4.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This chapter provides an analysis of potential adverse environmental impacts associated with the Mobil CARB Phase 3 Reformulated Gasoline Project. The individual sections analyze proposed project construction and operation impacts to the affected environment of each environmental resource discussed in Chapter 3.

Pursuant to CEQA, this chapter 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, removal of a small amount of marginal habitat from a species with a widespread distribution would probably not be a significant impact. Similarly, 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.

As discussed in Chapter 2, Mobil is considering both marine tanker and rail transportation modes for importing fuel ethanol into southern California. Both options may be used when the proposed project is operational, and thus, the EIR evaluates the potential impacts of both options. Because the mix of the two options is not known at this time (i.e., how much by rail and how much by ship), the EIR assesses the potential impacts of importing the entire needed fuel ethanol supply by both rail and ship. This would result in evaluating the effects of importing twice as much ethanol as is needed, which obviously will not occur. However, this extremely conservative approach provides a broad envelope within which potential impacts can be understood.

4.1 Air Quality

This section describes the expected air quality impacts associated with the proposed project. It begins with a discussion of the activities that are expected 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 Torrance Refinery and the various terminals. The section evaluates the potential significance of changes in operational criteria pollutant emissions by comparison with emission thresholds, and the potential significance of changes in toxic air contaminant emissions 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.

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 SCAQMD Regulation XX-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 Table 4.1-1 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.

Table 4.1-1
Air Quality Significance Thresholds

Criteria Pollutants Mass Daily Thresholds			
Pollutant	**Construction**	**Operation**	**RECLAIM Pollutants**
NO_x	100 lbs/day	55 lbs/day	10,589 lbs/day
VOC	75 lbs/day	55 lbs/day	---
PM_{10}	150 lbs/day	150 lbs/day	---
SO_x	150 lbs/day	150 lbs/day	8,172 lbs/day
CO	550 lbs/day	550 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
Reference: SCAQMD CEQA Guidelines TAC = toxic air contaminant; AHM = Acutely Hazardous Material	

4.1.1 Construction Emissions

Construction of the proposed project at the Torrance Refinery is scheduled to begin in September 2001 and be completed in December 2003. Construction activities at the terminals are scheduled to begin in December 2001**,** and are expected to last for eight to 10 months at each site. Construction activities at the Torrance Refinery and the terminals will occur during one eight-hour shift per day, Monday through Friday, from 7:15 a.m. to 3:45 p.m.

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 painting. Offsite emissions during the construction phase normally consist of exhaust emissions and entrained paved road dust from worker commute trips and material delivery trips.

Chapter 2 describes the modifications and new equipment that will require construction at the Torrance Refinery and at each of the terminals (see Tables 2.4-1 and 2.4-2). 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;
- EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition;
- 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 PM_{10} Control Strategies Study," Midwest Research Institute, October 12, 1990.

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

To estimate the peak daily emissions associated with the construction activities, estimates were made of the duration, number and types of construction equipment to be used, peak daily operating hours for each piece of construction equipment, and onsite motor vehicle usage. These estimates were made for each of the following construction elements at the Torrance Refinery:

1. C4/C5 Splitter, Demolition
2. C4/C5 Splitter, Earthwork
3. C4/C5 Splitter, Concrete and Steel
4. C4/C5 Splitter, Equipment Vessels and Exchangers
5. C4/C5 Splitter, Piping
6. C4/C5 Splitter, Electrical
7. C4/C5 Splitter, Painting
8. Ethanol Unloading and Storage, Track Fill Earthwork
9. Ethanol Unloading and Storage, Track Lay
10. Ethanol Unloading and Storage, Concrete and Steel
11. Ethanol Unloading and Storage, Tank Installation
12. Ethanol Unloading and Storage, Piping
13. Ethanol Unloading and Storage, Electrical
14. Ethanol Unloading and Storage, Painting

15. 6K-2 and 7K-2 Compressor Trains, All
16. LPG Load Rack Expansion for C5/LSR, Demolition
17. LPG Load Rack Expansion for C5/LSR, Earthwork
18. LPG Load Rack Expansion for C5/LSR, Concrete and Steel
19. LPG Load Rack Expansion for C5/LSR, Tank Installation
20. LPG Load Rack Expansion for C5/LSR, Piping
21. LPG Load Rack Expansion for C5/LSR, Electrical
22. LPG Load Rack Expansion for C5/LSR, Painting
23. Merox, Demolition
24. Merox, Earthwork
25. Merox, Concrete and Steel
26. Merox, Equipment Vessels and Exchangers
27. Merox, Piping
28. Merox, Electrical
29. Merox, Painting
30. Interconnecting Pipeway, Demolition
31. Interconnecting Pipeway, Earthwork
32. Interconnecting Pipeway, Concrete and Steel
33. Interconnecting Pipeway, Piping
34. Interconnecting Pipeway, Electrical
35. Rerun Tower Sidestripper, Demolition
36. Rerun Tower Sidestripper, Earthwork
37. Rerun Tower Sidestripper, Concrete and Steel
38. Rerun Tower Sidestripper, Equipment Vessels and Exchangers
39. Rerun Tower Sidestripper, Piping
40. Rerun Tower Sidestripper, Electrical
41. Rerun Tower Sidestripper, Painting

Similar estimates also were made for construction activities at each terminal, but the estimates were not broken out by construction element. Estimates also were made of peak daily offsite motor vehicle trips and trip lengths during construction at each of the facilities involved. All of these estimates are listed in the construction emission calculation spreadsheets in Attachment B-1 to Appendix B. This information was used to calculate onsite emissions from construction equipment exhaust, and from fugitive dust PM_{10} emissions from grading.

Onsite fugitive dust PM_{10} emission estimates were based on estimates of peak daily dust-generating operations, including the peak daily volumes of soil anticipated to be handled and the peak daily storage pile surface area during each construction activity. 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.

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 2.1 pounds per gallon (250 grams per liter) was assumed, based on the VOC limit specified in SCAQMD Rule 1113 for an industrial maintenance coating used after July 1, 2002. The maximum daily volume of coatings to be applied at each facility involved was estimated, based on the total surface area to be painted, the anticipated coverage per gallon of coating, and the schedule for painting.

Table 4.1-2 lists the motor vehicle classes and speeds that were used to calculate peak daily emissions from both on- and offsite motor vehicles.

Table 4.1-2
Motor Vehicle Classes and Speeds during Construction

Vehicle Type	Vehicle Class	Speed (mph)
Onsite 10 cubic yards (cy) Dump Truck	Heavy heavy-duty truck, diesel	15
Onsite 20-cy Dual Truck and Trailer	Heavy heavy-duty truck, diesel	15
Onsite 3 Ton Flat Bed Truck	Medium-duty truck, cat	15
Onsite Truck w/Low Boy Trailer	Heavy heavy-duty truck, diesel	15
Onsite Pickup Truck	Light duty truck, cat	15
Offsite construction commuter	Light duty truck, cat	35
Offsite heavy-duty delivery vehicle	Heavy heavy-duty truck, diesel	25
Offsite Demolition Waste Haul Truck	Heavy heavy-duty truck, diesel	55
Offsite Hazardous Waste Haul Truck	Heavy heavy-duty truck, diesel	55
Offsite Dump Truck	Heavy heavy-duty truck, diesel	55
Offsite Concrete Truck	Heavy heavy-duty truck, diesel	25
Offsite Electrician Truck	Light duty truck, cat	35

Table 4.1-3 lists estimated peak daily emissions during the construction elements at each Torrance Refinery process unit and at the terminals.

Because all of these construction activities will not occur simultaneously, the overall peak daily construction emissions will not be equal to the sum of the peak daily emissions listed in the preceding table. Therefore, the anticipated overlap of construction activities was evaluated to determine overall peak daily emissions. First, it was conservatively assumed that the peak daily emissions during each overlapping construction activity would occur at the same time. Next, the expected construction activities were identified for the entire construction period, based on the anticipated starting and ending dates of the activities listed in Table 4.1-4. It was conservatively assumed that emissions from offsite motor vehicles would be at peak daily levels throughout the construction duration. The peak daily emissions from the various construction activities then were added together to estimate the total peak daily emissions during each day. Finally, the days with the highest peak daily emissions were identified.

Table 4.1-3
Peak Daily Construction Emissions by Location and Activity

Location/Activity	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)
C4/C5 Splitter, Demolition	58.7	11.1	83.1	6.9	5.2	8.5	13.7
C4/C5 Splitter, Earthwork	121.8	10.1	33.5	2.4	2.0	24.7	26.7
C4/C5 Splitter, Concrete and Steel	42.5	9.5	69.0	6.2	4.4	0.8	5.2
C4/C5 Splitter, Equipment Vessels and Exchangers	53.1	15.7	120.1	10.6	7.6	8.3	15.9
C4/C5 Splitter, Piping	85.3	19.0	146.8	14.9	8.6	2.4	11.0
C4/C5 Splitter, Electrical	13.2	2.5	17.5	1.9	1.0	0.8	1.8
C4/C5 Splitter, Painting	0.0	56.7	0.0	0.0	0.0	0.0	0.0
Ethanol Unloading and Storage, Track Fill Earthwork	75.4	16.7	142.8	12.0	8.1	197.8	205.8
Ethanol Unloading and Storage, Track Lay	32.3	6.5	54.3	5.2	3.3	1.3	4.6
Ethanol Unloading and Storage, Concrete and Steel	34.4	6.8	48.3	4.4	3.1	0.8	3.9
Ethanol Unloading and Storage, Tank Installation	46.4	11.2	89.2	8.5	5.3	8.3	13.7
Ethanol Unloading and Storage, Piping	71.0	15.2	115.9	12.0	6.7	2.4	9.1
Ethanol Unloading and Storage, Electrical	13.2	2.5	17.5	1.9	1.0	0.8	1.8
Ethanol Unloading and Storage, Painting	0.0	56.7	0.0	0.0	0.0	0.0	0.0
6K-2 and 7K-2 Compressor Trains, All	25.0	64.0	52.7	4.8	3.3	0.8	4.1
LPG Load Rack Expansion for C5/LSR, Demolition	202.0	31.2	258.3	21.3	15.3	18.5	33.9
LPG Load Rack Expansion for	71.8	15.9	130.9	11.6	7.6	112.2	119.9

Table 4.1-3
Peak Daily Construction Emissions by Location and Activity

Location/Activity	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)
C5/LSR, Earthwork							
LPG Load Rack Expansion for C5/LSR, Concrete and Steel	34.4	6.8	48.3	4.4	3.1	0.8	3.9
LPG Load Rack Expansion for C5/LSR, Tank Installation	70.7	16.5	133.4	13.1	7.9	8.5	16.4
LPG Load Rack Expansion for C5/LSR, Piping	48.0	11.2	71.1	7.0	4.2	3.8	8.0
LPG Load Rack Expansion for C5/LSR, Electrical	13.2	2.5	17.5	1.9	1.0	0.8	1.8
LPG Load Rack Expansion for C5/LSR, Painting	0.0	168.0	0.0	0.0	0.0	0.0	0.0
Merox, Demolition	60.4	11.4	87.3	7.1	5.4	16.0	21.4
Merox, Earthwork	121.8	10.1	33.5	2.4	2.0	24.8	26.8
Merox, Concrete and Steel	73.4	17.2	124.2	11.2	8.0	1.6	9.6

Table 4.1-3 (Concluded)
Peak Daily Construction Emissions by Location and Activity

Location/Activity	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)
Merox, Equipment Vessels and Exchangers	70.2	20.3	152.7	13.7	9.6	9.1	18.7
Merox, Piping	107.6	23.1	183.2	19.0	10.7	2.4	13.0
Merox, Electrical	23.7	4.4	34.7	3.8	1.9	0.8	2.7
Merox, Painting	0.0	56.7	0.0	0.0	0.0	0.0	0.0
Interconnecting Pipeway, Demolition	12.4	2.5	20.0	1.6	1.3	7.5	8.8
Interconnecting Pipeway, Earthwork	31.0	6.4	44.2	3.2	2.6	32.1	34.7
Interconnecting Pipeway, Concrete and Steel	38.3	7.5	54.8	5.1	3.5	0.8	4.2
Interconnecting Pipeway, Piping	89.8	18.6	146.6	15.4	8.4	2.4	10.8
Interconnecting Pipeway, Electrical	13.2	2.5	17.5	1.9	1.0	0.8	1.8
Rerun Tower Sidestripper, Demolition	60.4	11.4	87.3	7.1	5.4	16.0	21.4
Rerun Tower Sidestripper, Earthwork	66.9	6.2	24.6	2.0	1.6	8.5	10.1
Rerun Tower Sidestripper, Concrete and Steel	42.5	9.5	69.0	6.2	4.4	0.8	5.2
Rerun Tower Sidestripper, Equipment Vessels and Exchangers	48.2	14.8	112.0	9.7	7.1	8.3	15.5
Rerun Tower Sidestripper, Piping	45.1	10.5	83.1	8.3	5.0	0.8	5.8
Rerun Tower Sidestripper, Electrical	13.2	2.5	17.5	1.9	1.0	0.8	1.8
Rerun Tower Sidestripper, Painting	0.0	56.7	0.0	0.0	0.0	0.0	0.0
General Refinery Equipment	34.7	6.8	2.7	0.0	0.0	3.5	3.6
Atwood Terminal, All	2,415.8	313.7	127.5	10.4	7.6	36.7	44.3
Southwestern Terminal, All	2,096.2	194.8	77.5	6.7	4.7	8.3	13.0
Torrance Loading Rack, All	2,793.1	220.1	87.3	6.9	5.0	44.6	49.6
Vernon Terminal, All	3,675.3	404.6	183.3	15.3	11.1	49.2	60.3
Refinery, Offsite Vehicles	171.9	25.2	121.7	0.0	2.3	105.7	108.0
Atwood Terminal, Offsite Vehicles	42.3	6.4	29.5	0.0	0.8	33.0	33.8
Southwestern Terminal, Offsite Vehicles	33.8	5.2	28.8	0.0	0.8	32.7	33.4
Torrance Loading Rack, Offsite Vehicles	33.7	5.1	23.6	0.0	0.6	26.8	27.5
Vernon Terminal, Offsite Vehicles	72.0	10.5	32.2	0.0	0.8	34.2	35.0

Table 4.1-4
Anticipated Starting and Ending Dates of Construction Activities

Location/Activity	Starting Date	Ending Date
C4/C5 Splitter, Demolition	9/20/01	1/7/02
C4/C5 Splitter, Earthwork	9/20/01	1/7/02
C4/C5 Splitter, Concrete and Steel	9/27/01	2/9/02
C4/C5 Splitter, Equipment Vessels and Exchangers	2/10/02	8/22/02
C4/C5 Splitter, Piping	3/28/02	12/30/02
C4/C5 Splitter, Electrical	5/23/02	3/15/03
C4/C5 Splitter, Painting	2/1/03	3/15/03
Ethanol Unloading and Storage, Track Fill Earthwork	9/23/01	10/27/01
Ethanol Unloading and Storage, Track Lay	10/28/01	3/18/02
Ethanol Unloading and Storage, Concrete and Steel	2/23/02	10/4/02
Ethanol Unloading and Storage, Tank Installation	9/20/01	12/20/02
Ethanol Unloading and Storage, Piping	5/2/02	1/6/03
Ethanol Unloading and Storage, Electrical	6/27/02	3/8/03
Ethanol Unloading and Storage, Painting	1/25/03	3/8/03
6K-2 and 7K-2 Compressor Trains, All	8/22/02	2/7/03
LPG Load Rack Expansion for iC5, Demolition	11/8/01	12/17/01
LPG Load Rack Expansion for iC5, Earthwork	11/8/01	12/17/01
LPG Load Rack Expansion for iC5, Concrete and Steel	12/20/01	10/7/02
LPG Load Rack Expansion for iC5, Tank Installation	9/20/01	8/12/02
LPG Load Rack Expansion for iC5, Piping	8/1/02	12/16/02
LPG Load Rack Expansion for iC5, Electrical	8/1/02	3/15/03
LPG Load Rack Expansion for iC5, Painting	8/15/02	3/15/03
Merox, Demolition	10/24/02	1/27/03
Merox, Earthwork	10/24/02	1/27/03
Merox, Concrete and Steel	11/21/02	4/13/03
Merox, Equipment Vessels and Exchangers	12/7/02	2/22/03
Merox, Piping	12/26/02	10/4/03
Merox, Electrical	2/23/03	12/13/03
Merox, Painting	11/2/03	12/13/03
Interconnecting Pipeway, Demolition	9/20/01	2/7/02
Interconnecting Pipeway, Earthwork	9/20/01	2/7/02
Interconnecting Pipeway, Concrete and Steel	10/18/01	5/25/02
Interconnecting Pipeway, Piping	2/23/02	11/15/02
Interconnecting Pipeway, Electrical	2/23/02	11/15/02
Rerun Tower Sidestripper, Demolition	10/24/02	12/20/02
Rerun Tower Sidestripper, Earthwork	10/24/02	12/20/02

Table 4.1-4 (Concluded)
Anticipated Starting and Ending Dates of Construction Activities

Location/Activity	Starting Date	Ending Date
Rerun Tower Sidestripper, Concrete and Steel	10/31/02	1/10/03
Rerun Tower Sidestripper, Equipment Vessels and Exchangers	11/16/02	1/19/03
Rerun Tower Sidestripper, Piping	2/6/03	11/13/03
Rerun Tower Sidestripper, Electrical	4/4/03	12/31/03
Rerun Tower Sidestripper, Painting	12/12/03	12/31/03
General Refinery Equipment	9/20/01	12/31/03
Atwood Terminal, All	2/14/02	10/31/02
Southwestern Terminal, All	3/1/02	10/31/02
Torrance Loading Rack, All	12/19/01	10/31/02
Vernon Terminal, All	12/17/01	10/31/02
Refinery, Offsite Vehicles	9/20/01	12/31/03
Atwood Terminal, Offsite Vehicles	2/14/02	10/31/02
Southwestern Terminal, Offsite Vehicles	3/1/02	10/31/02
Torrance Loading Rack, Offsite Vehicles	12/19/01	10/31/02
Vernon Terminal, Offsite Vehicles	12/17/01	10/31/02

Overall peak daily CO, VOC and PM_{10} emissions are anticipated during a period that includes:

- C4/C5 Splitter piping and electrical work
- Ethanol Storage and Unloading tank construction and piping and electrical work
- Compressor Train modifications
- Pentane Storage and Shipping piping and electrical work and painting
- Merox demolition and earthwork
- Interconnecting Pipeway piping and electrical work
- Rerun Tower Sidestripper demolition, earthwork and concrete and steel work
- Construction at all of the terminals

Overall peak daily NO_X and SO_X emissions are anticipated to occur during a period that includes:

- C4/C5 Splitter equipment installation and piping and electrical work
- Ethanol Storage and Shipping concrete and steel work, tank construction, and piping and electrical work
- Pentane Storage and Shipping concrete and steel work, tank construction, and piping and electrical work

- Interconnecting Pipeway piping and electrical work
- Construction at all of the terminals

The estimated emissions during these periods are summarized in Table 4.1-5, along with the SCAQMD's significance level for each pollutant. As shown in the table, significance thresholds are exceeded for all pollutants except SO_X during construction. 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 the same time at all locations where construction is taking place.

