public services are expected as a result of the proposed project, no mitigation is necessary or proposed.

4.10 Solid and Hazardous Waste

Impacts to waste disposal will be considered significant if the generation and disposal of either nonhazardous or hazardous waste exceeds the capacity of designated landfills.

4.10.1 Nonhazardous Waste Generated During Construction

Refinery

There would be an increase in the generation of nonhazardous wastes as a result of the demolition of existing structures, grading to provide foundations for new structures, and installing new structures. It is estimated that during the construction of the proposed project at the Refinery, approximately 300 tons of municipal (nonhazardous) solid waste would be generated over a 24-month period. It is estimated that about 10 percent of the waste would be recycled and the remaining 90 percent would be landfilled offsite. Solid waste generated at the Refinery would be disposed of at the Bradley Canyon Landfill maintained by the LACSD. However, as stated in Section 3.10, all of the landfills maintained by LACSD have the capacity to accept the waste produced by the proposed project.

Construction activities could uncover hydrocarbon-contaminated soils, given the heavily industrialized nature of the Refinery facilities and the fact that refining activities, petroleum storage, and distribution have been conducted at the sites for a number of years. It is estimated that 43,000 cubic yards of soil will be generated as a result of construction activities at the Refinery. Approximately 19,000 cubic yards of the soil is expected to contain more than the regulatory limit for hydrocarbon content and will be recycled offsite as a nonhazardous waste at the American Remedial Technologies facility in Lynnwood, California. Approximately 24,000 cubic yards of the dirt is expected to contain less than the regulatory limit for oil content and will be used as fill material onsite.

Handling of hydrocarbon-containing soil is regulated by SCAQMD Rule 1166 and by a source-specific Clean Up and Abatement Order from the LARWQCB for the Refinery. Hydrocarbon-containing soil generated during construction will be handled according to these two requirements. Therefore, significant adverse impacts due to contaminated soil excavation are not expected.

Terminals

Construction activities at the distribution terminals would generate a minimal amount of nonhazardous waste during the six-month construction period. Nonhazardous waste generation would include paper products and metals from piping replacement. It is estimated that approximately 10 percent of these wastes would be recycled and the remaining wastes would be disposed of at an approved landfill. Solid waste generated at the Montebello and Van Nuys

Terminals would be disposed of at one of the landfill sites maintained by the LACSD, and solid waste generated at the Huntington Beach Terminal would be disposed of at one of the landfill sites maintained by the Orange County Integrated Waste Management District. As stated in Section 3.10, these sites have adequate capacity to accept the waste produced by the proposed project.

As the increases in solid waste disposal related to construction/demolition activities would be small and temporary and the capacity of the landfills in Los Angeles and Orange counties is sufficient to handle project-related wastes, the nonhazardous solid waste impacts related to construction activities are expected to be less than significant.

4.10.2 Hazardous Waste Generated During Construction

At the Refinery, there may be an increase in the amount of hazardous waste generated and disposed offsite as a result of the proposed project construction. Asbestos-containing materials may be generated as a result of piping modifications at the Refinery and terminal sites. Suspect asbestos-containing materials would be characterized and treated/disposed of offsite in accordance with applicable regulations.

Additionally, proposed modifications to the Refinery's Alkylation Unit Deisobutanizer would generate approximately 356 cubic yards of potentially hazardous soil as this area was formerly used as a waste disposal site. The types of waste disposed of in this area are not known; however, soil excavated from this area will be characterized and treated/disposed of offsite in accordance with applicable regulations. There is adequate capacity at the Class I landfills in California (see Section 3.10) to accommodate this one-time disposal event. Therefore, the generation of 356 cubic yards of potentially hazardous soil is not considered a significant impact.

4.10.3 Hazardous Waste Generated During Operation

At the Refinery, project operations would generate approximately 45 tons per year of hazardous waste in the form of spent CO and SCR catalyst. The spent CO and SCR catalyst would be recycled for metals recovery or landfilled. As stated in Section 3.10, the three Class I landfills in California have a total permitted capacity of 23.3 million cubic yards. Therefore, the small quantities of hazardous waste that would be generated by project operations (45 tons per year) is not expected to have a significant impact on the capacity of the three Class I landfills in California.

At the terminals, no new types or quantities of hazardous waste will be generated or transported offsite as a result of the proposed project operations.

