SECTION I: PLANS AND SCHEDULES

This section lists all plans approved by AQMD for the purposes of meeting the requirements of applicable AQMD rules specified below. The operator shall comply with all conditions specified in the approval of these plans, with the following exceptions:

a. The operator does not have to comply with NOx or SOx emission limits from rules identified in Table 1 or Table 2 of Rule 2001(j) which became effective after December 31, 1993.

b. The operator does not have to comply with NOx or SOx emission limits from rules identified in Table 1 or 2 of Rule 2001(j) after the facility has received final certification of all monitoring and reporting requirements specified in Section F and Section G.

Documents pertaining to the plan applications listed below are available for public review at AQMD Headquarters. Any changes to permit applications will require permit modification in accordance with Title V permit revision procedures.

List of approved plans:

Application	Rule
299235	463
334141	2002
410212	1178
423346	1173
460671	1105.1
474699	1166
493043	461
493681	1166
500933	1118

NOTE: This section does not list compliance schedules pursuant to the requirements of Regulation XXX-Title V Permits; Rule 3004(a)(10)(C). For equipment subject to a variance, order for abatement, or alternative operating condition granted pursuant to Rule 518.2, equipment specific conditions are added to the equipment in Section D or H of the permit.

[Plan Approval Date]

Mr. Wesley Waida
Ultramar, Inc.
2402 E. Anaheim Street
Wilmington, CA 90744

APPLICATION NO: 500933
Facility ID: 800026

RULE 1118 – CONTROL OF EMISSIONS FROM REFINERY FLARES
PLAN APPROVAL

Please refer to your submitted application (A/N 500933) received on July 28, 2009 for the evaluation of your Flare Minimization Plan under District Rule 1118 – Control of Emissions from Refinery Flares. Your attached Rule 1118 Flare Minimization Plan has been reviewed and approved as submitted.

Pursuant to Rule 1118, no later than 90 days from the end of a calendar year, your facility shall submit for the approval a revised Flare Minimization Plan in the event the annual performance target for that calendar year is exceeded. The owner and operator of the refinery shall comply with all provisions of the approved Flare Minimization Plan.

If you have any questions concerning this plan, please contact Ms. Connie Yee at (909) 396-2619.

Sincerely,

Jay Chen
Senior Manager
Refinery and Waste Management
Engineering and Compliance

Attachment

cc: Compliance

Ultramar Inc.
(dba Valero Wilmington Refinery)
Facility ID 80026
Flare Minimization Plan (2009)

AECOM

Contents

Appendix

I. List of Drawings

II. Drawings

List of Tables

Charts and Figures

Executive Summary

As adopted by the South Coast Air Quality Management District's ("SCAQMD") Governing Board on November 4, 2005, the primary objective of the amendments to Rule 1118 was to minimize flaring and reduce criteria pollutant emissions, such as sulfur dioxide ("SO_2",also referred to "SO_x"), oxides of nitrogen (" NO_x"), reactive organic gases ("ROG"), particulate matter ("PM_{10}") and carbon dioxide ("CO_2") emissions from flares at petroleum refineries, sulfur recovery plants and hydrogen production plants. Rule 1118 prohibits flaring of vent gases except for those situations resulting from emergencies, shutdowns and startups, turnarounds, and specific essential operational needs; establishes operational requirements and diagnostic practices to minimize flaring; and sets refinery specific annual SO_2 performance targets that decrease with time from 2006 to 2012 to ensure that emissions from flares are reduced on a permanent basis. Exceedance of the annual performance target by a subject facility would trigger mitigation fees and the submittal of a Flare Minimization Plan ("FMP"). However, the provisions of Rule 1118 are not intended to preempt any petroleum refinery, sulfur recovery plant and hydrogen production plant operations and practices with regard to safety.

For, Ultramar Inc., dba Valero Wilmington Refinery, (collectively "Wilmington Refinery"), Rule 1118 established performance targets of 44.4 tons of SO_2 for 2006, 29.6 tons of SO_2 for 2008, 20.7 tons of SO_2 for 2010, and 14.8 tons of SO_2 for 2012 and in perpetuity. Historically, the Wilmington Refinery has been well below its performance targets and in the last few years on pace to be below its 2012 target well in advance of the 2012 timeframe.

However, in September and October 2008, the Wilmington Refinery had two flaring events that were both triggered by the abrupt interruption of oxygen supply from our third-party supplier. This resulted in a loss of oxygen to our Sulfur Recovery Unit Trains 1 and 2 (Facility Permit Process 11, Systems 1 and 2) (collectively SRUs) and the unplanned shutdown of these units. The loss of oxygen flow occurred when a valve on our supplier's oxygen transfer line unexpectedly closed. As a result, high concentration hydrogen sulfide gas normally treated by the SRUs was sent to the Phase 0 Flare (Process 17, System 3) for approximately two to two and half hours for each flaring event to avoid an atmospheric release and for safety purposes. This brief flaring resulted in approximately 22 tons of SO_2 emissions from the September event and 16 tons of SO_2 emissions from the October event.