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	11,614.8	573.6	1,371.4	133.2	82.4	N/A	82.4
Onsite Motor Vehicles	170.5	35.5	96.7	4.2	5.3	226.7	232.0
Onsite Fugitive PM_{10}	N/A	N/A	N/A	N/A	N/A	5.0	5.0
Architectural Coating	N/A	896.7	N/A	N/A	N/A	N/A	N/A
Total Onsite	**11,785.2**	**1,505.8**	**1,468.1**	**137.3**	**87.7**	**231.7**	**319.4**
Offsite Motor Vehicles	**353.7**	**52.4**	**235.8**	**0.0**	**5.3**	**232.3**	**237.6**
TOTAL	**12,139.0**	**1,558.2**	**1,703.8**	**137.3**	**93.0**	**464.0**	**557.1**
CEQA Significance Level	*550*	*75*	*100*	*150*			*150*
Significant? (Yes/No)	**Yes**	**Yes**	**Yes**	No	---	---	**Yes**
Note: Sums of individual values may not equal totals because of rounding. NA: Not Applicable							

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.

Torrance Refinery

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

- Butane/Pentane (C4/C5) Splitter
- C5/LSR Storage
- Rail Loading and Unloading Facilities
- Fuel Ethanol Storage and Railcar Unloading Facilities
- Unsaturated Gas Plant Sidestripper
- Light Ends Component Segregation
- Merox Unit

In addition to these new and modified units, a new 40,000-bbl internal floating roof tank will be constructed for fuel ethanol storage and two new 10,000-bbl spheres will be constructed for pentane storage. Two 20,000-bbl tanks, which are currently out-of-service, will be converted to internal floating roof tanks for fuel ethanol storage. A new vapor combustor will also be installed to handle the additional vapors from ethanol tanker truck loading.

Torrance Loading Rack

Fuel ethanol will be brought to the Torrance facilities by railcar and tanker truck. The rail delivery unloading and fuel ethanol storage facilities are addressed as part of the discussion of air quality impacts at the Torrance Refinery. A new truck unloading rack will be constructed at the Torrance Loading Rack, which will allow two trucks to unload simultaneously. A new fuel ethanol truck loading lane and canopy will also be added.

Modifications associated with fuel ethanol unloading and blending will result in fugitive emissions from various components.

Vernon Terminal

Fuel ethanol will be brought to the Vernon Terminal by railcar and tanker truck, and unloaded into two existing floating roof tanks (Tank 3 - 20,000 bbl and Tank 4 - 60,000 bbl). To replace the lost gasoline storage capacity from the two converted tanks, a new 50,000-bbl cone roof tank (internal floating roof) will be constructed. A new tanker truck unloading rack and a new railcar unloading rack will be installed. A second four-position truck loading rack will be modified to blend fuel ethanol as the tanker trucks are being loaded.

The change in service of a tank to fuel 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 since the current maximum potential to emit permit condition will not be changed.

This means that the terminal 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 reduction emissions due to the lower vapor pressure of CARB Phase 3 reformulated gasoline will be allowed for the proposed project.

Modifications associated with fuel ethanol unloading and blending will result in fugitive emissions from various components.

Atwood Terminal

Fuel ethanol will be brought to the Atwood Terminal by tanker truck from the SWT or the Vernon Terminal and unloaded into a new 15,000-bbl cone roof tank. A new two-lane tanker truck unloading rack will be constructed and the existing tank truck loading rack will be modified to allow fuel ethanol blending.

Modifications associated with fuel ethanol unloading and blending will result in fugitive emissions from various components.

Southwestern Terminal (SWT)

Fuel ethanol will be brought to SWT by marine tanker and unloaded into six existing domed external floating roof storage tanks (four 80,000-bbl tanks that currently store gasoline and two 40,000-bbl tanks that currently store MTBE).

New truck loading facilities will be constructed and used to transfer the fuel ethanol from the storage tanks to tanker trucks for shipment to the Vernon and Atwood distribution terminals, as well as the Torrance Loading Rack. Modifications associated with fuel ethanol unloading and blending will result in fugitive emissions from various components.

The change in service of a tank to fuel ethanol is anticipated to lead to a reduction in emissions, because of differences in the vapor pressures between fuel ethanol and the materials currently stored. This potential reduction has been estimated, but is not included in the evaluation of the project's significance, since the current maximum potential to emit permit condition will not be changed. This means that the terminal 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 reduction emissions due to the lower vapor pressure of CARB Phase 3 reformulated gasoline will be allowed for the proposed project.

A new vapor combustor will be installed to handle the additional fuel ethanol vapors from tanker truck loading.

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 Torrance Refinery and at the terminals. A further description of the emissions estimates is provided in Appendix B.

Mobil 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 Mobil-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 Torrance Refinery and terminals. Emissions were calculated for the new components. Although modifications will be made to the existing equipment and some equipment will be demolished and removed from service, emission reductions from components removed to make these changes were not deducted from the operational emission estimates for the proposed project. This is a conservative approach. Mobil estimated the numbers and types of service for components to be added for each Torrance Refinery process unit and at the terminals. It was conservatively assumed that only 50 percent of the new valves less than eight inches in size would be bellow seal valves, and that it would be technically infeasible to apply BACT to the other 50 percent of the new valves.

Mobil has in place an SCAQMD-approved inspection and maintenance program to detect and remedy leaks from process components. This program has allowed Mobil to estimate emissions from process components with emission factors that are more accurate than the SCAQMD default factors.

VOC emissions from the new fuel ethanol storage tank at the Torrance Refinery and the emissions from the new fuel ethanol storage tanks at the terminals (one each at Vernon and Atwood) were estimated using version 4.09 of the U.S. EPA TANKS program. The changes in VOC emissions that are anticipated from changes in service of the two existing tanks at the Torrance Refinery, six existing tanks at SWT and two existing tanks at the Vernon 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.

The project will require additional steam that will be generated by two existing boilers. Projected emissions for the two boilers were calculated by assuming a 27 percent increase in firing rate. Based on flow rates of the two stacks, nine percent of the emissions were assigned to the first boiler, and 91 percent of the emissions were assigned to the second boiler.

VOC emissions will be generated by loading fuel ethanol into tanker trucks at SWT, the Vernon Terminal and Torrance Loading Rack. It was assumed that the emissions would be at the 0.08 lb/1,000-gallon limit specified in SCAQMD Rule 462 for the Vernon Terminal. A new vapor combustor with a 99-percent control efficiency, one each at the Torrance Refinery and SWT, will handle the additional vapors from fuel ethanol tanker truck loading at the Torrance Refinery and SWT facilities, respectively. The fuel ethanol that will be loaded into tanker trucks at the terminals contains five percent gasoline as a denaturant. Emissions of TACs during tanker truck loading also were estimated.

VOC emissions will be generated by non-CARB Phase 3 gasoline loading of marine tankers at the SWT. It was assumed, based on SCAQMD guidance, that the emissions would have an uncontrolled emission factor of 75.6 lb/1,000 bbl, and the vapors would be sent to a vapor control unit with an 99 percent efficiency. The gasoline that will be loaded into marine tankers at the terminal contain TACs. Emissions of TACs during marine tanker loading also were estimated.

Pentanes will be loaded into railcars for transport and storage outside California. The quantity of butanes loaded into railcars for export from the Torrance Refinery also will increase. Since the displaced vapors from these railcar-loading operations will be collected by the refinery's vapor recovery system, only emissions from fugitive components are expected.

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 Torrance Refinery's sulfur plant, but a small fraction will be emitted as sulfur oxides. The additional sulfur to be removed is estimated to be 0.9 tons per day, based on expected production rates and feed sulfur content. Based on historical data, the sulfur oxide emission rate is 0.84 lb SO_x per ton of sulfur recovered.

The direct operational criteria pollutant emissions for the proposed project are summarized in Table 4.1-6.

Table 4.1-6
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					
Torrance Refinery					
Fugitive VOC from components	0.0	37.3	0.0	0.0	0.0
Fuel ethanol tanks	0.0	3.8	0.0	0.0	0.0
Sulfur recovery plant	0.0	0.0	0.0	0.8	0.0
Boilers	6.1	10.2	22.5	11.2	30.7
New vapor combustor	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total	**6.2**	**51.4**	**22.6**	**12.1**	**30.7**
Torrance Loading Rack					
Fugitive VOC from components	0.0	21.8	0.0	0.0	0.0
Fuel ethanol tanker trucks	0.0	1.5	0.0	0.0	0.0
Total	**0.0**	**23.4**	**0.0**	**0.0**	**0.0**
Southwestern Terminal					
Fugitive VOC from components	0.0	18.8	0.0	0.0	0.0
Marine tanker non-CARB Phase 3 gasoline loading	0.0	113.4	0.0	0.0	0.0
Fuel ethanol tanker trucks	0.0	4.2	0.0	0.0	0.0
New vapor combustor	< 0.1	< 0.1	0.1	< 0.1	< 0.1
Total	**0.0**	**136.4**	**0.1**	**0.0**	**0.0**
Vernon Terminal					
Fugitive VOC from components	0.0	40.3	0.0	0.0	0.0
New gasoline storage tank	0.0	14.5	0.0	0.0	0.0
Fuel ethanol tanker trucks	0.0	0.8	0.0	0.0	0.0
Total	**0.0**	**55.6**	**0.0**	**0.0**	**0.0**
Atwood Terminal					
Fugitive VOC from components	0.0	14.3	0.0	0.0	0.0
New fuel storage tank	0.0	1.2	0.0	0.0	0.0
Total	**0.0**	**15.5**	**0.0**	**0.0**	**0.0**
Total Direct Emissions	**6.2**	**282.2**	**22.7**	**12.1**	**30.8**
Indirect Emissions					
Tanker trucks	21.5	5.2	100.1	0.0	71.7
Switch engine for railcars	1.6	0.9	14.8	0.1	0.4
Total Indirect Emissions	**23.1**	**6.1**	**115.0**	**0.1**	**72.1**
Note: Sums of individual values may not equal totals because of rounding.					

Anticipated changes in annual operational emissions of toxic air contaminants at the Torrance Refinery and terminals are listed in Table 4.1-7. The table shows that increases in toxic air contaminant emissions are anticipated at the Torrance Refinery. As mentioned previously, decreases in fugitive emissions from removed components were not identified. Emissions of acetaldehyde, ammonia, benzene, 1,3-butadiene, cresols, formaldehyde, hydrogen sulfide, lead, manganese, mercury, MTBE, naphthalene, nickel, phenol, PAHs, propylene, styrene, toluene, xylenes, zinc, acenaphthene, acenaphthylene, anthracene, carbon disulfide, chromium, cyclohexane, ethyl benzene, fluorene, glycol ethers, hexane, phenanthrene and 1,2,4-trimethylbenzene are anticipated to increase at the Torrance Refinery. The table shows that increases and decreases in toxic air contaminant emissions are anticipated at the terminals, depending on the individual species. Potential effects on human health of these changes in toxic air contaminant emissions have been estimated as described below in Subsection 4.1.3.2.

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

Species	**Emissions (lbs/year)**				
	Torrance Refinery	**Torrance Loading Rack**	**Southwestern Terminal**	**Vernon Terminal**	**Atwood Terminal**
Toxic Air Contaminants for Which Health Risk Factors Exist					
Acetaldehyde	0.9	0.0	0.0	0.0	0.0
Ammonia	0.0	0.0	0.0	0.0	0.0
Benzene	3.7	3.5	-28.4	18.1	3.4
1,3-Butadiene	0.5	0.0	0.1	0.2	0.0
Cresols	0.0	0.0	0.0	0.0	0.0
Formaldehyde	7.9	0.0	0.0	0.0	0.0
Hydrogen Sulfide	0.0	0.0	0.0	0.0	0.0
Lead	0.4	0.0	0.0	0.0	0.0
Manganese	1.2	0.0	0.0	0.0	0.0
Mercury	55.0	0.0	0.0	0.0	0.0
MTBE	0.0	0.0	-4,113.0	-376.0	0.0
Naphthalene	3.0	0.0	0.0	0.0	0.0
Nickel	1.8	0.0	0.0	0.0	0.0
Phenol	2.6	0.0	0.0	0.0	0.0
PAHs	0.0	0.0	0.0	0.0	0.0
Propylene	58.5	0.0	0.0	0.0	0.0
Styrene	0.0	0.0	0.0	0.0	0.0
Toluene	49.7	5.7	-92.9	12.7	5.5
Xylene	25.0	2.3	-33.1	6.5	2.2
Zinc	0.8	0.0	0.0	0.0	0.0

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

Species	Emissions (lbs/year)				
	Torrance Refinery	Torrance Loading Rack	Southwestern Terminal	Vernon Terminal	Atwood Terminal
Other Toxic Air Contaminants					
Acenaphthene	0.2	0.0	0.0	0.0	0.0
Acenaphthylene	0.4	0.0	0.0	0.0	0.0
Anthracene	1.0	0.0	0.0	0.0	0.0
Carbon Disulfide	0.0	0.0	0.0	0.0	0.0
Chromium, Total	0.3	0.0	0.0	0.0	0.0
Cyclohexane	0.6	0.0	0.0	0.0	0.0
Ethyl Benzene	4.8	0.3	-8.2	0.5	0.4
Fluorene	0.2	0.0	0.0	0.0	0.0
Glycol Ethers	0.0	0.0	0.0	0.0	0.0
Hexane	29.4	2.0	-77.9	129.0	8.9
Phenanthrene	1.0	0.0	0.0	0.0	0.0
1,2,4-Trimethylbenzene	2.3	21.2	19.2	34.8	13.1

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 Mobil facilities, emissions also will increase from indirect sources. The indirect sources that were evaluated include:

- Tanker truck trips to deliver fuel ethanol to distribution terminals on a daily basis
- Tanker truck trips to deliver spent alumina to third party facility
- Additional daily locomotive activity moving the additional railcars transporting fuel ethanol, pentane and butane
- Additional annual marine vessel activity delivering fuel ethanol and exporting non-CARB Phase 3 gasoline

Appendix B provides further discussion of the emission estimating methodologies.

Emissions were estimated from tanker truck deliveries of fuel ethanol to the distribution terminals and from deliveries of spent alumina to a third-party facility. The fuel ethanol received at SWT will be distributed via tanker truck to the Torrance facilities, Vernon Terminal, Atwood Terminal, and third-party terminals.

Pentane and fuel ethanol will be transported into the Torrance Refinery by railcar during the winter and year-round, respectively. Butane and pentane will be transported out of the Torrance Refinery by railcar during the summer. A maximum increase of 13 daily railcar shipments is expected. This increase in railcar movement will require additional switch engine operating time at the Torrance Refinery.

There will be a net increase of 28 marine tanker calls per year, since the existing MTBE marine tanker deliveries will be replaced by fuel ethanol deliveries and non-CARB Phase 3 gasoline exports. However, the berth at SWT can only accommodate one marine tanker at a time. The marine tankers transporting fuel ethanol are anticipated to the same size as the marine tankers currently used to import MTBE. Therefore, there will not be an increase in the peak daily emissions from marine tankers.

4.1.3 Significance of Project Operational Emissions

Significance criteria used to determine the air quality impacts of criteria pollutants from operation of the project are based on total emissions of each of CO, VOC, NO_x, SO_x, and PM_{10}, as shown in Table 4.1.-1. Project operational toxic emissions are analyzed through air dispersion modeling to determine if the project may create changes in localized concentrations of TACs above the identified human health risk significance criteria. Risk assessments were conducted at the Torrance Refinery including the Torrance Loading Rack, as well as at the three terminals because TACs are anticipated to increase at each of these locations due to new equipment. Although Table 4.1-7 shows an overall facility decrease in TAC emissions due to the project at the Vernon and SWT facilities, the overall decrease is not accounted for in the Tier 2 analysis. Rather the individual pollutants with increases at specific locations are reviewed in the Tier 2 analysis.

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 emissions from RECLAIM sources are due to almost entirely to the increased firing of the boilers. As seen in Table 4.1-8, neither the NO_x nor SO_x SCAQMD CEQA thresholds for sources subject to RECLAIM will be exceeded with the proposed project. As seen in Table 4.1-9, the significance thresholds are exceeded for VOC and NO_x non-RECLAIM emissions.