4.10.4 Nonhazardous Waste Generated During Operation

Because there would be no new operations or expansion of existing operations that would generate waste, no measurable increase in the generation of nonhazardous wastes are expected due to the proposed project at either the Refinery or the terminals. No significant impacts on solid waste facilities are expected.

4.10.5 Mitigation Measures

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

4.10.6 Ongoing Waste Reduction Policies

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

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

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

The Refinery will update its current SB14 Plan to reflect the additional hazardous wastes that will be generated at the Refinery. As required under SB14, the reduction of waste will be made where deemed technically and economically feasible. Recycling of all wastes, including nonhazardous and municipal wastes, will also be evaluated where appropriate.

4.11 Transportation/Circulation

This section describes the potential impacts of the proposed development upon the surrounding arterial traffic network. Traffic generated by development of the proposed project is added to the existing volumes presented in Chapter 3, and the resulting capacity impacts are assessed.

Impacts to transportation and circulation will be considered significant if the following criteria are met:

- A major roadway or railroad is closed to all through traffic and no alternate route is available.
- Peak period levels on major arterials within the vicinity of the Refinery and/or terminals are disrupted to a point where intersections with a LOS of C or worse are reduced one full level as a result of the project for more than two months.
- The project will increase traffic to and/or from any one facility or site by more than 350 truck trips per day.
- The project will increase customer traffic to a facility by more than 700 trips per day.
- The volume to capacity ratio increases by two percent for intersections with a LOS rating of E or F for more than two months.

4.11.1 Construction Impacts

4.11.1.1 Trip Generation

Refinery

Construction of the proposed project at the Refinery is scheduled to be completed in two phases, with Phase 1 beginning January 2002 and ending in December 2002 and Phase 2 beginning January 2003 and ending in September 2003. Construction is anticipated to take place five days per week in a single 10-hour work shift, from 6:30 a.m. to 5:00 p.m.

At the Refinery, the construction effort during Phase 1 is anticipated to require the highest average (period longer than two months) of construction workers. This average is estimated to be 200 workers for the majority of the length of Phase 1 construction, with the exception of the peak manpower period of 340 workers, which is expected to last two months during the 12 month construction period. Because of the short duration of the peak construction period, the average manpower estimate was used in this analysis to more accurately reflect the anticipated traffic changes that would result from construction of the proposed project. Using an average of 1.3 persons per vehicle for 200 workers (Bechtel, 2000), the vehicle occupancy rate was calculated to be 154 daily vehicles, (average number of construction workers is 200 workers/1.3 workers per vehicle), or 308 vehicle trips per day during the construction period with the highest number of construction workers (Phase 1). As a conservative or "worse-case" analysis, the maximum expected employees at the construction site was assumed to occur daily.

The average daily truck traffic at the Refinery during construction would be approximately 72 trucks per day. These trucks would be travelling to the Refinery to deliver construction materials. Commercial truck and delivery vehicles largely avoid deliveries during peak hours for economic reasons as the cost for a delayed truck and driver is extremely costly. As a result, material deliveries mainly would be spread throughout the work day, with few deliveries occurring during the peak hour. Therefore, their contribution to overall traffic impacts would be negligible.

Construction activities at the Refinery will occur during a five-day work week beginning at 6:30 a.m. and ending at 5:00 p.m. As indicated in the CMP Guidelines, the peak hours of the street system surrounding the Refinery occur during the morning peak period of 7:00 a.m. to 9:00 a.m. and the evening peak period of 4:00 p.m. to 6:00 p.m. Because the construction shift starts at 6:30 a.m., traffic attributable to the construction of the project will arrive at the Refinery before the morning peak period would begin and therefore is not expected to affect the morning peak hour intersection capacity utilization (ICU) values. However, because the construction shift ends at 5:00 PM, traffic attributable to the construction of the project will leave the site during the evening peak period. Therefore, the traffic analysis examines impacts from traffic attributable to the proposed project only during the evening peak hour.

Terminals

The construction activities at the terminals would begin some time during the second quarter of 2002 (April to June) and are expected to last from three to six months. Actual construction start times will vary at the terminal sites, but construction is anticipated to take place five days per week in a single 10-hour work shift, from 7:00 a.m. to 6:00 p.m.

As indicated above, a change of two percent at an intersection caused by the addition of project traffic is considered a significant change. A typical four-legged intersection, operating at an acceptable level of service, will have approximately 3,000 to 6,000 vehicles using the intersection during a peak hour. To result in a two percent change in the ICU, a minimum of 60 vehicles during the peak hour would be required (3,000 vehicles x .02 = 60 vehicles). The addition of 20 vehicles trips anticipated during construction, assuming a "worse-case" vehicle occupancy rate 1.0 persons per vehicle (with such a small number of workers, it is unlikely that there would be ridesharing/carpooling among terminal construction workers), would result in the addition of 20 vehicle trips to surrounding intersections. The addition of 20 vehicle trips at intersections surrounding the terminals is below the minimum of 60 vehicles identified above and will not cause a two percent change in the ICU value at these intersections. Therefore, construction traffic at intersections surrounding the terminal locations is not expected to result in significant traffic impacts. Additionally, the estimated 20 vehicle trips is below the threshold (50 peak hour trips) required by the CMP guidelines; hence, no additional traffic analysis was completed for construction-related traffic at the terminal sites.

Table 4.11-1 summarizes the total number of anticipated peak construction vehicles at the Refinery and each terminal site.

Table 4.11-1
Construction Traffic Summary

Location	Peak # Vehicles	Estimated Construction Time
Refinery	154 worker vehicles 72 trucks	21 months
Montebello Terminal	6-20	3-6 months
Van Nuys Terminal	6-20	3-6 months
Huntington Beach Terminal	6-20	3-6 months

4.11.1.2 Trip Distribution

Distribution of project generated traffic was derived from observation of existing travel patterns in the vicinity of the Refinery. In addition, it was assumed that construction workers would enter the site at Gate 8 on El Segundo Boulevard and Gate 22 on Rosecrans Avenue and trucks to deliver equipment, piping, etc., would enter the site at Gate 2 on El Segundo Boulevard or at Gate 10A on Sepulveda Boulevard. It was also assumed that construction personnel would commute to the site in private automobiles although carpooling would be encouraged. Railroad cars carrying heavy equipment would enter the project site from the rail line that crosses Sepulveda Boulevard/SR-1. The estimated trip distribution for the Refinery is illustrated in Figure 4.11-1.

4.11.1.3 2000/Existing Plus Project Traffic Impacts

To estimate the project-related traffic volumes at various points on the transportation system adjacent to the Refinery and thereby establish the magnitude and extent of traffic impacts, a three-step process was utilized. First, the amount of traffic that would be generated during construction was determined. Second, the construction traffic was geographically distributed to appropriate residential, commercial, and industrial areas. Finally, the trips were assigned to specific roadways and the traffic increases were evaluated on a route-by-route basis.

Roadways in the vicinity of the project would be affected by the project's construction-related traffic. However, project-related construction traffic would contribute less than two percent of the daily traffic volume on these roadways.