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	23	2,453	2,476	10,589	No
SO_2	12	2,462	2,474	8,172	No

(a) The 2003 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	6.2	23.1	29.3	550	No
VOC [a]	282.2	6.1	288.3	55	**Yes**
NO_X	0.1	115.0	115.1	55	**Yes**
SO_X	0.0	0.1	0.1	150	No
PM_{10}	30.8	72.1	102.9	150	No

[a] Does not include emission reduction from changes in tank service.

4.1.3.2 Risk Assessments

Risk assessment procedures for SCAQMD Rule 1401 were followed for each of the Mobil facilities involved in the proposed project. SCAQMD Rule 1401 risk assessment procedures consist of four tiers for preparing a risk assessment from a quick look-up table (Tier 1) to a detailed risk assessment involving air quality modeling analysis (Tier 4). For the Torrance Refinery, including the Torrance Loading Rack, a health risk assessment (Tier 4) was prepared and is described in detail below. The emissions of TACs at the remaining terminals exceeded the Tier 1 thresholds. Therefore, a Tier 2 analysis was performed for the SWT, Vernon Terminal, and Atwood Terminal, and results are presented below.

The Tier 2 screening risk assessment consists of calculating the maximum individual cancer risk (MICR), as well as the acute and chronic hazard index (HIA and HIC) due to all TACs at the facility. Table 4.1-10 summarizes the calculated values for the MICR and compares them to the thresholds for each equipment item at each terminal.

Table 4.1-10
Tier 2 Analysis Results and Comparison to Threshold for MICR

Terminal	MICR	Significance Threshold	Exceeds
Southwestern	0.023	1.0	NO
Vernon	0.053	1.0	NO
Atwood	0.040	1.0	NO

Table 4.1-11 presents the HIA by target organ and compares this result to the threshold for each terminal.

Table 4.1-11
Tier 2 Analysis Results and Comparison to Threshold for HIA

Target Organ	SWT Terminal	Vernon Terminal	Atwood Terminal	Threshold	Exceeds Threshold
Cardiovascular	8.20E-06	2.06E-05	1.17E-05	1.0	No
Central nervous system	5.31E-07	1.34E-06	7.55E-07	1.0	No
Endocrine	0.00E+00	0.00E+00	0.00E+00	1.0	No
Eye	8.88E-07	2.24E-06	1.26E-06	1.0	No
Immune	8.20E-06	2.06E-05	1.17E-05	1.0	No
Kidney	0.00E+00	0.00E+00	0.00E+00	1.0	No
Gastrointestinal system/liver	0.00E+00	0.00E+00	0.00E+00	1.0	No
Reproductive	8.73E-06	2.20E-05	1.24E-05	1.0	No
Respiratory	8.88E-07	2.24E-06	1.26E-06	1.0	No
Skin	0.00E+00	0.00E+00	0.00E+00	1.0	No

Table 4.1-12 presents the HIC by target organ and compares this result to the threshold for each terminal.

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

Target Organ	SWT Terminal	Vernon Terminal	Atwood Terminal	Threshold	Exceeds Threshold
Cardiovascular	1.28E-05	2.96E-05	2.26E-05	1.0	No
Central nervous system	1.82E-05	4.23E-05	3.17E-05	1.0	No
Endocrine	5.06E-08	1.20E-07	7.62E-08	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	5.06E-08	1.20E-07	7.62E-08	1.0	No
Gastrointestinal system/liver	5.06E-08	1.20-07	7.62E-08	1.0	No
Reproductive	1.70E-05	3.93E-05	3.00E-05	1.0	No
Respiratory	4.90E-06	1.13E-05	8.59E-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 4.1-10, the Rule 1401 cancer burden threshold value for the MICR is not exceeded at any of the project facilities. 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.

Atmospheric dispersion modeling was conducted to determine the localized ambient air quality impacts at the Torrance Refinery (including the Torrance Loading Rack) from the proposed project. The health risk assessment modeling was prepared based on the most recent (1995) Health Risk Assessment (HRA) for the Torrance Refinery including the Torrance Loading Rack. 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 ACE2588 (Assessment of Chemical Exposure for AB2588) risk assessment model (Version 93288) (CAPCOA, 1993). The updates to the ACE2588 model are consistent with those found on the OEHHA web site.

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 EPA model used for simulating the transport and dispersion of emission sources in areas of 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 Torrance Refinery.

Modeling Options

The options used in the ISCST3 dispersion modeling are summarized in Table 4.1-13. 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 air quality modeling in the Basin. For the vicinity of the Torrance Refinery, the SCAQMD requires the use of its King Harbor 1981 meteorological data file. This is the meteorological data file used for recent air quality and HRA modeling studies at the Torrance Refinery including the Torrance Loading Rack. To maintain consistency with this prior modeling, and following SCAQMD modeling guidance, the 1981 King Harbor meteorological data set was used for this modeling study. A wind rose for the King Harbor station is shown in Figure 3.1-4.

In the King Harbor data set, the surface wind speeds and directions were collected at the SCAQMD's King Harbor 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 worst-case modeling impacts. For this modeling, a fine grid of commercial and residential receptors was used. No receptors were placed within the Torrance Refinery property boundary. Terrain heights for all receptors were consistent with the existing Torrance Refinery (including Torrance Loading Rack) HRA.

Table 4.1-13
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	53012
Year of surface data	1981
Upper air station number	91919
Year of upper air data	1981

Source Parameters

Tables 4.1-14 and 4.1-15 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. Fourteen sources were modeled, comprised of nine sources of components with fugitive emissions, two converted storage tanks, one new storage tank. and two combustion source stacks. The nine sources comprised of components with fugitive emissions were modeled as rectangular area sources. The tanks were modeled as area sources. The emission rate used in the ISCST3 model run for the area sources is in units of grams/second-meter squared (g/s-m^2). A unit emission rate of 1.0 gram/second (g/s) was used, so that the emission rate is the inverse of the area in units of g/s-m^2. Table 4.1-14 details modeling parameters for the area sources, and Table 4.1-15 details modeling parameters for the point sources.

The coordinates are listed in Tables 4.1-14 and 4.1-15, and are the first vertex of the rectangle, the center of the tank, or the location of the point source. The emission rate used in the ISCST3 model run for the area sources is in units of 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. The emission rate used in the ISCST3 model run for the point sources is in units of g/s.

Table 4.1-14
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]
FUG07/C4/C5 Splitter	376958	3746435	0	2,362	4.23 E-04
FUG08/Unsaturated Gas Plant Sidestripper	376953	3746530	0	3,156	3.17 E-04
FUG09/Merox Unit	377053	3746468	0	934	1.07 E-03
FUG10/C4/C5 Splitter	377068	3746530	0	1,530	6.54 E-04
FUG56A/LPG Rack	375828	3746382	0	177,615	5.63 E-06
FUG56F/Light Ends Component Segregation	377469	3745979	0	162,640	6.15 E-06
EIR1/LPG Spheres	376721	3746245	0	2,184	4.58 E-04
EIR2/Ethanol Rack	375562	3746628	0	8,284	1.21 E-04
EIR3/Ethanol Loading	375562	3746625	0	9	1.11E-01
200x35/Converted Tank	375648	3746686	0	206	4.85 E-03
200x36/Converted Tank	375648	3746665	0	206	4.85 E-03
400xNN/New Tank	375604	3746685	0	263	3.80 E-03
Note: UTM = Universal Transverse Mercator Coordinates					

Table 4.1-15
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]
30F_1/Boiler	376799	3746618	0.0	30.5	1.00E+00
30F_2/Boiler	376811	3746618	0.0	30.5	1.00E+00
Note: MSL = mean sea level					

<u>Emissions</u>

The modeling was performed using only direct operational emissions associated with the proposed project. These consist of toxic emissions resulting from the addition of components with fugitive emissions in various process streams at the Torrance Refinery, as well as the two converted storage tanks, the proposed new storage tank, and increased usage of the two boilers.

With respect to the components with fugitive emissions, 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 ACE model run were in units of g/s.

Proposed emissions for the two boilers were calculated by assuming a 27 percent increase in firing rate. Based on flow rates of the two stacks, nine percent of the emissions were assigned to the first boiler (Model ID 30F_1) and 91 percent of the emissions were assigned to the second boiler (Model ID 30F_2).

Health Risks

The potential health risk impacts that are addressed are carcinogenic, chronic noncarcinogenic, and acute noncarcinogenic.

The ACE2588 model was used to evaluate the potential health risks from TACs. The ACE2588 model, which is accepted by the California Air Pollution Control Officers Association (CAPCOA), has been widely used for required health risk assessments under the CARB AB2588 Toxic Hot Spots 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 October 1993 CAPCOA HRA guidance. The toxicity data have been updated to reflect the latest values as shown on the OEHHA web site (updated October 2000). 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 location 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 reference exposure levels have been included in the HRA. The 19 TACs emitted from the proposed project consist of acetaldehyde, ammonia, benzene, 1,3-butadiene, cresol, formaldehyde, hydrogen sulfide, lead, manganese, mercury, naphthalene, nickel, phenol, polyaromatic hydrocarbons, propylene, styrene, toluene, xylenes, and zinc.

The dose-response data used in the HRA were extracted from the October 1993 CAPCOA HRA Guidelines. The pertinent data are located in Tables III-5 through III-10 of the CAPCOA guidance. These values were updated, as necessary, with values from the OEHHA website (October 2000).

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 that 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 EIR include an increased cancer risk of 10 in one million or greater. The established SCAQMD Rule 1401 limits are 1.0 in one million cancer risk for sources without best available control technology for toxics (T-BACT), and 10 in one million for those with T-BACT. The significance criteria for noncarcinogenic acute and chronic hazard are indices of 1.0 for any endpoint.

The maximum exposed individual (MEI) is 0.14 per million. The peak receptor is a commercial receptor located on the northwestern side of the property. Applying the worker adjustment factor of 0.14, the MEI among workers is 0.02 per million. The MEI among residential receptors is 0.012 per million. The results of the health risk assessment indicate that the potential impact of the proposed project is well below the significance level of 10 in one million.

The maximum noncarcinogenic acute and chronic hazard indices are 0.001 and 0.005, 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 also that there are minimal impacts as a result of the proposed 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. Total tanker truck exhaust PM_{10} emissions from the 46 daily truck round trips during operations are estimated to be only 3.5 pounds per day, which occur over a total distance of about 1,350 miles. Therefore, the exposure to exhaust diesel particulate matter resulting from the project at any single location is anticipated to be negligible, and no significant impacts are expected.

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. An analysis of these impacts is required if:

1. The project is anticipated to reduce the LOS of an intersection rated C or worse by one level or more, or

2. 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 4.10), the volume-to-capacity ratio at the Western and I-405 northbound on/off intersection, which currently is rated at Level of Service E, may increase by 0.02 from construction worker traffic arriving at the refinery at the start of the working day or the peak A.M. period. The volume-to-capacity ratio at the Crenshaw Boulevard and W. 190th intersection, which currently is rated at Level of Service E, may increase by 0.02 from construction worker traffic arriving at the Torrance Refinery at the start of the working day. This peak construction worker period is expected to last for no more than two months.

The potential impacts of CO emissions on sensitive receptors during construction of the project were evaluated per SCAQMD CEQA Handbook (1993) Sections 5.4 *Evaluating Projects for CO Impacts* and 9.4 *Guidance for Assessing Carbon Monoxide Emissions*. There are no intersections that will be impacted during operation of this project. Thus, a CO impact analysis was not prepared for the operation of this project.

The dispersion model CALINE4 was used to perform a site-specific analysis and estimate the potential for CO hot spots. The model is based on continuous line source emissions and estimate roadway impacts. All four links between the Western and I-405 northbound on/off intersection were evaluated (first analysis). Similarly, three links comprising the Crenshaw and W. 190th intersection were evaluated (second analysis). The four roadway segment links identified for the first analysis are the following.

- Western Avenue between I-405 off-ramp and W. 190th Street
- W. 190th Street between Western Avenue and Van Ness Avenue
- W. 190th Street between Van Ness Avenue and Crenshaw Place
- W. 190th Street between Crenshaw Place and the construction gate

The three roadway segment links for the second analysis are the following.

- Crenshaw Place 300 meters north of intersection to W. 190th Street
- Crenshaw Boulevard 300 meters south of intersection to W. 190th Street
- W. 190th Street between Crenshaw Place and the construction gate

For the first analysis, the volume-to-capacity increase is a result of 48 additional vehicles exiting the I-405 to drive southbound on Western Avenue before turning right onto W. 190th Street. The 48 vehicles then travel westbound on W. 190th Street where they are joined by five vehicles traveling southbound on Van Ness Avenue before turning right onto W. 190th Street. These 53 vehicles continue to travel westbound on W. 190th Street where they are joined by 38 vehicles traveling southbound on Crenshaw Place before turning right onto W. 190th Street. These 91 vehicles travel westbound on W. 190th Street until they arrive at the construction gate.

For the second analysis, the volume-to-capacity increase is a result of 38 additional vehicles traveling southbound on Crenshaw Place before turning right onto W. 190th Street. There are three additional vehicles that travel northbound on Crenshaw Boulevard before turning left onto W. 190th Street. These 94 vehicles travel westbound on W. 190th Street until they arrive at the construction gate.

Since the workers will arrive at the site by 7:15 a.m., a peak traffic one-hour period from 6 a.m. to 7 a.m. was used in this analysis. To be conservative, the eight-hour period was assumed to have the same vehicle per hour volumes as the one-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 mph. An EMFAC 2000 emission factor of 12.06 g/mi was used as input into CALINE4.

Figure 5-1 of the SCAQMD CEQA 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 using the 2000 Thomas Guide. There are residences along W. 190th Street between Crenshaw Place and the construction gate. Since the property extends to the street, the receptors were placed at the edge of the roadway. A daycare facility is located at the northwest corner of W. 190th Street and Crenshaw Place and was modeled as such. For the remaining receptors placed along the roadways listed above, it was assumed as a worst case that a person may be as close as five meters (or approximately 16.5 feet) from the roadway. Thus, to be conservative for these short-term exposure analyses (one-hour and eight-hour), it was assumed that the receptors were located five meters (or approximately 16.5 feet) from the edge of the roadways.

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

Table 4.1-1 lists the significance criteria for CO ambient impacts as 1.0 ppm and 0.45 ppm for the one- and eight-hour standards, respectively. As shown in Table 4.1-16, the impacts at the peak receptor modeled along the specified roadways do not exceed the significance threshold for either the one- or the eight-hour standard.

The "no project" ambient background CO concentration was obtained from Table 3.1-5. The peak one-hour and eight-hour concentrations for Station No. 094 for 1999 were 10 ppm and 8.4 ppm, respectively. In addition, the state and federal ambient air quality standards are summarized in Table 3.1-4. The state ambient one-hour and eight-hour ambient CO standards are 20 ppm and 9.0 ppm, respectively. The federal ambient CO standards are 35 ppm and 9.0 ppm, respectively.

The sum of the project (for both analyses) and the no-project concentrations are below the state and federal ambient one- and eight-hour standards for all roadway links as shown in Table 4.1-16 below. Therefore, the potential increase in congestion at these intersections during construction is not anticipated to lead to adverse carbon monoxide impacts on sensitive receptors.

Table 4.1-16
CO Hot Spots Analysis – Peak Impact

Time Period	Ambient Concentration	Project Impact	Significance Threshold	Significant	Total Concentration
One-hour	10 ppm	< 0.2 ppm	1.0 ppm	No	< 10.2 ppm
Eight-hour	8.4 ppm	< 0.1 ppm	0.45 ppm	No	< 8.5 ppm

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, and PM_{10}. The emissions from construction are primarily from four main sources: 1) onsite fugitive dust, 2) off-road mobile source equipment, 3) architectural coatings, and 4) on-road motor vehicles. The mitigation measures listed below are intended to minimize the emissions associated with these sources.

Table 4.1-17 lists mitigation measures for each construction 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 coatings 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 4.1-18 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 associated with mitigation. Implementation of mitigation measures, while reducing emissions, does not reduce the construction-related CO, VOC, NO_X, or PM_{10} impacts below the significance threshold.

4.1.6.2 Operational Mitigation Measures

The project operational CO, SO_x and PM_{10} emission increases are below the emissions significance criteria threshold applied to this project. However, operational VOC and NO_x emissions from sources that are not subject to RECLAIM are anticipated to exceed the significance criteria. The increased VOC emissions are primarily due to gasoline marine tanker loading, fuel ethanol tanker truck loading, and component fugitive emissions. The increased NO_x emissions are primarily due to fuel ethanol tanker truck deliveries to terminals and increased usage of the onsite switch engine for the railcars.

Project operational VOC emissions at the Torrance Refinery will be substantially reduced through the application of BACT, which, by definition, is the best available control technology. For example, where feasible, the new valves to be installed will be of the bellow-seals (leakless) variety. However, no feasible mitigation measure beyond implementing BACT, which is required under AQMD Rule 1303(a), were identified; therefore, VOC emissions remain significant.