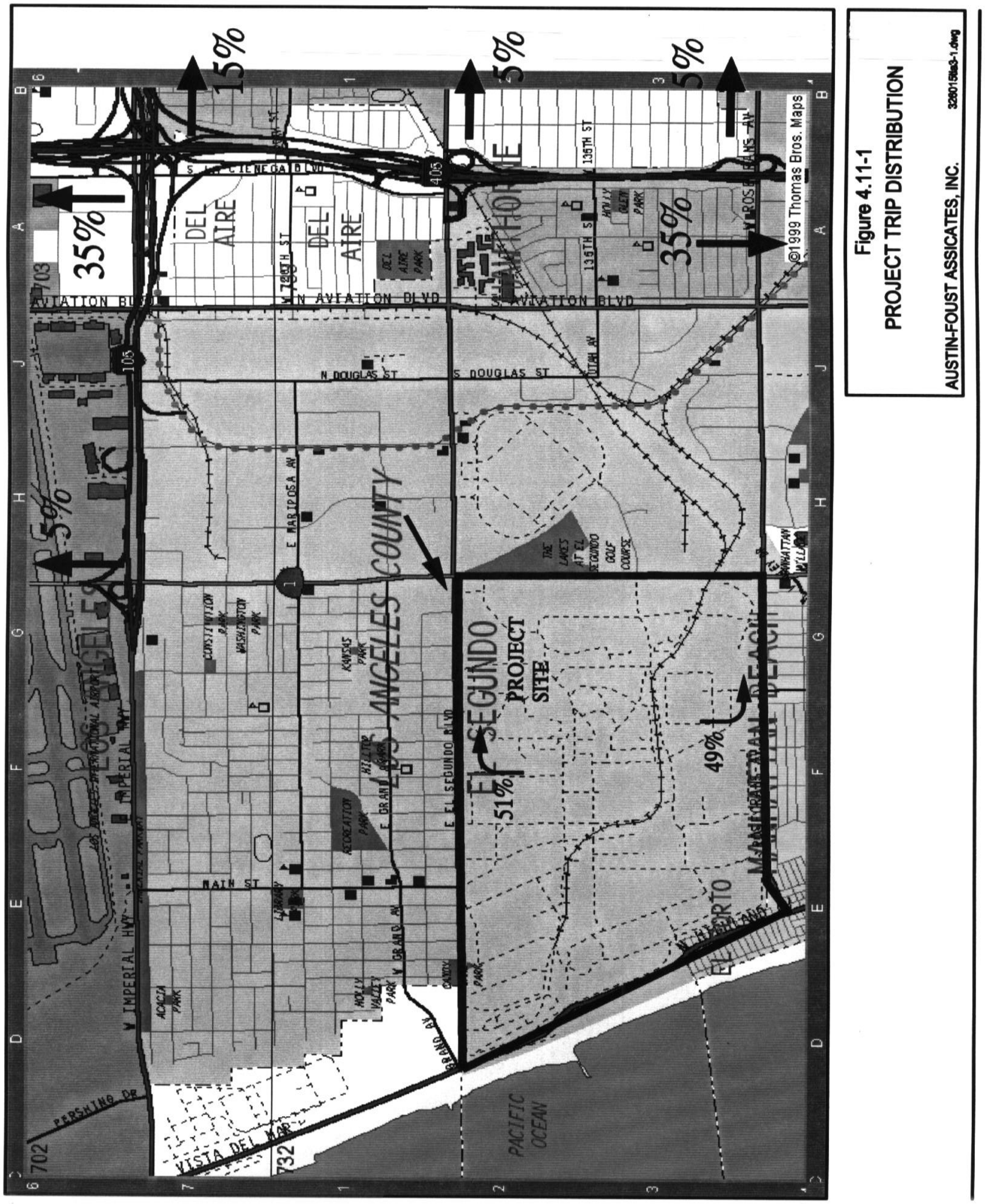

Figure 4.11-1 Project Trip Distribution

To more carefully assess the affects of the additional traffic on the surrounding roadways, an ICU analysis was conducted for the 12 intersections which would be most directly impacted by project construction traffic. Analysis year-plus-project intersection volumes were generated by adding the project-related intersection volumes to the existing (Year 2000) intersection volumes. Project turn volumes for the current evening peak hour are illustrated in Figure 4.11-2. Existing-Plus-Project PM peak hour volumes are illustrated in Figure 4.11-3. The corresponding ICUs for existing-plus-project PM peak hour volumes are summarized in Table 4.11-2 (actual ICU calculations are included in Appendix F). An examination of Table 4.11-2 reveals that project construction traffic does not disrupt the evening peak period to a point where intersections with an LOS C or worse are reduced one full level. In addition, project-related construction will not increase traffic to and/or from the Refinery by more than 350 truck trips per day and the proposed project will not increase customer traffic to the Refinery by more than 700 trips per day.

The analysis does indicate that project-related construction will cause a two percent change in the ICU values at four of the twelve intersections studied (Sepulveda/SR-1 and El Segundo Boulevard, La Cienega and El Segundo Boulevard, I-405 NB on/off and El Segundo Boulevard, and Hindry Avenue and I-405 SB on/off). However, three of the intersections are operating at LOS C; therefore, this change is not considered significant. One of the four intersections that would experience a two percent change for more than two months, Sepulveda/SR-1 & El Segundo Boulevard, is currently operating at LOS E and therefore this two percent change is considered a significant impact.

Table 4.11-2
Existing and Forecast Level of Service Summary

Intersection	Existing PM	Existing+ Project PM	% Change
1. Sepulveda/SR-1 & El Segundo Blvd	.953	.976	.023
2. Sepulveda/SR-1 & Rosecrans Ave	1.066	1.082	.016
3. Sepulveda/SR-1 & Imperial Hwy	1.115	1.120	.005
4. Aviation Blvd & El Segundo	.949	.963	.014
5. Aviation Blvd & Rosecrans	1.203	1.218	.015
6. La Cieniga & I-405 SB on/off	.569	.569	-NC-
7. La Cieniga & El Segundo	.706	.726	.020
8. I-405 SB on & El Segundo	.629	.633	.004
9. I-405 NB On/off & El Segundo	.742	.762	.020
10. I-405 SB off & Rosecrans	.635	.635	-NC-
11. I-405 NB on/off & Rosecrans	.689	.691	.002
12. Hindry Ave & I-405 SB on/off	.765	.795	.030

Level of service ranges: .00 - .60 A; .61 - .70 B; .71 - .80 C; .81 - .90 D; .91 - 1.00 E; Above 1.00 F

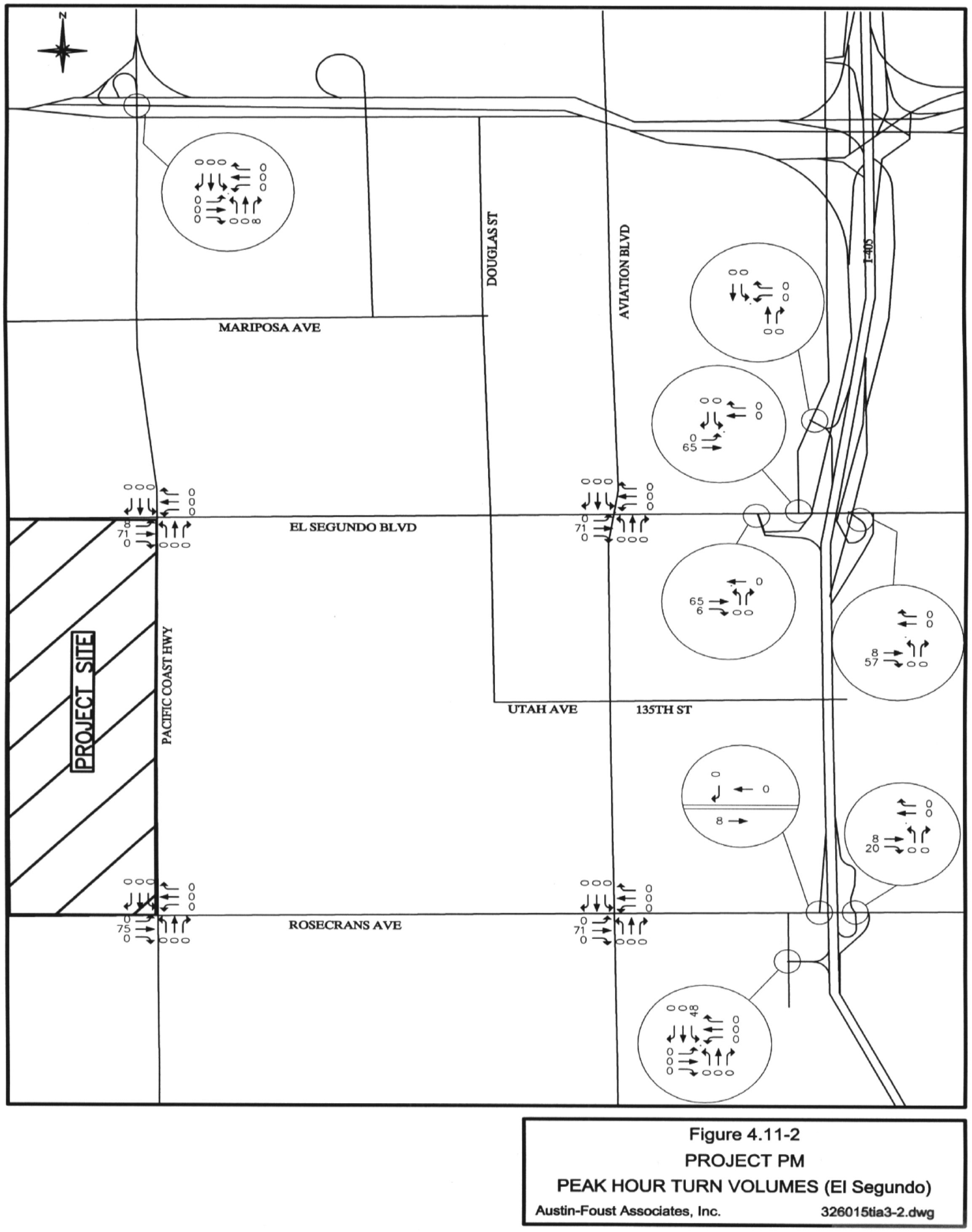

Figure 4.11-2 Project PM Peak Hour Turn Volumes

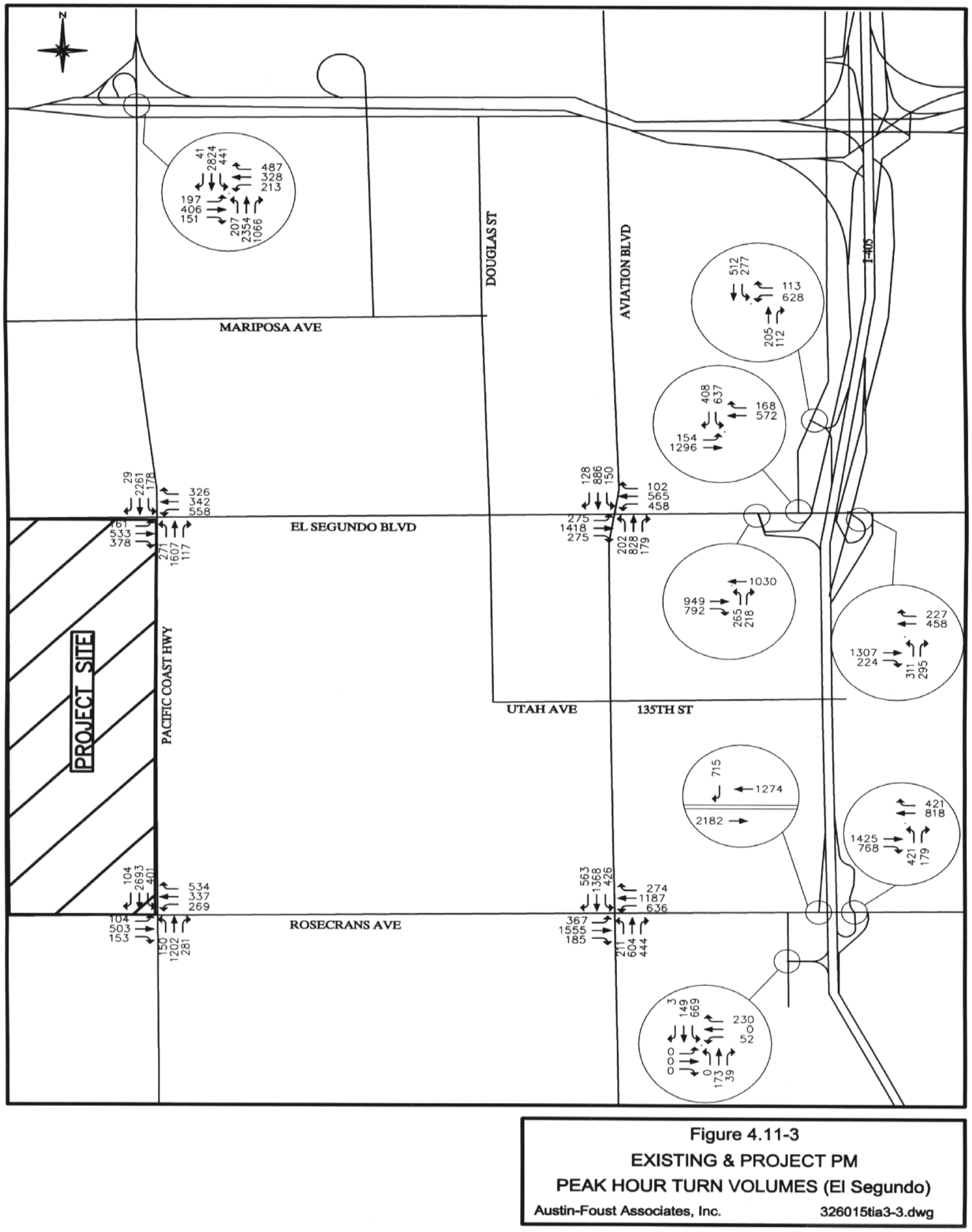

Figure 4.11-3 Existing + Project PM Peak Hour Turn Volumes

4.11.1.4 Onsite Circulation and Parking

Sufficient onsite parking is available to accommodate the increased parking demand from construction workers at the terminal locations.

The Refinery has parking capacity beyond the current operational requirements. On any given day, approximately 25 percent of the employees are not on the premises because of rotating shifts, vacations, and sick leave. Two construction worker parking areas are proposed within the Refinery property and will provide sufficient capacity to accommodate the forecast peak parking demand from the construction efforts. The total number of parking spaces exceeds the maximum number of construction workers, which will allow for fluctuations in manpower and will provide ample maneuvering space for construction trucks.