Table 4.1-17
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 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 at the end of the workday	Onsite Fugitive Dust PM_{10}	PM_{10}	Not Quantified
AQ-4	Prior to use in construction, the project proponent will evaluate the feasibility of retrofitting the large off-road construction equipment that will be operating for significant periods. Retrofit technologies such as selective catalytic reduction, 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
	No feasible measures identified	Architectural Coatings	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 4.1-18
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	11,614.8	573.6	1,371.4	133.2	82.4	N/A	82.4
Mitigation Reduction (%)	0%	5%	5%	5%	5%		
Mitigation Reduction (lb/day)	0.0	-28.7	-68.6	-6.7	-4.1		-4.1
Remaining Emissions	**11,614.8**	**545.0**	**1,302.8**	**126.5**	**78.3**		**78.3**
Onsite Motor Vehicles	170.5	35.5	96.7	4.2	5.3	226.7	232.0
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	**170.5**	**35.5**	**96.7**	**4.2**	**5.3**	**226.7**	**232.0**
Onsite Fugitive PM_{10}	N/A	N/A	N/A	N/A	N/A	5.0	5.0
Mitigation Reduction (%)	---	---	---	---	---	16%	--
Mitigation Reduction (lb/day)	---	---	---	---	---	-0.8	-0.8
Remaining Emissions	---	---	---	---	---	**4.2**	**4.2**
Architectural Coating	N/A	896.7	N/A	N/A	N/A	N/A	N/A
Mitigation Reduction (%)	---	0%	---	---	---	---	---
Mitigation Reduction (lb/day)	---	0.0	---	---	---	---	---
Remaining Emissions	---	**896.7**	---	---	---	---	---
Total Onsite	**11,785.2**	**1,477.1**	**1,399.5**	**130.7**	**83.6**	**230.9**	**314.5**
Offsite Motor Vehicles	353.7	52.4	235.8	0.0	5.3	232.3	237.6
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	**353.7**	**52.4**	**235.8**	**0.0**	**5.3**	**232.3**	**237.6**
TOTAL	**12,139.0**	**1,529.5**	**1,635.2**	**130.7**	**88.9**	**463.2**	**552.1**
Significance Threshold	*550*	*75*	*100*	*150*	---	---	*150*
Significant? (Yes/No)	**Yes**	**Yes**	**Yes**	No	---	---	**Yes**
Note: Sums of individual values may not equal totals because of rounding.							

The VOC exceedance does not include the actual emission reductions that will result from the storage of lower vapor pressure gasoline at the Torrance Refinery and terminals or the emission reductions that will result from removing components from service due to modifying and demolishing equipment. Although the actual reductions will occur, the potential emissions that could occur, based on current permit levels are greater and will not be modified; therefore, the reductions are not considered in this CEQA analysis. It also should be noted that the specific VOCs that increase as a result of the project were evaluated as part of a health risk assessment (Section 4.1.3.2) and, based on that analysis, are not anticipated to create significant localized human health risks.

Because the proposed project is being implemented specifically in response to air quality regulatory requirements, additional mitigation (i.e., emission offsets) is not required.

As seen from the summary in Table 4.1-6, anticipated peak daily NO_x emissions are primarily associated with tanker trucks to deliver fuel ethanol to the terminals and Torrance Refinery switch engine operations.

No feasible mitigation measures have been identified for NO_x emissions from the switch engine or the tanker trucks. Technologies do not exist to reduce NO_x emissions from these sources to levels that would reduce operational emissions below the significance thresholds. Additionally, the U.S. EPA has the authority to regulate emissions from locomotives, 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.

Importing fuel ethanol from the Midwestern states by pipeline, which would avoid project rail emissions, is not feasible because there are no dedicated ethanol pipelines available to avoid the risk of contamination with water. The only alternative to tanker trucks for fuel ethanol delivery within the South Coast Air Basin to the terminals would be delivery by pipeline. Mobil does not have available pipelines to its Southern California terminals that could be dedicated to ethanol service, and thus, is not proposing this approach. However, Mobil is evaluating the possibility of using an existing pipeline to transport fuel ethanol from SWT to the Vernon Terminal, from where it would be trucked to the other terminals. The potential environmental impacts of this pipeline transport approach is evaluated as an alternative in Chapter 5 of the EIR.

In summary, operational NO_X emissions cannot be mitigated to levels below the significance thresholds. However, it should be noted that total NO_X emissions from stationary sources at the Torrance Refinery, including sources subject to RECLAIM, are anticipated to increase by about 23 pounds per day. The majority of NO_X emissions are expected to be generated by mobile sources.

4.1.7 AQMP Consistency

Pursuant to CEQA Guidelines §15125(d), an EIR shall discuss any inconsistencies between the proposed project and any 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 air quality management standards.

4.2 Cultural Resources

4.2.1 Methodology and Significance Thresholds

Impacts to cultural resources will 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.

4.2.2 Project Impacts

Project implementation will result in minor ground disturbing activity at the Torrance facilities and the Atwood Terminal. However, archaeological surveys conducted at the Torrance and Atwood sites identified no important cultural resources. In addition, there has been extensive ground disturbance throughout the Torrance and Atwood facilities, which reduces the likelihood of intact cultural deposits occurring within the project sites. The proposed project will not result in impacts to equipment and structures over 50 years of age. Therefore, no impacts to prehistoric or historic cultural resources are anticipated at the Torrance and Atwood facilities.

Minor ground disturbance will occur at the SWT site. However, SWT is not considered a sensitive location in terms of archaeological resources because it is built on fill material. In addition, there has been extensive ground disturbance throughout SWT, which reduces the likelihood of intact cultural deposits occurring within the areas of the facility affected by the proposed project. There will be no impacts to equipment or structures over 50 years old at the facility. Therefore, no impacts to prehistoric or historic cultural resources are anticipated or addressed for SWT.

Based on the SCCIC and NAHC record searches, background research, field surveys, and extent of previous ground disturbance, project implementation at the Vernon Terminal is not expected to impact archaeological resources. However, since a field survey of the Vernon Terminal was infeasible because the relevant areas are paved, and because of the reported observation of historic materials (bricks and glass) unearthed within the terminal, there is a potential for buried historic and/or prehistoric deposits to occur on the property.

No buildings, structures, or equipment 50 years or older will be modified at the Vernon Terminal as part of the proposed project. Therefore, no significant impacts to historic cultural resources are expected to occur as a result of project implementation.

4.2.3 Mitigation Measures

Although significant adverse impacts to cultural resources are not anticipated, in the event that the historic or prehistoric site is found during construction (primarily at the Vernon Terminal), the following measures are proposed to mitigate potential impacts to cultural resources, if any. The following mitigation measures would assure handling and documentation of unanticipated cultural resources:

CR-1: Excavation for the new tank foundation and two tank car unloading pumps at the Vernon Terminal should be monitored by an archaeologist trained in historic archaeology. Based on their observations, the archaeological monitor shall have the authority to refine the monitoring requirements during construction as appropriate (i.e., change to spot checks, reduce or increase the project areas to be monitored).

CR-2: A cultural resources orientation will be provided to construction workers associated with excavation activities at the Vernon Terminal. The orientation will include a description of what kinds of cultural resources might be encountered during construction, and what steps are to be taken if such a find is unearthed.

CR-3: 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 documented and necessary preservation measures have been implemented, work in the area may resume. A Gabrielino/Tongva representative will be contacted to monitor any mitigation work associated with prehistoric cultural material.

CR-4: If human remains are unearthed, State Health and Safety Code §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 §5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the NAHC. The NAHC will than contact the most likely representative of the deceased Native American.

Implementation of the above measures would ensure that potential project-specific cultural resource impacts remain insignificant if unanticipated resources are encountered during construction.

4.3 Energy Sources

The impacts to energy will be considered significant if any of the following criteria are met:

- The project conflicts with adopted energy conservation plans or standards.
- The project results in the use of energy in a wasteful manner.
- The project results in substantial depletion of existing energy resource supplies.
- An increase in demand for utilities impacts the current capacities of the electric and natural gas utilities.

4.3.1 Construction Impacts

Project construction will result in the expenditure of non-renewable energy sources, primarily gasoline and diesel fuel. In addition, there is expected to be small increases in natural gas and electricity usage during construction. While project usage would occur in the context of current shortages in California of both electricity and natural gas (which fuels much of California's electricity generating facilities), project uses during construction are considered not significant. A discussion follows of the anticipated impacts to these resources.

4.3.1.1 Gasoline and Diesel Fuel

Approximately 154,000 gallons of gasoline and 182,000 gallons of diesel fuel will be used by onsite construction equipment, construction workers' vehicles, and material delivery trucks traveling to and from the project sites. Gasoline and diesel fuel usage calculations and associated assumptions are provided in EIR Appendix B. Gasoline and diesel fuel usage for transportation activities in the Los Angeles region in 2000 were projected by the CEC to be 6.5 billion gallons per year and 1.1 billion gallons per year, respectively (CEC, 1999). Assuming construction-related activities in the future years would yield similar results, the gasoline and diesel fuel required by the proposed project would represent 0.002 and 0.02 percent, respectively, of the projected demand. This demand is one-time only and represents a very small percentage of the total demand for fuels in the Los Angeles region. Therefore, the gasoline and diesel fuel usage for project construction is not considered a significant impact.

4.3.1.2 Electricity

Electricity required during construction activities is expected to be minimal as the vast majority of project construction equipment will be powered by gasoline or diesel fuel. In addition, the electricity demand during construction would be for a limited duration and represents a very small percentage (a very small fraction of one percent) of the total electricity demand in the Los Angeles area. Therefore, the increase in electricity usage for project construction is not considered a significant impact.

4.3.1.3 Natural Gas

Construction of the proposed project would have virtually no impact on the amount of natural gas imported to the project sites. A one-time use of refinery fuel gas may be required at the Torrance Refinery for blanketing (displacing air) in the new and converted C5/LSR spheres. However, this gas will be recovered into the fuel system for use as onsite combustion fuel. This one-time gas usage will not represent an incremental use of gas.

4.3.2 Operation Impacts

The primary energy demands from operation of the proposed project would be for natural gas and electricity, although minor increases in diesel fuel demand are also expected. Increased natural gas usage is expected at the Vernon Terminal and SWT. The Torrance Refinery currently generates some of the electrical power it consumes, but the CARB Phase 3 project will not add additional generating capacity. A small increase in electricity demand at the Torrance Refinery and the terminal sites is expected for new pumps, compressors, and other new or modified equipment. While the project's electrical and natural gas consumption would represent increases over current usage, and there currently are supply shortages and price increases for both natural gas and electricity, project usage would be small compared to current usage at the Mobil facilities and negligible compared to overall regional consumption. The expected increases in usage of these energy resources are discussed in the following subsections.

4.3.2.1 Gasoline and Diesel Fuel

The amount of diesel fuel consumed by tanker trucks for the purpose of delivering fuel ethanol to the project sites, will be very small (approximately 30,000 gallons per year). Compared to the estimated 1.1 billion gallons per year of diesel fuel used in the Los Angeles area for transportation purposes, project diesel consumption would be negligible and would have minimal impact on existing diesel supplies. As only two additional workers will be required for the proposed project's operational activities, a negligible amount of gasoline or diesel fuel will be consumed from additional worker commute trips to and from the project sites. Based on these considerations, no significant impacts to gasoline or diesel fuel supplies are expected to result from operational-related activities.

4.3.2.2 Electricity

At the Torrance Refinery, the expected increase in power demand is estimated to be 0.75 megawatts once the project comes online by the end of 2002. Current electricity demand at the Torrance Refinery is approximately 89 megawatts. The increased electricity requirement for operation of the proposed project represents a 0.08 percent increase over current electrical demand. This small additional demand is negligible relative to the existing demand and the existing and expected available electricity supplies. Therefore, the additional electricity required for operation of the proposed project at the Torrance Refinery is not expected to create a significant impact.

At the terminals, there will be a small increase in electricity demand from new pumps and meters at the new/modified loading racks and new lighting for tank truck loading areas. The increase in electricity demand is expected to be minor relative to the existing demand at the terminals, and negligible compared to the existing and expected available electricity supplies. As discussed above, new power plants will support the regional power demand. Based on these considerations, no significant impacts to electricity resources are expected from operation of the proposed project at the terminal sites.

4.3.2.3 Natural Gas

At the Torrance Refinery, there is no expected increase of natural gas usage as a result of operation of the proposed project. Therefore, no significant impacts are expected related to natural gas at the Torrance Refinery.

At the terminals, increases in natural gas usage are expected only at SWT and Vernon. The increases at SWT and Vernon combined will be approximately 95,000 therms per year, compared to current usage of about 100,000 therms per year. Although this represents consumption nearly double current levels, the increase would be more than sufficient to fuel one modest size industrial boiler for a year, and much smaller than boilers typically used in large industrial facilities. To provide an additional perspective, project annual gas consumption would represent about one-thousandth of one percent of total southern California gas consumption. Therefore, no significant impact to the natural gas supply is expected as a result of operation of the proposed project at the terminal sites.

4.3.3 Mitigation Measures

No significant impacts to energy resources are expected to result during construction or operation of the proposed project. Therefore, no mitigation is necessary or proposed.

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 components of the proposed project.
- Secondary seismic effects occur, (i.e., earthquake-induced ground failure or liquefaction-related failure).
- Seismic events cause topographic alterations or physical changes to the sites that could include changes such as visual degradation, soil erosion, and drainage alteration.
- Geologic or seismic events cause the disturbance of large volumes of soil impacted by petroleum hydrocarbons or other hazardous constituents.

4.4.1 Construction

Construction will require some minor grading and excavation at all of the various project sites. These grading and excavation activities will disturb both surface and subsurface soils.

4.4.1.1 Expansive Soil

In general, construction-related soil disturbances will be limited to the uppermost 10 to 20 feet of soil materials at the project sites, which are comprised predominately of granular alluvial materials, along with lesser amounts of clay, silts, and sandy, silty artificial fills. These predominantly granular soils do not tend to exhibit expansion characteristics or problems associated with expansive soils. Therefore, construction-related activities at the four project sites are not expected to create significant soil expansion impacts.

4.4.1.2 Erosion

Wind erosion and water-related sediment loss potentially could occur during construction activities. Best management practices (e.g., temporary berms, silt fences, and other temporary barriers) will be utilized to reduce wind erosion and prevent sediment runoff offsite. Further, routine dust abatement measures, including watering of the excavations for dust control, will minimize wind erosion. The combination of these factors will keep erosion impacts to an insignificant level

4.4.1.3 Soil Contamination

Historic soil sampling conducted by Mobil for specific areas within two project sites (Torrance and SWT) indicates that contaminated soils may be present. Please see Section 4.9 for a discussion of how Mobil plans to manage and mitigate the presence of contaminated soils if encountered at the project sites. Contaminated soils encountered during construction activities will be appropriately managed in accordance with state, federal, and local regulations.

4.4.2 Operational Impacts

4.4.2.1 Seismicity – Ground Rupture

Some areas in southern California are noted for earthquake-induced ground rupture. These areas are identified as part of the Alquist-Priolo Special Study Act. Although such designated areas are located in the general vicinities of the Mobil facilities, none of the project sites are included within the delineated earthquake fault zones. Therefore, the risk to any of the project sites due to earthquake-induced ground rupture is considered low.

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. In both project design and construction, Mobil will adhere to the applicable legal and technical requirements included in the 1997 Uniform Building Code, area-specific construction standards, and other applicable federal, state, and local laws, regulatory and ordinances. The 1997 edition of the Uniform Building Code is the most recent version, and its seismic design information incorporates the increased knowledge developed after the 1994 Northridge earthquake. All designs will be certified by an appropriate registered engineer and/or other professional. With implementation of the proper design and construction practices, no significant seismic (e.g., ground shaking) 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

SWT and the Atwood Terminal have been identified by the CDMG as areas that have the potential for permanent ground displacements due to liquefaction. Subsurface conditions at these two sites, combined with the regional active seismicity, indicate that potentially liquifiable soils underlie these two sites. Adherence to the requirements of the 1997 Uniform Building Code, area-specific construction requirements and other applicable federal, state, and local laws, regulations, and ordinances would be expected to adequately address the liquefaction risks at the project sites. All project designs also will be certified by an appropriate registered engineer and/or other professional.

4.4.2.4 Seismicity – Slope Stability

Of the various project sites, none have been identified by the CDMG as within areas with the potential for permanent ground displacements due to earthquake induced landslides. Based on 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 mitigation of potential landslide hazards at the project sites will be necessary.

4.4.2.5 Subsidence

Of the proposed project sites, only locations in the Long Beach/Los Angeles Harbor vicinity near the SWT site have been affected by significant historic ground subsidence. However, mitigation activities since 1950 have been successfully employed, and the SWT area is not expected to experience significant subsidence in the future.

4.4.3 Mitigation Measures

Project facilities will be designed and construction in accordance with all applicable federal, state, and local regulatory requirements, the 1997 Uniform Building Code (which was upgraded to incorporate seismic design information learned from the 1994 Northridge earthquake), and area-specific construction requirements, earthquake safety standards, etc. Adherence to these requirements and standards would adequately mitigate seismic and other geologic hazards. Appropriate and conservative seismic design requirements for depth of concrete foundations, thickness of structural supports for piping and equipment, etc., will be incorporated into all project mechanical and structural features.

4.5 Hazards and Hazardous Materials

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

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

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

The first three conditions above relate to design codes, fire standards, and generally accepted industry practices. The project will be designed, operated, and maintained to provide a safe workplace, and to prevent significant adverse offsite impacts. Mobil 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. No further analysis of these standards is needed in this project hazard analysis. Adherence to codes will be verified by the appropriate local jurisdiction building inspector before the proposed project's new or modified facilities and equipment become operational. This includes:

- City of Torrance for the Torrance Refinery and Torrance Loading Rack;
- City of Vernon for the Vernon Terminal;
- City of Anaheim for the Atwood Terminal; and,
- City of Los Angeles for SWT.

4.5.1 Background

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 of each scenario. The primary focus is on potential impacts to the environment or the community outside the various Mobil facilities. The range of the impact beyond Mobil's fenceline 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 involve the installation of new units and the modification of existing units at the Torrance Refinery. The project also will change the methods of delivery, storage, distribution, and blending of fuel additives (i.e., fuel ethanol) will be blended into the CARB Phase 3 gasoline. These changes will affect operations at the Torrance Refinery and the various Mobil terminals.

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 MTBE gasoline production (the current gasoline produced and distributed by Mobil at the project facilities). 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 impacts of the new elements were compared to a zero baseline.

4.5.2 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 the subsections below.