There are no additional operational employees required for this project, so no new parking facilities are needed as a result of operation of the proposed project.

4.11.2 Operational Impacts

Anticipated operation vehicle traffic at the Montebello, Van Nuys, and Huntington Beach Terminals is forecasted to be below the CMP guidelines. However, the rail car deliveries at the Montebello Terminal are expected to have an affect on vehicular traffic on Vail Avenue (adjacent to the east of the terminal) and to a lesser extent Maple Avenue. Thus, an analysis of the impacts on traffic on Vail Avenue and Maple Avenue due to operation of the rail spur at the Montebello Terminal was performed by Austin-Foust Associates (see Appendix F).

The rail car delivery of ethanol to the Montebello Terminal is proposed to occur Monday through Friday between 10:00 AM and 1:00PM, with traffic on Vail Avenue blocked a maximum of six times per day for up to 9.5 minutes per day, with the longest closure being up to four minutes-during this three-hour window. Maple Avenue will be interrupted up to two minutes during this period.

Rail loading and unloading at the Montebello Terminal will include a sequence of events. Table 4.11-3 provides the timing associated with the sequencing described below.

1. The arriving locomotive with 12 full rail cars will stop prior to crossing Vail Avenue and disconnect the 12 full rail cars.

2. The locomotive will pull forward of the Chevron rail switch, which will be opened, and the locomotive will back into the Montebello Terminal to connect to the 12 empty rail cars. The locomotive will stop short of Vail Avenue but may activate the gates even though the

locomotive does not cross Vail Avenue. If the crossing devices are activated, Vail Avenue will be closed for a maximum of one minute.

3. The locomotive with 12 empty rail cars will pull out of the Montebello Terminal and stop short of Vail Avenue. The Vail Avenue crossing devices will be activated for a maximum of one minute.

4. After the Chevron rail switch is closed, the locomotive with the 12 empty rail cars will back down the tract to connect with the 12 full rail cars. The Vail Avenue crossing devices will be activated for up to one minute.

5. The locomotive with 24 rail cars will proceed past Vail Avenue and stop approximately 500 feet past Maple Avenue. The Vail Avenue crossing devices will be activated for up to 90 seconds. The Maple Avenue crossing devices will be activated for up to two minutes.

6. After the Chevron rail switch is opened, the 24 rail cars will be backed into the Montebello Terminal and the 12 full rail cars will be disconnected. The Vail Avenue crossing devices will be activated for up to four minutes.

7. The locomotive with the 12 empty rail cars will pull out of the Montebello Terminal again activating the Vail Avenue rail crossings for up to one minute while the Chevron rail switch is closed.

8. The locomotive with the 12 empty rail cars will proceed west to the Union Pacific Railroad yard.

Table 4.11-3 Sequence Timing	
Activity	**Time**
Disconnect full rail cars	2 minutes
Proceed to west side of switch	1 minute
Realign Chevron switch	1 minute
Back into Chevron property	1 minute
Connect empty rail cars	4 minutes
Proceed out of Chevron past Vail Avenue	1 minute
Wait for cars to clear Vail Avenue and realign switch	2 minutes
Back up to full rail cars	2 minutes
Connect to full rail cars	1 minute
Proceed past Vail Avenue and Maple Avenue	2 minutes
Wait for cars to clear Vail Avenue and realign switch	2 minutes
Back into Chevron and drop off full cars	3 minutes
Proceed out of Chevron past Vail Avenue	1 minute
Wait for cars to clear Vail Avenue and realign switch	4 minutes
Cross Vail Avenue and go back to rail yard	1 minute
The total time that it takes to perform the rail car transfer operation is based on starting the timing when the locomotive comes to a stop west of the Chevron rail switch.	

The total time required to perform the rail car transfer is 28 minutes during which Vail Avenue will be closed and re-opened a total of six times and Maple Avenue will be closed once. Traffic volume counts for Vail Avenue and Maple Avenue were collected every 15 minutes for a 24-hour period on a typical weekday. As discussed in Section 3.10, during the peak 15 minute period between 10:00AM and 1:00PM, 142 vehicles cross the Union Pacific Railroad track on Vail Avenue and 94 vehicles cross the tracks on Maple Avenue. This is equivalent to 10 vehicles per minute on Vail Avenue and six vehicles per minute on Maple Avenue. Assuming the rail delivery to the Montebello Terminal occurs during the peak 15-minute period then the six closings of Vail Avenue will result in a total of 95 vehicles being delayed an average of 51 seconds each. The worst case delay during the maximum four minute closure at Vail Avenue will be 40 vehicles delayed an average of 123 seconds. The one closing of Maple Avenue will result in 12 vehicles being delayed an average of just over one minute each.

The vehicular delay to due rail car operations at the Montebello Terminal is not considered significant as defined by SCAQMD significance criteria since there are adequate alternate routes available. However, there is the potential for the road blockage to affect the response times of emergency vehicles attempting to use Vail Avenue between 10:00 AM and 1:00 PM Monday through Friday. Mitigation is proposed to minimize the potential delays to emergency service vehicles. Chevron will notify the appropriate emergency services in the City of Montebello of the scheduled road blockages.

4.11.3 Mitigation Measures

Based on the traffic analysis performed for this project, one (Sepulveda/SR1 & El Segundo Boulevard) of the 12 intersections in the vicinity of the Refinery will be significantly impacted as a result of project-related construction. It should be noted that as a result of the proposed project, this intersection experiences an increase in the LOS of 0.023 or 0.003 above the maximum allowable change for a non-significant impact. This represents an increase of 10 vehicles per hour over an otherwise non-significant impact. In other words, if 10 less employee vehicles use this intersection during the evening peak hour, then there is no significant impact.

Several mitigation measures were considered to lessen the impacts to insignificance. However, none of the mitigation measures considered were deemed feasible. Under CEQA Guidelines (§ 15126.4(a)(1)), "an EIR shall describe feasible measures which could minimize significant adverse impacts…" According to § 15364 of the CEQA Guidelines, when determining the feasibility of a mitigation measure, it is acceptable to take into account economic, environmental, legal, social, and technological factors.

Based on these guidelines, the following mitigation measures were considered, but were deemed infeasible due to economic, environmental, legal, social, and technological factors:

- Road improvements to increase the capacity of the impact intersection.

  An additional eastbound through lane would have to be constructed on El Segundo Boulevard to increase the capacity of the intersection. Such construction would require acquisition of additional right-of-way and demolition of existing buildings along the southside of El Segundo Boulevard both east and west of Sepulveda Boulevard. Such acquisition and building demolition would cost millions of dollars, would require an environmental review, could not be accomplished in the time frame established for this project, and is not commensurate with the short-term construction impact.

- Shifting the construction start time from 6:30 a.m. to an earlier time or a later time so that the construction end time would occur outside of the evening peak period.

  This mitigation is considered infeasible due to economic and technological considerations. Shifting the start of construction earlier or later would require construction workers to work in the dark, making it necessary to provide lighting and other special equipment that would increase the costs of construction the project. Such construction might also cause significant noise impacts since allowable noise levels at night are lower and generators used to power the lights would be additional noise sources.

- Provide offsite parking areas for construction workers and bus them onto the Refinery site.

  Identifying and establishing offsite parking and providing transportation to and from the Refinery would not be cost effective for the relatively small number of construction workers and short duration of construction required for this project.

Mitigation is required to reduce the impact due to closure of Vail Avenue and Maple Avenue during delivery of ethanol by rail to the Montebello Terminal. Emergency vehicles may be required to use these portions of Vail Avenue and Maple Avenue during the delivery of ethanol to the Montebello Terminal. . As previously stated, traffic on Vail Avenue may be blocked for up to 9.5 minutes during a period of 28 minutes per day, with the longest closure being four minutes and Maple Avenue will be closed for up to two minutes during the same period of time. To mitigate the potential impact from the rail deliveries of ethanol, Chevron will contact emergency response providers in the area and advise them of the project so that they may plan their response routes accordingly. If an emergency vehicle is seen or heard approaching the street crossing by the Union Pacific Railroad train crew, then the locomotive engineer will immediately clear the crossing. In addition, the locomotive engineer will not re-interrupt a street crossing, under normal circumstances, until delayed vehicle traffic has cleared the crossing. In the future if the rail delivery schedule changes, Chevron will recontact the emergency response providers in advance of the change.

4.12 Growth-Inducing Impacts of the Proposed Project

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

The proposed project is not expected to foster population growth in the area, nor will additional housing or infrastructure be required. The project involves the modification of existing industrial facilities and additional refinery workers are not expected to be needed. No new services will be required; therefore, no infrastructure development or improvement will be required, and no population growth will be encouraged as a result of the project.

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