4.5.3 Hazardous Chemicals Associated with the Project

The primary hazardous chemicals associated with the project are pentane, butane, ethanol and assorted catalysts. Pentane and butane are regulated substances under the federal RMP program and the CalARP. There are several other chemicals involved in producing CARB Phase 3 gasoline at a petroleum refinery, e.g., hydrogen and base gasoline stock, but these would not increase significantly or change in the location of their storage, use or mode of transport due to this proposed project. Because the hazard analysis is concerned with the potential increase of risk due to the proposed project, these “other chemicals” are not addressed.

A primary objective of the proposed project is the replacement of MTBE with fuel ethanol. MTBE is more flammable and reactive than fuel ethanol, and almost twice as much MTBE is required to accomplish oxygenation of the fuel as will be required with fuel ethanol. Operations, storage and processes that substitute fuel ethanol for MTBE would be less hazardous than before due to the smaller ethanol volume required, as well as its lower flammability and lower reactivity. This would include marine tanker operations, off-loading and transfer by pipeline and storage. For these less hazardous substituted operations, detailed hazard assessments are unnecessary.

For new operations associated with the proposed project, such as shipping pentane to a new location that did not receive pentane before, the incremental risks are estimated of the transfer and storage activities. For transfer of fuel ethanol in a pipeline that did not carry ethanol before, or for storage of fuel ethanol in converted storage tanks, a comparison was made between the risks associated with ethanol and the risks of transporting and 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.

Fuel ethanol, which is denatured, typically contains 95 percent ethanol and 5 percent natural gasoline. To phase-out MTBE and meet the CARB 3 fuel specifications, processing changes and equipment modifications will be required at the Torrance Refinery and at the various terminals. The types and quantities of hazardous chemicals and operations involved in these various facility modifications provide the basis for defining scenarios that allow estimating incremental hazard impacts.

The required modifications are discussed in more detail in the following subsections.

4.5.4 Refinery Modifications

The proposed project at the refinery consists primarily of modifications to existing refinery equipment along with the addition of some new equipment.

4.5.4.1 MTBE Removal

With the discontinued use of MTBE, the oxygen requirement for gasoline will be met by the use of fuel ethanol. However, because the fuel ethanol RVP effect is higher than MTBE, more of the other light components of the gasoline blend need to be removed. The following paragraphs discuss each process and piece of equipment affected by the RVP reduction requirement and how these changes affect the calculation of risk.

Deisobutanizer Tower – Butane Handling

An increased volume of butanes will be available for storage and subsequent use or sale on the commercial market. Consequently, a portion of the butane stream will require additional processing, which will consist of modifications to the Torrance Refinery's existing Deisobutanizer Tower. The modifications will consist of the addition of a pump and additional piping. Additional steam will be required to produce the necessary separation within the modified tower. The incremental impact of the added equipment will be estimated.

New C4/C5 Splitter

A new C4/C5 Splitter will be installed to remove pentane from the input stream before feeding the SGP debutanizer. The estimated splitter volume is 10,900 gallons. The incremental impact of the splitter will be estimated relative to a zero baseline.

C5/LSR Pipeline from Storage to Blending Area

A new 3,000-foot pipeline with a flow of 1,680 gpm will transport the C5/LSR from the storage area to the blending area. The risk from the pipeline due to an uncontained spill and explosion will be compared to a zero baseline.

Replacement of Diesel Fuel Additive (Octylnitrate) Storage Tank

Currently, there are two 1,500-bbl storage tanks containing a diesel fuel additive [(octylnitrate (2-ethylhexyl nitrate)] at the Torrance Refinery. To make physical space available for other components of the project, one diesel fuel additive tank will be removed from octylnitrate service and replaced with a new 300-bbl storage tank with containment structure at a new location at the Torrance Refinery. Overall, risk associated with diesel fuel additive storage will therefore be reduced with the proposed project, because of the elimination of the larger tank. However, installing the new 300-bbl tank will produce a new risk at the new location. Even though this risk is lower than the existing risk because it is at a different location, it must be considered a new risk and compared against a zero baseline.

Liquefied Petroleum Gas (LPG) Rail Facilities – Vessels, Loading, and Additional Track

To process the volumes of additional butanes and pentanes that would be removed from the various component streams, Mobil will install new LPG rail facilities and associated equipment. The Torrance Refinery's existing butane spheroid tank (51,000 bbl) will be converted to pentane service. Two new 10,000-bbl pentane storage spheres will be installed after demolishing an existing tank. A new railcar loading/unloading facility and additional rail track are required to support the rail loading operation. The impact of potential fires and explosions associated with conversion of butane storage to pentane storage and the new pentane storage spheres will be estimated. The pentane spheres will be compared to a zero baseline. The impact of potential fires and explosions associated with railroad tank car accidents will be estimated for pentane.

Fuel Ethanol Storage – Tanks, Rail and Off-loading Facilities

Fuel ethanol will be stored at the Torrance facilities for blending with the base gasoline stock. A new 40,000-bbl tank will be constructed west of Prairie Avenue to store the fuel ethanol. Two existing 20,000-bbl tanks also will be converted to fuel ethanol service. New rail spurs and off-loading facilities also will be constructed west of Prairie Avenue for receiving fuel ethanol by rail. The impact of potential fires and explosions associated with fuel ethanol storage vessels will be estimated and compared to a zero baseline. The impact of potential fires and explosions associated with railroad tank car accidents will be estimated for fuel ethanol.

4.5.4.2 Gasoline Sulfur Reduction

Another feature of the CARB Phase 3 gasoline specifications is the reduction of sulfur content in gasoline. The following paragraphs summarize the processes and equipment Mobil proposes to modify to meet this requirement, and how these changes affect the calculation of risk.

Compressor Upgrades

This project component increases the capacity to feed crude tower overhead gas to the Saturated Gas Plant and reduces the discharge of overhead gas to the Unsaturated Gas Plant. To obtain this capacity increase, two compressors will be modified. The compressor modifications will produce a small increase in the maximum crude tower overhead gas flow to the Saturated Gas Plant. The increased risk associated with this flow is within the uncertainty of the modeling technique used to estimate changes in risk. Therefore, no significant change in off-site risk is expected from these modifications.

Unsaturated Gas Plant Sidestripper

The new sidestripper for the Unsaturated Gas Plant Rerun Tower will help reduce residual H_2S to less than one ppm from a mid-cut cracked naphtha. In addition to the sidestripper, the project will require the installation of a new reboiler, bottoms cooler, two pumps, and an air cooler. The stripped naphtha will be sent to an existing storage tank for subsequent sale or use. The risks associated with the new unit are compared to a zero baseline.

MEROX™ (2nd Stage Merox Naphtha Wash and New Merichem™ Unit)

To reduce the amount of sulfur entering the Alkylation Unit, a new grassroots Merichem™ Unit will be installed to treat purchased isobutane, while a second stage naphtha wash will be added to the existing unsaturated LPG Merox™ Unit. The Merox™ Unit treats the unsaturated propane and butane derived from the Unsaturated Gas Plant.

The unsaturated stream is currently treated in a Merox™ Unit for H_2S and mercaptan removal. To improve sulfur removal, a second stage naphtha wash will be installed, consisting of a new caustic/naphtha separator and two new circulating pumps. A new Merichem™ Unit also will be installed to remove H_2S and mercaptans from the purchased isobutane stream. This unit will operate similarly to the existing Merox™ Unit, except that H_2S will be removed via caustic washing, as opposed to liquid amine.

The risk of upset associated with the new Merichem™ Unit will be comparable to that for the existing (pre-project) Merox™ Units, since both units are of essentially similar design and function and process similar types of feed. Under typical "worst-case" release scenarios, only the failure of a single similar piece of equipment or unit is assumed, since the likelihood of joint failure of two independent units is much smaller than the failure of a single unit.

The proposed project involves two new units for hazard analysis purposes: 1) the modified existing Merox™ Unit and 2) the new Merichem™ Unit. While there may be a small increase in total risk due to the addition of the new Merichem™ Unit, or the modification of the existing Merichem™ Unit, the failure of only one unit is assessed at a time. The modeling techniques used for assessing risks have a resolution of 0.1 mile. The change in risk from either of the new or modified units is within the uncertainty of the modeling techniques. Therefore, the hazard associated with the addition of the new or modified units is considered comparable to that for the existing baseline. Consequently, project sulfur reduction activities are not expected to produce an increase in potential offsite risks.

4.5.5 Terminal Improvements

Because of the affinity of ethanol for water, fuel-blending activities will take place at the distribution terminals, instead of at the Torrance Refinery. Fuel ethanol is not produced commercially in southern California, so it will be transported to the Los Angeles area by rail and by marine tanker. Currently, large amounts of MTBE are imported by marine tanker from the Gulf Coast. Replacing MTBE with fuel ethanol will result in displacing MTBE marine tanker trips by fuel ethanol marine tanker trips. Because less ethanol than MTBE is needed as an oxygenate, there also is expected to be fewer marine vessel transport trips. Ethanol has a lower fire and explosion impact than MTBE, which reduces the impact. No incremental risk is expected from these shipping operations.

Currently, MTBE is transported to the Torrance Refinery via pipeline from SWT. Fuel ethanol will be off-loaded from railcars at both the Vernon and Torrance facilities. The fuel ethanol will be distributed by tanker truck from the Torrance and Vernon sites to other distribution terminals for blending with base gasoline stock. The impacts of accidents during transport by rail and truck will be estimated, as these are new activities associated with the project.

In addition, fuel ethanol will be off-loaded from marine tankers at Mobil's SWT in the Port of Los Angeles. Fuel ethanol will be distributed from SWT by truck to distribution terminals for blending with base gasoline stock. As stated above, fuel ethanol has lower fire and explosion risks than MTBE, which reduces the hazard risks during off-loading ethanol from the marine tankers. Thus, no incremental risk is expected from these marine tanker operations. The potential hazard impacts from ethanol truck transport accidents will be estimated.

4.5.5.1 Torrance Loading Rack

Improvements at the Torrance Loading Rack include constructing a new fuel ethanol unloading rack and a new vapor recovery unit, adding a new fuel ethanol truck loading lane at an existing loading rack, and modifying two existing loading racks to allow for fuel ethanol blending. Incremental risk will be estimated for off-loading ethanol at the new unloading rack.

4.5.5.2 Vernon Terminal

Planned improvements at the Vernon Terminal include modifying existing railroad spurs to accommodate fuel ethanol unloading and installing a new railcar unloading system. Up to 15 railcars carrying fuel ethanol will be offloaded per day at the Vernon Terminal. Two pumps will be installed to accommodate the off-loading operation. The rail unloading impacts for fuel ethanol are less or comparable to existing impacts. The increase in rail traffic will increase the incidence of potential accidents; the incremental accident frequency will be estimated.

Additional improvements include the construction of a new two-position truck fuel ethanol truck unloading rack, and a new fuel ethanol-loading lane at an existing loading rack. The impact of potential truck accidents will be estimated. As a truck accident potentially could happen anywhere along its route, a generic truck accident will be used to define the hazard associated with a truck accident at the Vernon Terminal (or other terminals) or on the highway system.

Approximately eight trucks per day are expected to carry fuel ethanol from Vernon to Atwood, and nine additional trucks per day to outlying third-party terminals, such as those located in Colton and San Diego.

Fuel ethanol storage at the Vernon facility will be accommodated by the conversion of two existing aboveground gasoline storage tanks, (one - 20,000-bbl and the other - 60,000-bbl). A new 50,000-bbl aboveground storage tank and associated containment dike and piping will be installed in the east tank farm to replace the gasoline storage capacity lost by converting two tanks to fuel ethanol storage. The net reduction in gasoline storage at the Vernon facility will be 30,000 bbls. Under a worst-case assumption for the baseline, the larger of the two existing gasoline tanks would fail. As the new gasoline tank is smaller than the existing larger tank, a net reduction in overall risk would occur and no risk analysis for gasoline storage is required. The risk of failure of the converted 60,000-bbl fuel ethanol tank at Vernon will be compared to a 60,000-bbl gasoline tank baseline.

4.5.5.3 Atwood Terminal

Improvements required at the Atwood Terminal include construction of a new truck unloading rack, and modification of a truck rack for blending of fuel ethanol. Approximately eight truckloads per day of fuel ethanol will be brought to Atwood. The impact of ethanol truck accidents will be estimated.

Fuel ethanol storage at the Atwood facility will be accommodated by the installation of a 15,000-bbl AST to the northwest of the existing loading rack. The existing storage tank dike wall will be modified. The incremental impact of the new tank will be estimated relative to a zero baseline.

4.5.5.4 Southwestern Terminal

The improvements at SWT include construction of a new two-lane truck loading rack and a new vapor combustor. The new truck loading rack will accommodate up to 46 trucks per day. The impact of potential truck accidents will be estimated.

Fuel ethanol will be delivered to SWT by up to three marine tanker shipments per month, with each delivery containing 100,000 bbls. The risk of a fire on a marine tanker carrying fuel ethanol will be compared to the risk of a fire on a marine tanker carrying MTBE. Fuel ethanol storage at SWT will be accommodated by the conversion of six existing aboveground gasoline storage tanks (total capacity of 400,000 bbls) so that they also can store ethanol. Conversion from MTBE service to fuel ethanol will lower the fire and explosion risks at SWT and aboard the marine tanker.

Non-CARB gasoline produced at the Torrance Refinery and destined for use outside California will be shipped via an existing pipeline to SWT for outbound shipment on 100,000-bbl marine tankers. The existing pipeline is currently used for transporting gasoline and gasoline components for import and export through SWT. While the quantities of gasoline shipped will vary from current operations, there will be no change in the size of the pipeline or the size of the marine tanker used for export. Increasing shipments do not increase the unit risk associated with a given pipeline failure or marine tanker failure, since the release scenarios will not change. Only the probability of an accident will increase if there are increased hours of operation of the pipeline or if more tankers will be needed. There will be two additional tanker shipments per month for exporting gasoline. The increased hours of operation would not represent a substantial change from historical usage of the pipeline. However, the probability of a major pipeline or marine tanker accident is very small and the small increase in overall risk due to additional throughput or additional tanker operation is considered negligible.

4.5.6 Review of Potential Hazards

Most industrial accidents may be classified within one of several broad categories 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.

4.5.6.1 Toxic Gas Release

Toxic gas releases are usually a concern in evaluating potential accidents at petroleum and 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 gaseous AHM release scenarios were identified.

A number of catalysts are expected to be associated with the proposed project. The compositions of individual catalysts used in a given process typically are 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, a significant release of catalysts to the air would require a catastrophic failure of a piece of equipment or refinery 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.

4.5.6.2 Toxic Liquids Release

Toxic liquid can be released in two forms, as a liquid spill or as aerosol droplets. Generally, toxic liquid spills do not represent a direct offsite hazard. Liquid spills are typically contained within berms, or dikes, or similar containment designed to prevent runoff. Potential offsite hazards could result from evaporation of spilled products and transport of these gases offsite. The consequences of such a spill would depend on 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 used in this project are flammable and explosive, but are not notable for their toxicity. For this reason, toxic liquid releases are not applicable.

4.5.6.3 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 hazard could occur if the spilled materials were to catch fire, be introduced to the stormwater 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 expected to be associated with the proposed project. The compositions of individual catalysts used in a given process typically are 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, a significant release of catalysts to the air would require a catastrophic failure of a piece of equipment or unit by fire or explosion. However, 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.

4.5.6.4 Gas Fire

Several combustible, potentially gas-phase materials will 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 worst-case quantities of gases associated with the proposed project are comparable to quantities currently used, and project risks are assessed for these worst-case quantities under specific release scenarios. In general, the hazard associated with the rupture of a single large storage container, such as a pentane or butane storage sphere, is much greater than the hazards from the rupture of a small diameter line or a piece of process equipment containing the same substance, because the quantities in the storage sphere are much greater. Therefore, the worst case fire or explosion risks associated with a given gas typically are assessed for a major component failure (e.g., a large storage tank or an overall process unit) rather than for individual pieces of equipment.

4.5.6.5 Liquid Pool Fire

Combustible, liquid-phase materials that will be present in project components include gasoline, refrigerated pentane, and fuel ethanol, but pool fire hazards would be created 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 fuel ethanol, boils at 130^{o}F (54.4^{o}C). Ethanol, which is replacing MTBE boils at 170.6^{o}F (77ºC). 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 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 were modeled for storage tank ruptures into containment areas, for unconfined tank truck ruptures and for unconfined pipeline ruptures.

4.5.6.6 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 also are typically less severe than a gas or liquids fire due to the smaller volumes involved. No solids fires were considered in this analysis, because the proposed project does not include the use of new or increased use of flammable solids.

4.5.6.7 Confined Explosion

A confined explosion would involve the presence of explosive conditions internal to the process equipment or storage tanks. 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 were eliminated from consideration in this analysis.

4.5.6.8 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 were modeled for scenarios involving tank ruptures of pentane and tank truck ruptures for butane with associated vapor cloud explosions.

4.5.6.9 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 proposed 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 or increase the use of flammable solids.

4.5.6.10 Boiling Liquid Expanding Vapor Explosion

A boiling liquid expanding vapor explosion (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, which later ignites. The thermal radiation generated by a fireball can be considerable, and can be the predominant cause of potential offsite impacts. BLEVE cases were considered for the new pentane storage tanks proposed for the project.

4.5.7 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.

4.5.7.1 Severity

Severity criteria must be defined separately for each type of consequence, due to the physical differences in the effects of each event. The types of accidents considered in this evaluation included 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, the EPA Risk Management Program Offsite Consequence Analysis Guidance was used to determine the endpoint. Endpoints for each accident category considered in this study are described below. The distance that had to be traversed away from the center of the upset to reach the endpoint was calculated for each 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.

4.5.7.2 Toxic Exposure Endpoint

Toxic exposures are of concern when a process containing an acutely hazardous material 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 (AIHA/ORC, 1988) Level II as its significance criterion. The Emergency Response Planning Guidelines 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.

No toxic impacts were considered in this analysis.

<u>Heat Evaluation Endpoint</u>

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 U.S. 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 U.S. EPA as a significance criterion, is an overpressure of 1.0 psi. An overpressure of 1.0 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.

4.5.7.3 Likelihood

The likelihood of an occurrence can be expressed as "Frequent," "Periodic," "Occasional," "Improbable," or "Remote." In qualitative terms, a "Frequent" likelihood is an event that would occur more than once a year, while 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 a 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 below in Section 4.5.10.

4.5.8 Select Specific Scenarios

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

4.5.9 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 the risk analyst’s experience with similar projects. The likelihoods are categorized as Frequent, Periodic, Occasional, Improbable, and Remote as defined above in Section 4.5.8.2.

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 frequency of a maximum probable (6.3 Richter) Newport-Inglewood earthquake is about one per 100 years[1].Approximately one in ten spherical vessels fail for lateral accelerations >0.2g which can be generated in such an earthquake[2] 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 40,000 years. Fires would be of higher probability, but less than one per rupture. (The combined tank failure and fire frequency is approximately one per 1,000 years to one per 40,000 years).

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

Scenario	Likelihood (Qualitative)	Frequency
Tank failure (catastrophic)	Improbable/ Remote	The catastrophic pressurized tank mean failure rate[4] is approximately one per 10,000 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 400,000 years[3]. Fires would be of higher probability, but less than one per rupture. (The combined fire and failure rate is approximately one per 10,000 years to one per 400,000 years).
Tank failure (catastrophic)	Improbable	The catastrophic atmospheric tank mean failure rate[4] is approximately one per 116 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 4,600 years[3]. Fires would be of higher probability, but less than one per rupture. (The combined fire and failure rate is approximately one per 114 years to one per 4,600 years).
Pipe failure from earthquake	Improbable	The event frequency (major earthquake) is approximately once per 100 years, but the pipe may not rupture[1]. Assume the pipe failure rate in a maximum probable earthquake is one in 10, as for tanks. The number of pipe failures that result in unconfined explosions is estimated to be one in 10 (by relating failures and failures plus explosions) for a combined estimate of one per 10,000 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 1,000 years to one per 10,000 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 10 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 16,790 truck deliveries of fuel ethanol per year for a total of approximately 583,000 miles per year, the expected number of truck accidents will be one per 14.9 years. The likelihood of release is one in ten and of a major release one in 40[5]. The expected major release frequency is approximately one per 597 years.

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

Scenario	Likelihood (Qualitative)	Frequency
Railcar accident pentane/LSR	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[7]. The combined likelihood for hazardous material release is one per 90 million miles. Assume that a maximum of 2,093 tank cars of pentane are shipped annually 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 43 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[7]. The combined likelihood for hazardous material release is one per 90 million miles. The Torrance Refinery will have about 1,090 railcars per year while the Vernon Terminal will have about 3,900 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 41 and 11 years for the Refinery and terminal, respectively.
Railcar accident butane	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[7]. The combined likelihood for hazardous material release is one per 90 million miles. Assume that a maximum of 1,729 tank cars of butane are shipped annually 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 52 years. The current butane shipments to and from the refinery number 1,456 trips per year with the likelihood of release once per 62 years. These likelihoods (once in 52 years vs. once in 62 years) are essentially the same, and the impact of a butane release does not change.

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

Scenario	Likelihood (Qualitative)	Frequency
Truck Connect/ Disconnect Accident	Periodic	Human error rate[6] is about one per 2,000 operations. For 44 fuel ethanol tank truck trips per day, there are 88 connect/disconnects or 32,120 per year. A bad connect/disconnect would be expected about 16 times per year. Assume the same release rate as for truck accidents. The likelihood of any connection release (small spill) is one in ten and of a larger (200 gallons) release is one in 40[5]. The approximate larger release rate for connections is about one per two and one-half years.

Frequent - More than once per year (0 to 1 years)
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 SCAQMD, 1993
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

4.5.10 Assess Consequences

Consequence modeling was 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 the U.S. EPA's RMP Guidance worst-case estimates for explosions, fires, and BLEVEs. The 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 C 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 accident scenarios that were considered in the analysis of offsite impacts are given in Table 4.5-2. Impacts are considered significant if they extend offsite. For those scenarios for which the risk remains unchanged, no modeling was performed.

Table 4.5-2
Definition of Hazard Scenarios Modeled

Scenario	Hazard	Chemical	Discussion
1	Explosion	Butane	Assumes an explosion in the modified deisobutanizer tower. The impact of modified tower at new capacity (15,700 gallons) is compared with the pre-modified capacity of the tower (14,800 gallons)
2	Explosion	Pentane	A catastrophic failure of the new C4/C5 Splitter at the Torrance Refinery due to a major external event, such as an earthquake, is assumed to release 10,900 gallons of pentane as a vapor cloud which explodes. The incremental risk was compared with a zero baseline.
3	Explosion	Pentane and Butane	A catastrophic failure of the converted 51,000-bbl spherical storage tank at the Torrance Refinery due to a major external event, such as an earthquake, is assumed to release 10,900 gallons of pentane as a vapor cloud which explodes (U.S. EPA worst-case assumption). The incremental risk of 51,000 bbls of pentane was compared with an explosion of 51,000 bbls of butane.
4	Pool Fire	Pentane	The contents of converted 51,000-bbl spheroid tank (pentane) are spilled into a containment dike and then catches fire. The storage tank failure was assumed to be caused by an external event or degradation of the equipment. The incremental risk was compared with a zero baseline since butane is not a liquid at ambient temperatures.
5	BLEVE	Pentane and Butane	A fire in the vicinity of the 51,000-bbl spheroid tank (pentane) causes the tank to fail catastrophically; resulting in 10 percent of the contents exploding as a vapor cloud. The incremental risk was compared with a butane BLEVE baseline.
6	Pool Fire	Pentane	A 700-bbl railcar of pentane spills its contents, ignites and burns. The pentane fire is compared with a zero baseline.
7	Explosion	Pentane	A 700-bbl railcar of pentane explodes. The pentane explosion is compared with a zero baseline.
8	Pool Fire	Ethanol	The entire contents of an 8,500-gallon fuel ethanol tank truck at the Torrance Refinery are spilled in a vehicle accident. The contents spread in an unconfined manner to a depth of one centimeter and then ignites. The fire is compared to a zero baseline.

Table 4.5-2 (Continued)
Definition of Hazard Scenarios Modeled

Scenario	Hazard	Chemical	Discussion
9	Pool Fire	Ethanol	The entire contents of an 8,500-gallon fuel ethanol tank truck at SWT spill in a vehicle accident. The contents spread in an unconfined manner to a depth of one centimeter and then ignite; the fire is compared to a zero baseline.
10	Pool Fire	Ethanol	An improperly connected fuel ethanol truck 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. The fire is compared to a zero baseline.
11	Pool Fire	Ethanol	The contents of the new Torrance Refinery fuel ethanol tank (40,000-bbl) are spilled into a containment dike and catch fire. The storage tank failure was assumed to be caused by an external event or degradation of the equipment. The incremental risk was compared with a zero baseline.
12	BLEVE	Ethanol	A fire in the vicinity of the new Torrance Refinery fuel ethanol tank (40,000-bbl) 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 was compared with a zero baseline.
13	Explosion	Pentane	A catastrophic failure of the new Side Stripper Tower releases 1,010 gallons of light ends as a vapor cloud, which explodes. The failure was assumed to be caused by a major external event like an earthquake. The incremental risk was compared with a zero baseline.
14	Pool Fire	Ethanol	A 700-bbl railcar of fuel ethanol spills its contents, ignites and burns. The ethanol fire was compared with a zero baseline.
15	Pool Fire	Ethanol and Gasoline	The contents of the converted 60,000-bbl fuel ethanol storage tank at Vernon are spilled into a containment dike (200' x 280' x 6') and catch fire. The storage tank failure was assumed to be caused by an external event or degradation of the equipment. The incremental risk was compared with a 60,000-bbl gasoline baseline.
16	BLEVE	Ethanol and Gasoline	A fire in the vicinity of the converted 60,000-bbl fuel ethanol tank at Vernon 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 was compared with a 60,000-bbl gasoline baseline.

Table 4.5-2 (Concluded)
Definition of Hazard Scenarios Modeled

Scenario	Hazard	Chemical	Discussion
17	Pool Fire	Ethanol	The contents of the new fuel ethanol tank (15,000 bbl) at Atwood are spilled into a containment dike (130' x 130' x 6') and catch fire. The storage tank failure was assumed to be caused by an external event or degradation of the equipment. The incremental risk was compared with a zero baseline.
18	BLEVE	Ethanol	A fire in the vicinity of the new 15,000-bbl fuel ethanol tank at Atwood 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 was compared with a zero baseline.
19	Pool Fire	Ethanol, MTBE, and Gasoline	A 100,000-bbl shipload of fuel ethanol ignites and burns through a 10,000-square foot opening in the deck. The ethanol fire is compared with an MTBE fire of the same size to estimate the incremental risk of the conversion project. A 100,000-bbl gasoline tanker fire is compared with a zero baseline to estimate non-CARB gasoline shipments.
20	Pool Fire	Pentane	The pipeline from the C5/LSR storage to the blending area ruptures and the spilled liquid ignites. Flow is assumed to occur for 10 minutes at 1,680 gpm until the flow can be stopped. The impact is compared to a zero baseline.
21	BLEVE	Pentane	The pipeline from the C5/LSR storage to the blending area ruptures and releases a vapor cloud that explodes in a fireball or BLEVE. Flow is assumed to occur for two minutes at 1,680 gpm and 10 percent of the released mass is assumed to be consumed in the BLEVE. The impact is compared to a zero baseline.

The results of the model runs are summarized in Table 4-5-3. It should be noted that the upsets that were modeled are not likely to occur and were very conservatively based on U.S. EPA RMP worst case and alternate case assumptions. However, in the unlikely event that an upset would occur, most impacts would be significant. The consequences presented for the upset scenarios do not take credit for existing safety and emergency response programs that Mobil has in place, or mitigation measures Mobil will have in-place when the project is completed. Mitigation measures are discussed in Subsection 4.5.12.

Table 4.5-3
Distance (meters) to Endpoint from Center to Upset in Meters (feet)*

Scenario	Event	Explosion	Pool Fire	BLEVE	Of Im
1a	Deisobutanizer (14,800 gallons before)	550 (1,800)	NA	NA	Y
1b	Deisobutanizer (15,700 gallons after)	560 (1,840)	NA	NA	Y
2	C4/C5 Splitter Fail (10,900 gallons pentane)	510 (1,670)	NA	NA	Y
3a,4,5a	Pentane Spheroid (51K bbl)	2,960 (9,710)	510 (1,670)	1,740 (5,710)	Y
3b,5b	Butane Spheroid (51K bbl)	2,900 (9,510)	NA	1,690 (5,540)	Y
6,7	Pentane RR Tank Car (700 bbl)	710	660 (2,170)	NA	Y
8	Fuel Ethanol Tank Truck (8,500 gallons)	NA	130 (430)	NA	Y
9	Fuel Ethanol Tank Truck (8,500 gallons)	NA	130 (430)	NA	Y
10	Bad Connect/Disconnect (200 gallons)	NA	20 (70)	NA	N
11,12	Fuel Ethanol Tank Failure (40K bbl)	NA	170 (560)	1,350 (4,430)	Y
13	Side Stripper (1,010 gallons pentane)	230 (750)	NA	NA	N
14	Fuel Ethanol RR Tank Car (700 bbl)	NA	250 (820)	NA	Y
15a,16a	Vernon Fuel Ethanol Tank Failure (60K bbl)	NA	170 (560)	1,590 (5,220)	Y
15b,16b	Vernon Gasoline Tank Failure (60K bbl)	NA	380 (1,250)	1,930 (6,330)	Y
17,18	Atwood Fuel Ethanol Tank Failure (15K bbl)	NA	90 (300)	920 (3,020)	Y
19a	100K-bbl Ship Fire – Gasoline	NA	160 (520)	NA	Y
19b	100K-bbl Ship Fire – MTBE	NA	150 (490)	NA	Y
19c	100K-bbl Ship Fire - Fuel Ethanol	NA	70 (230)	NA	Y
20,21	C5/LSR 1,680 gpm pipeline rupture	NA	500 (1,640)	110 (360)	Y

* Endpoint – EPA RMP
Explosion endpoint – 1.0 psi
Fire/BLEVE endpoint – 5.0 kW/m^2 for 40 seconds or equivalent
NA – Not Applicable
All endpoint distances are rounded to the nearest 10 meters (10 feet).

- Case 1 assumes a vapor cloud explosion of the entire 15,700-gallon contents of the deisobutanizer. This is a high unlikely event, but it is the U.S. EPA worst-case assumption for butane. Case 1 compares the impact distance of a butane explosion after modification (Case 16) of the deisobutanizer with an explosion before modification (Case 1a). Table 4.5-3 shows that the size of the impact zone for a vapor cloud explosion increases by approximately 10 meters after modification. This increase in impact distance is not a significant change, since it is within the uncertainty of the resolution of the modeling technique. However, the potential exists for offsite consequences in both cases, which is significant.

- Case 2 assumes a vapor cloud explosion of the entire 10,900-gallon contents of the new C4/C5 Splitter. This is a high unlikely event, but it is the U.S. EPA worst-case assumption. (Pentane has a slightly larger impact distance than butane, so the contents were assumed to be all pentane for the worst case). The impact distance for the pentane explosion scenario was approximately 510 meters, which is significant.
- Case 3 considers the catastrophic failure of the 51,000-bbl butane spheroid that will be converted to pentane storage. This case assumes that the entire 51,000 bbls are released as a vapor and explode (U.S. EPA worst case). The impact distance for a pentane explosion is compared with a vapor cloud explosion of butane. Table 4.5-3 shows that impact distance for pentane is 2,960 meters as compared with 2,900 meters for butane. This is an increase of 40 meters, or about one percent, is not significant since it is within the uncertainty of the resolution of the modeling technique. However, the potential exists for offsite consequences in both cases, and is, therefore, significant.
- Case 4 considers the catastrophic failure of the 51,000-bbl butane spheroid that was converted to pentane storage. This case assumes that the entire 51,000 bbl spill to a 10-foot deep containment dike capable of containing the entire contents plus 20 percent, and then ignites. The impact distance for a pentane pool fire is compared with a zero baseline since butane flashes to vapor at standard temperatures. Table 4.5-3 shows that the impact distance for pentane fire is 510 meters. This impact is significant because the impact could extend offsite.
- Case 5 assumes a fire in the vicinity of the 51,000-bbl butane spheroid that will be converted to pentane storage. The fire causes the tank to fail resulting in a fireball or BLEVE. This case assumes that 10 percent of the 51,000 bbl is released as a vapor and explodes. The impact distance for a pentane BLEVE is compared with a vapor cloud explosion of butane. Table 4.5-3 shows that impact distance for pentane is 1,740 meters compared with 1,690 meters for butane. This is an increase of 50 meters or about three percent, which is not significant since it is within the uncertainty of the resolution of the modeling technique. However, the potential exists for offsite consequences in both cases.
- Case 6 assumes that a 700-bbl railcar of pentane ruptures, spills and ignites. The pentane 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 estimated to be 660 meters, which is significant. The

actual pool size and impact distance would be much smaller, since a one-centimeter depth is unrealistic for a tank car spill.

- Case 7 considers the catastrophic failure of a 700-bbl pentane railcar. This case assumes that the entire 700 bbl are released as a vapor and then explodes (U.S. EPA worst case). Table 4.5-3 shows that impact distance for the pentane explosion is 710 meters, which is significant because it potentially could occur offsite.
- Case 8 estimates the impact of a Torrance Refinery site fuel ethanol truck accident. This case assumes that 8,500 gallons of fuel ethanol are released in an unconfined manner, spread to one-centimeter depth, and then ignite. The impact distance from a pool fire was estimated to be 130 meters. As this accident could happen just as the tanker truck is about to leave the facility, the impact could extend offsite, and is therefore significant.
- Case 9 estimates the impact of a SWT fuel ethanol truck accident. This case assumes that 8,500 gallons of fuel ethanol are released in an unconfined manner, spread to one-centimeter depth and then ignites. The impact distance from a pool fire was estimated to be 130 meters. As this accident could happen just as the tanker truck is about to leave the terminal, the impact could extend offsite, and is therefore significant.
- Case 10 estimates the impact of a partial spill of fuel ethanol due to a bad hose connection or hose rupture during loading or unloading. About 200 gallons was assumed to be released in an unconfined manner, spread to a one-centimeter depth, and then ignite. The impact distance was calculated to be approximately 20 meters. This risk would be confined to the Mobil site where the release occurred, and is not considered significant.
- Case 11 considers the catastrophic failure of the new 40,000-bbl fuel ethanol storage tank at the Torrance Refinery. This case assumes that the entire 40,000-bbl spill to a five-foot-deep containment dike capable of containing the entire contents plus a margin of safety, and then ignite. The impact distance for an ethanol pool fire is compared with a zero baseline. Table 4.5-3 shows that impact distance for an ethanol fire is 150 meters, which is significant because the tanks are located near the property line and the impact could extend offsite.
- Case 12 assumes a fire in the vicinity of the new 40,000-bbl fuel ethanol storage tank at the Torrance facilities. The fire causes the tank to fail, resulting in a fireball or BLEVE. This case assumes that 10 percent of the 40,000 bbl are released as a vapor and explodes. Table 4.5-3 shows that the impact distance for an ethanol BLEVE is 1,350 meters, which is significant because it would extend offsite.
- Case 13 considers the catastrophic failure of the new Unsaturated Gas Plant Side Stripper Tower. This case assumes that the entire 1,010 gallons of light-end

contents of the Tower is released as a vapor and explodes (U.S. EPA worst case). (The light ends were conservatively assumed to be all pentane, since this has a larger impact when estimating the worst case). The impact distance for the side stripper explosion is 230 meters. However, the side stripper is in the central portion of the Torrance Refinery, approximately 400 meters from the facility boundary. Therefore, this impact is confined to Mobil's Torrance site, and is not significant because there would be no offsite consequences.

- Case 14 assumes that a 700-bbl 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 Mobil's facilities.
- Case 15 considers the catastrophic failure of the converted 60,000-bbl fuel ethanol storage tank at Vernon, resulting in a contained pool fire. The impact distance for a fuel ethanol pool fire was compared with a gasoline pool fire baseline. Table 4.5-3 shows that the impact distance for a gasoline fire is 380 meters, while the ethanol distance is 170 meters, a reduction of 55 percent. The project therefore reduces pool fire risk at the Vernon facility. However, the potential exists for offsite consequences in both cases since the tanks are near the property line and the impacts could extend offsite.
- Case 16 assumes a fire in the vicinity of the converted 60,000-bbl fuel ethanol storage tank at Vernon. The fire causes the tank to fail resulting in a fireball or BLEVE. This case assumes that 10 percent of the 60,000 bbl are released as a vapor and explodes. The baseline is a BLEVE from the existing 60,000-bbl gasoline tank. Table 4.5-3 shows that impact distance for a gasoline BLEVE is 1,930 meters, while the impact distance for the ethanol BLEVE is 1,590 meters, a reduction of 18 percent. The project therefore reduces the BLEVE risk at the Vernon facility. However, the potential exists for offsite consequences in both cases and is, therefore, significant.
- Case 17 considers the catastrophic failure of the new 15,000-bbl fuel ethanol storage tank at Atwood, resulting in a contained pool fire. The impact distance for fuel ethanol pool fire is compared with a zero baseline. Table 4.5-3 shows that impact distance for fuel ethanol fire is 90 meters, which is significant since the tanks are near the property line and the impacts could extend offsite.
- Case 18 assumes a fire in the vicinity of the 15,000-bbl fuel ethanol storage tank at Atwood. The fire causes the tank to fail resulting in a fireball or BLEVE. This case assumes that 10 percent of the 15,000 bbl is released as a vapor and explodes.

Table 4.5-3 shows that impact distance for a gasoline BLEVE is 920 meters, which would extend outside the terminal site, and thus is significant.

- Case 19: A 100,000-bbl marine tanker containing non-CARB gasoline ignites and burns through a 10,000-square foot opening in the deck. The gasoline fire is compared with an MTBE fire to estimate the incremental risk. A marine tanker containing fuel ethanol is also compared with MTBE under the same conditions. Table 4.5-3 shows that the impact distance in the harbor area is 160 meters for a gasoline fire compared with a baseline 150 meters for an MTBE fire. The 10-meter incremental distance is not significant. For fuel ethanol, the impact distance, at 50 meters, is about one-half as large as the MTBE impact distance. Therefore the fuel ethanol impact is significantly less than the MTBE impact. However, the potential exists for offsite risks in both cases, which is significant.
- Case 20 assumes a pipeline rupture carrying C5/LSR. Pipeline flow at 1,680 gpm was assumed to continue for 10 minutes forming a pool one centimeter in depth, and then igniting. The impact distance was conservatively estimated to be 500 meters, which is significant since a portion of the pipeline runs near the refinery boundary and thus, the impact could potentially extend offsite.
- Case 21 assumes a pipeline rupture carrying C5/LSR. Pipeline flow at 1,680 gpm was assumed to continue for two minutes, forming a vapor cloud that than consumes 10 percent of the vapor mass in a BLEVE. The impact distance was conservatively estimated to be 110 meters, which is significant.

4.5.11 Potential Risks from Transportation Accidents

The potential for project-related increased risk from truck and rail/train accidents was evaluated, and is 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, butane, and LSR from the refinery, and for delivery of fuel ethanol to the Torrance Refinery and Vernon Terminal.

4.5.11.1 Train Traffic

The proposed project will increase the number of railcar shipments of pentane/butane/LSR from the Torrance Refinery. Pentane and LSR will be shipped out in February through October at an estimated rate of five railcars per day, seven days per week. Pentane and LSR will be shipped back to Torrance in November through January, at an estimated rate of eight railcars per day, seven days per week. The incremental impact of a pentane railroad tank car accident was estimated relative to a zero baseline. The number of pentane shipments per year will increase the probability of an accident, which, combined with the consequences of an accident, will increase the incremental risk. Table 4.5-3 estimates the likelihood of a pentane railcar accident based on the assumption of a maximum of 2,093 railcar trips per year, with shipments averaging 1,000 miles per trip. This was compared to a zero baseline for pentane railcars before the proposed project. The likelihood of an accident with the release of hazardous materials is estimated to be once per 43 years ("Occasional"). (An accident with a major release would be less frequent).

For butane, the maximum number of railcars that will be shipped to and from the Torrance facilities will increase from 1,456 trips per year currently to an estimated peak of 1,730 trips under the proposed project. The impacts of a butane release will not increase, but the likelihood of an accident will increase due to the increase in trips. This will increase the overall risk. For 1,456 trips of an estimated distance of 1,000 mile per trip, the current likelihood is one hazardous release per 62 years ("Occasional") compared with a likelihood of once per 52 years (Occasional) for current operations. (Accidents with a major release would be less frequent). The incremental risk from butane transport (considering both the consequence and likelihood) does not significantly increase.

In addition, there will be railcar shipments of fuel ethanol to the Vernon Terminal and the Torrance facilities. Fuel ethanol will be shipped from a mid-west location, conservatively assumed to be about 2,000 miles away. Vernon will receive 3,900 tank cars per year for an estimated total travel distance of 7.8 million miles. The likelihood of an accident with a chemical release is about one per 11 years. An accident with a major release would be less frequent. For Torrance, there will be about 1,092 shipments of fuel ethanol per year of about 2,000 miles each. The likelihood of an accident with a chemical release is about one per 41 years. An accident with a major release would be less frequent. Because such accidents would have offsite consequences, the risk is considered significant.

4.5.11.2 Truck Traffic

The project will involve the transport of approximately 46 new tank truck deliveries of fuel ethanol per day, or 16,790 per year. Because MTBE is currently shipped to the distribution terminals by pipeline, rather than by surface transportation, the transportation of fuel ethanol by truck to the terminals represents a potential new risk. The distance traveled by all ethanol trucks per year was estimated from trip maps to be about 583,000 miles per year. The likelihood of a major release calculates to be approximately one per 587 years. The pipeline accident rate was estimated to vary from once per 1,000 years for major failures to once per 10,000 years for major failures with explosions. Both these likelihoods would be considered as "Improbable" (see Table 4.5-1). MTBE in a 10-minute pipeline release would have a larger impact than a tank truck release of fuel ethanol, due to the higher rate of combustion of MTBE. Combined with the likelihood, the overall ethanol truck risk is not considered to be significantly greater than current operations.

However, the location of the risk would be different. While the footprint for the risk of upset from MTBE exists at the marine terminal and along the pipeline corridor, the footprint for the risk of upset from fuel ethanol exists along the rail line and the highway system used for railcar and tanker truck transport. Because there would be a different location for the fuel ethanol risk, and thus a different potentially exposed population, the proposed project risk is considered significant, even though the risk of upset for the proposed project is not greater than for current operations (MTBE).

4.5.12 Mitigation Measures

The potential incremental change in risk that will result from the project does not substantially change the overall expected risk from the Torrance Refinery and the various terminals. This is based on the low probability of the occurrence of a catastrophic event, the very conservative assumptions used to estimate the worst-case events, and the implementation of Mobil 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 new gasoline and fuel ethanol storage tanks at the various facilities. These risks are significant and would be mitigated by planned (and required) containment systems and fire suppression systems at all new storage facilities.

While not considered mitigation measures for this project because they are presently implemented as required by regulation, compliance by Mobil with RMP and PSM requirements will help reduce the likelihood of occurrence of offsite hazards posed by the proposed project. However, RMP and PSM would not likely affect the consequences of a release. Since impact significance is based only on consequence, RMP and PSM would not mitigate project hazards to insignificance.

RMPs are required under California Health and Safety Code 25534 and 40 CFR Part 68, Section 112r. These regulations require Mobil to update the Torrance Refinery's RMP for any new processes that contain more than 10,000 pounds of pentane. 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, Section 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-start 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 this 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-start up 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 C_4/C_5 splitter and for the 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 Mobil facilities:

- 24-hour per day, seven day per week staffing;
- Fire detectors;

- Manual shutdown of liquid into or out of the splitter and storage tanks in case of fire, which will minimize the quantity of release.
- High-pressure fire deluge systems for the C_4/C_5 splitter and protective coatings for the pentane storage tank; these measures would reduce the possibility of BLEVEs caused by fires in the vicinity of these facilities.

H-3 The following practices are currently implemented at Mobil's Torrance 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; and
- 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 Mobil 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 and thus meet the definition of significant impacts. However, the combined likelihood and consequences of upset conditions would produce overall risk levels that are comparable to current operations at the Torrance Refinery and terminals.

4.6 Hydrology/Water Quality (Water Resources)

Due to low average annual rainfall in the region, over half of the water supply in the Los Angeles Basin is imported, making water supply and water quality extremely 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 will cause degradation or depletion of ground water resources and surface water substantially affecting current or future uses.
- The project will result 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 would use 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 Water Supply Effects

This section discusses potential water supply impacts from construction-related project activities.

4.6.1.1 Construction Impacts

Potential hydrology and water supply impacts caused by construction-related activities at the project sites are expected to be minimal. For example, small quantities of water may 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 worst case that approximately 530 square yards of soil would be disturbed at the Torrance Refinery in any one day. It is not expected that grading activities will take place at the terminals. Assuming that it takes 0.2 gallons of water per square yard per hour for adequate dust suppression, the worst-case water demand can be estimated by the following equation (EPA, 1992).

$$\text{Daily Water Usage} = 0.2\ (\text{gal/yd}^2\text{-hr}) \times 530\ \text{yd}^2 \times 8\ \text{hrs/day} = 848\ \text{gal/day}$$

Thus, on a worst-case basis, dust suppression activities during construction would require about 850 gallons of water per day per site. 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 criteria of 5,000,000 gallons per day.

4.6.1.2 Operational 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 (City of Los Angeles, 2001).

The Torrance Refinery currently uses water from three sources: municipal (raw) water, reclaimed water, and onsite well water. The current municipal water use at the Torrance Refinery is approximately 3.19 million gallons per day. In addition, six million gallons of reclaimed water and

1.13 million gallons of well water are used per day. The proposed project is expected to increase the demand for water by approximately 350,000 gallons per day, as additional water will be required for the cooling water system, steam generation, and the new Merichem system.

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.

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 Water Quality Effects

This section discusses potential impacts from construction-related project activities.

4.6.2.1 Construction 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 hydrotesting process at the Torrance Refinery will be discharged under WDRs. WDRs (NPDES Permit No. CAG674001 and Monitoring and Reporting Program No. CI-8160) were issued to the facility in June 2000 to discharge hydrostatic test water to a storm drain and ultimately to the Los Angeles River. Hydrostatic testing water at the terminals will also be discharged under either site-specific or general WDRs.

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 ground water 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. These wastes will also be disposed of offsite. 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 Torrance Refinery encompasses approximately 3.4 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. Stormwater Construction Permits will also not be required at the terminals, as minimal ground disturbing activities are expected.

The project will be constructed at existing facilities and involves the construction of a limited number of surface features. No significant changes in stormwater runoff volumes or drainage patterns are expected; therefore, no significant impacts are expected from stormwater discharges during construction activities.

4.6.2.2 Operational Impacts

This section discusses potential impacts to water quality relating to project operations.

Process Wastewater Discharges

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

It is expected that the proposed project activities will have a minor impact on Torrance Refinery wastewater handling and treatment systems. An additional 2,880 gallons of wastewater per day will be discharged as a result of the new Merichem system. This additional wastewater will be discharged to the sanitary sewer under Industrial Wastewater Permit No. 516 and will meet the required permit limits. This permit allows an average wastewater flow of 4,010,384 gallons per day or a peak of 5,301 gallons per minute. The small quantity of additional wastewater discharge from the Merichem system is not expected to create significant impacts.

Wastewater generated by activities at the terminals is currently 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.

Fuel Ethanol Delivery

Fuel ethanol will be transported to the Los Angeles area by ship and rail, replacing MTBE, which is currently transported to the area by ship. Therefore, the potential exists for a release of ethanol from a ship or railcar to surface waters. In addition, though the probability of a fuel ethanol release during truck transport is small, a release to a storm drain could occur. Therefore, the potential also exists for water quality impacts from releases during fuel ethanol deliveries. It should be noted that ethanol is highly soluble in water and biodegrades rapidly. Therefore, ethanol is less likely to create significant impacts to surface water than MTBE if released.

A large ethanol spill into a surface water body would have some immediate impact to the biota in direct vicinity of the spill. However, because of its properties (e.g., infinite solubility in water, rapid evaporation), ethanol would quickly dissipate. Within a very short distance from the spill location, concentrations would reach levels where biodegradation could occur (Malcom Pirnie, 1998). The reported half-life of ethanol in surface waters ranges from 6.5 to 26 hours (Handbook of Environmental Degradation Rates, 1991). Therefore, it is not expected that a significant spill of ethanol to surface water would result in degradation substantially affecting current or future uses.

In addition, release may occur from ASTs. Mobil proposes to store fuel ethanol at the Torrance Refinery in two existing ASTs, which will be modified for this purpose. The modifications include installation of double tank bottoms with leak detection and new tank gauging. In addition, a new 40,000-bbl tank will be constructed. The new tank will be constructed per American Society for Testing and Materials (ASTM) standards and within secondary containment. The ASTs are maintained per American Petroleum Institute standards.

Mobil also proposes to store fuel ethanol in ASTs at the Vernon and Atwood terminals. The new ASTs will be constructed per ASTM standards and within secondary containment. In addition, existing gasoline storage tanks at the SWT and Vernon facilities will be converted to also store fuel ethanol at SWT and Vernon facilities. These existing ASTs are also located within secondary containment designed to contain a release from the ASTs, and are maintained per American Petroleum Institute standards.

The ASTs will be periodically refilled from tanker trucks and an accidental release of fuel ethanol may occur during delivery. In addition, releases may occur from the ASTs. However, the spilled material would be contained within the containment area, which is designed to hold the entire contents of the tank plus a margin of safety. Therefore, significant surface water quality impacts are not expected from the release of fuel ethanol during delivery or storage.

Stormwater Quality

Stormwater runoff from the project sites will not be adversely affected as a result of the proposed project. The various project sites have SWPPPs in place, and project-related stormwater discharges at the sites will be handled in compliance with these plans. As needed, the SWPPPs will be updated to reflect the operational modifications to each facility 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.

Groundwater Quality

The proposed project involves fuel ethanol storage and blending into the gasoline at the terminals, including the Torrance Loading Rack. As fuel ethanol will replace MTBE, the proposed project eliminates the use of MTBE at the Torrance Refinery. In the context of the proposed project, accidental spills of fuel ethanol could occur at the terminals from operational activities such as fuel ethanol storage, transfer by piping within the facility, tanker truck unloading operations, or during tanker truck transport. Potential water quality impacts would occur if the fuel 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 new aboveground storage tanks at the Torrance Refinery, Vernon Terminal and Atwood Terminal will be installed to comply with current design, construction, and monitoring standards. No new tanks will be constructed at SWT. 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 a margin of safety; and

- Formal spill response procedures, such as training requirements and spill containment kits.

In the unlikely event that a leak from a storage tank does occur and ethanol is released to the soil, it is possible that groundwater would be impacted. However, groundwater contamination due to an ethanol spill is unlikely. An analysis of the lateral and vertical movement of an ethanol spill showed that penetration was limited to the immediate spill area (D'Eliscu, 1987). According to D' Eliscu, contamination of an underground water supply is unlikely unless the aquifer is small, near the surface, and the spill very large.

As existing site conditions at the SWT include groundwater impacted by hydrocarbons, the potential exists for ethanol spills to interact with the existing hydrocarbons. The Lawrence Livermore National Laboratory conducted a study that identified potential impacts of ethanol containing gasoline on ground and surface waters. A major concern identified is the potential for benzene plumes in groundwater to increase in length. However, the primary issue at the SWT is a layer of free product floating on the groundwater, not a plume of hydrocarbons in the groundwater. As ethanol is heavier than gasoline, spilled ethanol would sink through the layer of free-product. Ethanol is very soluble in water. As the water table at the terminal is significantly influenced by the tides, the rising and falling of the water table would cause the ethanol to mix into the groundwater relatively quickly, where it would rapidly biodegrade. Therefore, a release of ethanol to the groundwater at SWT is not expected to significantly adversely affect the groundwater at the site especially compared to MTBE, which persists in water for substantially longer periods than ethanol. Indeed, replacing MTBE with ethanol is a means of reducing existing adverse groundwater impacts caused by MTBE contamination.

It should be noted that 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 U.S. 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. Mobil will continue to use water conservation measures to reduce the use of fresh water and increase the reuse of wastewater. The measures may include water reuse and the use of reclaimed water. Mobil 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

All proposed construction and operation of new/modified facilities and equipment will occur within the existing property boundaries of the Mobil facilities. No new property will be acquired as part of this project. The new equipment and minor modifications to existing equipment are consistent with the existing land uses in the vicinity of all of the involved Mobil facilities which for the most part are 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 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 any of the Mobil facilities. The proposed project will not conflict with land-use patterns delineated by the various General Plan designations for the project areas, so no General Plan amendments will be needed.

Discussions with the planning departments at the various jurisdictions indicate that approvals for the proposed project will require Mobil to submit the appropriate permit applications and/or site plans, which are described in the following paragraphs. This will ensure that the applicable construction design standards and/or guidelines will be followed.

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 Torrance facilities will require Mobil to provide detailed information to the City of Torrance. The City would then decide whether modification to Mobil's existing land use permits are needed.

Because the Vernon Terminal is a conditionally permitted use, modifications and additions proposed at the terminal require filling a conditional use permit, including a plot, circulation, and floor plans (as applicable). Following presentation of a completed application to the Department of Community Services, the application will be brought before the City Council for review and approval (City of Vernon, 1995).

Modifications at SWT will require submittal of an Application for Development Projects to the Property Management Department at the Port of Los Angeles. The application will then be subject to environmental review by the Environmental Management Division at the Port and subject to review for potential coastal development permit requirements (Dubich, 2001). Additionally, because the proposed project will change the amount and type of flammable liquids stored at SWT, the proposed modifications and additions are subject to a Risk Management Analysis by the Planning and Research Division at the Port (Yon, 2001).

Because the Atwood Terminal is a conditionally permitted use, a public hearing will be held by the Planning Commission to determine if grounds exist for the modification or termination of the existing conditional use permit. A pre-filing application can be submitted to the planning department so that the applicant can receive feedback from the planning department on changes needed to the site/construction plans prior to their review before the Planning Commission (Wright, 2000).

4.7.3 Mitigation Measures

No significant 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 Public Services

The Initial Study prepared for the proposed project concluded that the only public service agencies that would be adversely affected by the proposed project were local fire departments. Impacts to public services will be considered significant if:

- Additional service needed from the fire departments require an increased workforce.

4.8.1 Construction and Operation

As the proposed project will result in only relatively minor modifications to Mobil's existing industrial facilities, no significant impacts to fire services provided by the City of Torrance Fire Department, City of Anaheim Fire Department, the Orange County Fire Authority, City of Vernon Fire Department or the City of Los Angeles Fire Department are expected as a result of either construction or operation of the proposed project. The Mobil Torrance Refinery maintains its own onsite fire department, as discussed in Section 3.9.2. Additionally, fire stations in the areas near the Torrance Refinery and the terminals are equipped to handle emergency response incidents at industrial facilities. Close coordination also will be continued with local fire departments and emergency services, including the City of Torrance, City of Anaheim, City of Vernon, City of Los Angeles and County of Orange.

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

4.8.2 Mitigation Measures

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

4.9 Solid/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.

4.9.1 Nonhazardous Waste

This section discusses potential impacts related to the disposal of nonhazardous waste from project-related activities.

4.9.1.1 Construction Impacts

An estimated total of approximately 700 cubic yards of concrete and masonry will be recycled onsite at the Torrance facilities. Approximately 300 tons of scrap metal will be shipped offsite to local metal recyclers. Approximately 20 truckloads of wood debris will be shipped offsite to one of the landfill sites maintained by the LACSD. As stated in Section 3.9, these sites have the capacity to accept the waste produced by the proposed project.

Construction activities have the potential to uncover hydrocarbon-impacted soils, given that refining activities, petroleum storage, and distribution have been conducted at the site for over 70 years. As a conservative worst-case assumption, it is estimated that 1,500 cubic yards of hydrocarbon impacted soil may be uncovered, from activities related to the demolition of an old oil storage tank. In addition, the tank demolition will generate approximately 500 cubic yards of concrete and 500 cubic yards of oily residue. The concrete, oily residue and 500 cubic yards of soil will be sent offsite for treatment and/or disposal. Approximately 1,000 cubic yards of this soil will be treated in the onsite soil remediation facility. The onsite facility has the capacity to manage 1,000 cubic yards of the soil. The soil will be managed in accordance with SCAQMD Rule 1166. There also is adequate capacity to manage the material sent offsite for treatment/disposal at sites such as Safety Kleen's Buttonwillow facility or Chemical Waste Management's Kettleman City facility. Therefore, significant impacts related to the decommissioning of the tank are not expected.

The terminals are expected to generate a minimal amount of nonhazardous waste during construction. This waste would most likely include paper products and metals from piping replacement. It is estimated that approximately 10 percent of these wastes will be recycled and the remaining wastes disposed at an approved landfill. As the increases in the volume of solid waste disposed from construction/demolition activities will be small, 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.

4.9.1.2 Operational Impacts

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

4.9.2 Hazardous Waste

This section discusses potential impacts from the disposal of hazardous wastes generated during project activities.

4.9.2.1 Construction Impacts

At the Torrance Refinery, there may be an increase in the amount of hazardous waste generated and disposed offsite as a result of the proposed project construction. It is possible that asbestos-containing materials may be generated as a result of piping modifications at the various facilities. Suspect asbestos-containing materials would be characterized and disposed offsite in accordance with applicable regulations. If encountered, quantities of asbestos-containing materials would be small and well within the capacity of appropriately permitted disposal facilities in the region.

4.9.2.2 Operational Impacts

No additional hazardous wastes are expected to be generated from project activities at any of the Mobil facilities. Approximately 10 railroad cars per year of spent caustic from the new Merichem system at the Torrance Refinery will be transported to the Merichem facility in Texas and used in the production processes there. This material is considered to be a hazardous material and not a hazardous waste. In addition, approximately 26 additional truckloads per year of spent alumina from the Torrance Refinery will be shipped offsite as a hazardous material via tanker trucks. The spent alumina will be shipped to a cement facility for recycling. Therefore, no adverse impacts related to hazardous wastes are expected from proposed project activities.

4.9.3 Mitigation Measures

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

4.10 Transportation/Traffic

This section presents the evaluation of construction-related traffic, and its impact on surrounding circulation and flow patterns near the Torrance Refinery site. The impact assessment methodology involves adding proposed project-generated traffic to existing traffic volumes, and assessing the resulting capacity impacts.

The project construction work force and resulting construction phase traffic volumes are both small and short-term at the terminals, and impacts in the vicinity of the terminals are expected to be minimal. Expected traffic volumes related to project construction at the terminals are below the Los Angeles County Congestion Management Program's (CMP) threshold for requiring a detailed traffic analysis of 50 vehicles per day. Therefore, no detailed analysis was performed. (Traffic impacts for construction at the Torrance Loading Rack are included in the analysis for the Torrance Refinery).

Operation-phase traffic impacts at the Torrance Refinery and the various terminals are expected to be minimal and are not analyzed in detail. Additional employment (and resulting traffic) would be limited to one additional employee at Vernon and one at the Torrance facilities. At the Torrance, Vernon, and Atwood facilities, there would be less than 20 additional truck trips per day (fuel ethanol transport). At SWT, there would be up to 46 additional fuel ethanol truck trips. Truck trips at the project facilities would be spread throughout the day, and thus would not affect traffic circulation near the facilities.

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 Mobil facilities are disrupted to a point where intersections with a LOS of C or worse are reduced to the next lower LOS as a result of the 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.

4.10.1 Trip Generation

Construction of the proposed project at the Torrance Refinery is expected to begin in September 2001 and be completed in December 2003 (28 months). The proposed construction schedule will extend from 7:15 AM to 3:45 PM Monday through Friday. Construction at the Torrance Loading Rack (10 months) will overlap with the Torrance Refinery construction period. Therefore, the analysis focuses on the period of the combined peak of construction traffic volumes at the Torrance Refinery and the Loading Rack, because traffic associated with both construction efforts will impact the same roadways and intersections near the Torrance site.

Peak construction employment at the Torrance site is estimated at 126. An average of 1.3 persons per vehicle was assumed (based on information from construction projects at the ARCO

Carson Refinery) (SCAQMD, 1993). Thus, peak project traffic volumes are estimated at 97 vehicles, or a total of 194 peak daily vehicle trips during the construction period.

The AM peak hours of the adjacent street system occurs during the period of 7:00 AM to 9:00 AM as indicated in the Los Angeles County Metropolitan Transportation Authority's CMP guidelines. Proposed project construction traffic would arrive at the Torrance site during this AM peak period, given the planned 7:15 AM construction start time.

The PM peak hours for the adjacent street system are from 4:00 to 6:00 PM, also according to CMP Guidelines. Because the proposed project construction work schedule extends only to 3: 45 PM, project traffic would leave the site before the beginning of the PM peak on the surrounding street system, and thus would not be expected to affect PM intersection capacity utilization values.

4.10.2 Trip Distribution

Figure 4.10-1 shows the expected distribution of project traffic volumes on 15 key intersections in the vicinity of the Torrance facilities site, based on traffic counts in December 2000, and analysis of traffic patterns in the area. The proposed project will cause an increase in vehicular movements at the various project sites during construction. Project daily traffic volumes will range from a short-term (one to two month) peak of 10 to 15 vehicles at SWT to 35 to 40 vehicles at Vernon. Peak construction traffic volumes at the Torrance site will be approximately 97 vehicles. However, the anticipated construction traffic at the terminal sites are considered less than significant, based on Los Angeles County CMP guidelines, which do not consider significant (or call for detailed analysis) less than 50 additional vehicle trips per day.

Materials required to support the construction effort (i.e., construction materials, heavy construction equipment, piping, and new equipment) will be delivered to the Torrance facilities by truck. Peak truck usage will correspond to the peak manpower period, although materials and equipment deliveries will occur throughout the construction period.

Estimating the impacts of project-related construction traffic volumes on the transportation system near the refinery site involved a three-step process:

- Estimate the amount of traffic generated during construction;
- Distribute the amount of traffic geographically to appropriate industrial, commercial, and residential areas; and
- Assign the vehicle trips to specific roadways and evaluate the traffic increase on a route-by-route basis.

4.10.3 2000/Existing Plus Project Traffic Impacts

The proposed project is expected to generate short-term impacts on traffic and circulation in the vicinity of the Torrance facilities during the construction period. An intersection capacity utilization

(ICU) analysis was conducted for the 15 intersections that would be most directly affected by project construction traffic. This analysis added project intersection volumes to the existing year 2000 background intersection values. Figure 4.10-1 illustrates the AM-plus-project turn volumes. Table 4.10-1 summarizes the corresponding ICUs at the intersections of concern, based on existing lane configurations; the actual ICU calculations are provided in EIR Appendix D.

As shown in Table 4.10-1, proposed project construction traffic is not expected to have a significant impact. No worsening of LOS is expected at any of the intersections. At 10 of the 15 intersections, there would be no change in the ICU, while at three intersections the change would be 0.01. At the intersection of Western Avenue and I - 405 northbound on/off ramps, the LOS change would be 0.02. Although this intersection is currently at LOS F (and would remain at LOS F when project traffic is added), this impact would occur for no more than two months out of the 28 - month total construction period, and thus would not be considered a significant impact. At the intersection of Western Avenue and the I-405 Northbound on/off ramps, the change in ICU also would be 0.02. However, this intersection currently is at LOS E, and would remain at Level E with the addition of proposed project construction traffic. This impact would also occur for no more than two months. For these reasons, proposed project traffic impacts are not considered significant.

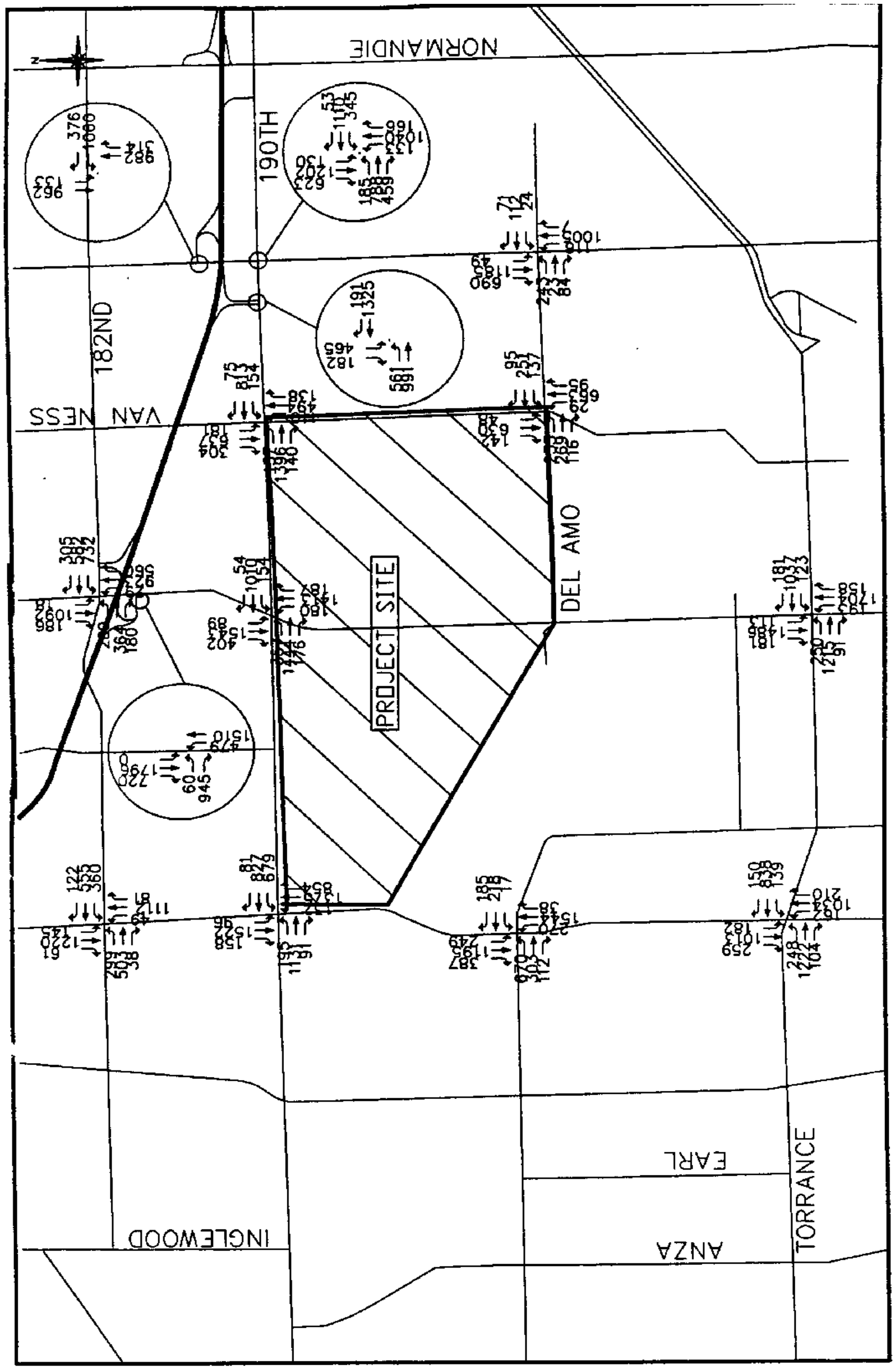

Figure 4.10-1 Existing + Project AM Peak Hour Turn Volumes

Table 4.10-1
Intersection Capacity Utilization Summary – Existing Plus Project Conditions
(Using number of peak workers)

		Existing		Existing + Project	
		AM	**LOS**	**PM**	**LOS**
1.	Prairie and 182nd	0.94	E	0.94	E
2.	Crenshaw and 182nd	0.89	D	0.89*	F
3.	I-405 and 182nd	0.70	B	0.70*	F
4.	Prairie and 190th	1.09*	F	1.09*	F
5.	Crenshaw and 190th	0.94	E	0.96*	F
6.	Van Ness and 190th	1.04*	F	1.04*	F
7.	Western and 190th	0.88	D	0.89	D
8.	Prairie and Del Amo	0.80	C	0.80	C
9.	Crenshaw and I-405 SB on/off	1.11*	F	1.12	E
10.	Van Ness and Del Amo	0.74	C	0.74	C
11.	Western and Del Amo	0.82	D	0.82	D
12.	I-405 SB on/off and 190th	1.05*	F	1.06	E
13.	Western and I-405 NB on/off	0.93	E	0.95	D
14.	Prairie/Madrona and Torrance	0.84	D	0.84	D
15.	Crenshaw and Torrance	0.95	E	0.95	E

* Exceeds acceptable LOS E
Definition of significant impact = % change 2 percent at intersections exceeding LOS E
Level of Service Ranges:

0.00 - 0.60 = A	0.81 - .90 = D
0.61 - 0.70 = B	.91 -1.00 = E
0.71 - 0.80 = C	Above 1.00 = F

4.10.4 Onsite Circulation and Parking

Sufficient onsite parking is available to accommodate the increased parking demand from construction workers at any of the Mobil facilities. The Torrance Refinery property has a contractor parking lot with approximately 375 spaces, which will easily accommodate the combined peak of less than 100 vehicles of Torrance Refinery and Torrance Loading Rack construction workers. The available parking supply sufficiently exceeds proposed project requirements to allow for fluctuations in manpower and to provide ample maneuvering room for heavy trucks.

4.10.5 Mitigation Measures

Because proposed project construction traffic does not significantly change ICU values at the intersections of concern, no mitigation is required because of project impacts.

4.11 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. This would include projects that 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 primarily involves replacing MTBE with fuel ethanol in gasoline; there will be no increase in the supply of gasoline as a result. This replacement involves the modification of existing industrial facilities. Construction of the proposed project would draw on the large existing southern California construction labor pool, i.e., there would be no influx of construction workers into the area. Further, there is no increase expected in operational employment at the Torrance Refinery or Mobil's terminals as a result of the project, nor will there be any new services required at the facilities, and thus no infrastructure development or improvement will be required, and no population growth will be encouraged as a result of the project.

4.12 Effects Not Found to be Significant

Based on the assessment conducted for the Initial Study, the following areas were eliminated from further consideration in the EIR:

- Aesthetics
- Agricultural Resources
- Biological Resources
- Mineral Resources
- Noise
- Population/Housing
- Recreation

LIST OF TABLES

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