The cause of the two flaring events has been determined to be due to a faulty valve positioner on the oxygen supply valve and/or vibration or degradation of component(s) located within the oxygen supply valve control box. As mentioned previously, both the oxygen supply valve, the components therein, and the valve control box and the components located therein are owned, maintained, and operated by a third-party oxygen supplier.

Despite this, the SCAQMD made the determination that these flaring events, taken together, exceeded the Wilmington Refinery's 2008 SO_2 performance target of 29.6 tons. Individually, neither flaring event would result in the Wilmington Refinery exceeding its 2008 performance target.

As a result of this exceedance, the SCAQMD has determined that the Wilmington Refinery is required pursuant to Rule 1118(e) to submit a FMP. Specifically, Rule 1118(e)(1) requires that a FMP include a list of all actions to be taken by the petroleum refinery to meet the performance targets, including the following:

(A) A complete description and technical specifications for each flare and associated knock-out pots, surge drums, water seals and flare gas recovery systems;

(B) Detailed process flow diagrams of all upstream equipment and process units venting to each flare, identifying the type and location of all control equipment;

(C) Refinery policies and procedures to be implemented and any equipment improvements to minimize flaring and flare emissions and comply with the performance targets for:

(i) Planned turnarounds and other scheduled maintenance, based on an evaluation of these activities during the previous five years;

(ii) Essential operational needs and the technical reason for which the vent gas cannot be prevented from being flared during each specific situation, based on supporting documentation on flare gas recovery systems, excess gas storage and gas treating capacity available for each flare; and

(iii) Emergencies, including procedures that will be used to prevent recurring equipment breakdowns and process upset, based on an evaluation of the adequacy of maintenance schedules for equipment, process and control instrumentation.

(D) Any flare gas recovery equipment and treatment system(s) to be installed to comply with the performance targets.

Thus, the purpose of the FMP is to address the issues that caused the performance target exceedance (i.e., the type of flaring that led to the exceedance) and put into place prevention measures, corrective actions, policies, procedures, etc. taken to minimize or eliminate, to the extent feasible and safe this type, of flaring in the future. (See SCAQMD Governing Board Letter, November 4, 2005, Agenda No. 35, p. 9). Accordingly, the following FMP will focus primarily on the prevention measures taken to minimize flaring during the two flaring events and immediately thereafter, and the corrective actions subsequently taken to minimize or eliminate, to the extent this is feasible and safe, this type of flaring in the future.

It is the Wilmington Refinery's belief that the following information that makes up this FMP meets the intent and requirements of Rule 1118(e)(1) and will serve as an important component of the Wilmington Refinery's continued efforts to meet its current and future performance targets. Pursuant to Rule 1118(e)(2), the Wilmington Refinery requests timely approval of the following FMP by the SCAQMD.

For the reader's convenience, the following FMP is organized as follows:

- Section 1 – Brief overview of the Wilmington Refinery's historical flaring since the revised rule went into effect and the annual performance targets were adopted in 2006;
- Section 2 – A complete description and technical specifications for each flare and associated knock-out pots, surge drums, water seals, and flare gas recovery systems;
- Section 3 – Detailed process flow diagrams of all upstream equipment and process units venting to each flare, identifying the type and location of all control equipment;
- Section 4 – Refinery policies and procedures to be implemented and any equipment improvements to minimize flaring and flare emissions and comply with the performance targets; and
- Section 5 – Conclusion.

Please note that the Appendix of this FMP contains trade secret and confidential business information ("CBI") of the Wilmington Refinery as defined by the California Public Records Act, Government Code § 6254.7 et seq., and the Freedom of Information Act, 40 CFR Part 2 (40 CFR § 2.105(a)(4)), 5 USC 552(b)(4), and 18 USC 1905. Because of the sensitive and competitive nature of this information, the Wilmington Refinery requests that the SCAQMD afford the information CBI status and treatment indefinitely. Accordingly, the Appendix in the public version of this FMP has been excluded. A complete copy of the FMP, including the Appendix, is included in the CBI version of the FMP provided to the SCAQMD.

1.0 Wilmington Refinery's Historical Flaring

Although not required pursuant to Rule 1118(e)(1), as part of this FMP, the Wilmington Refinery evaluated its historic flaring and associated SO_2 emissions for the years 2006 through 2008.

1.1 Wilmington Refinery Flare SO_2 Emission Performance

Rule 1118 set forth the SO_2 emission targets for the refinery based on a SO_2 performance target emission factor and a baseline year (2004) annual crude processing capacity. The SO_2 emission factor is designed to reduce every two years from 2006 to 2012, further reducing the target SO_2 emissions from the facility. As shown in the Table below, the annual target SO_2 emissions factor for years 2006, 2008, 2010, and 2012 are 1.5, 1.0, 0.7, and 0.5 tons per million barrels of annual baseline crude processing capacity, respectively.

Table 1.1: Rule 1118(d)(1) Performance Targets

Calendar Year	Performance Target (Tons per million barrels of crude processing capacity*)
2006	1.5
2008	1.0
2010	0.7
2012	0.5

*Based on 2004 crude oil processing capacity.

Based on the above rule performance targets, the Wilmington Refinery (2004 crude processing capacity of the 29,604,642 barrels) is limited to the following specific SO_2 performance targets for its flares.

Table 1.2: Wilmington Refinery-Specific Performance Targets

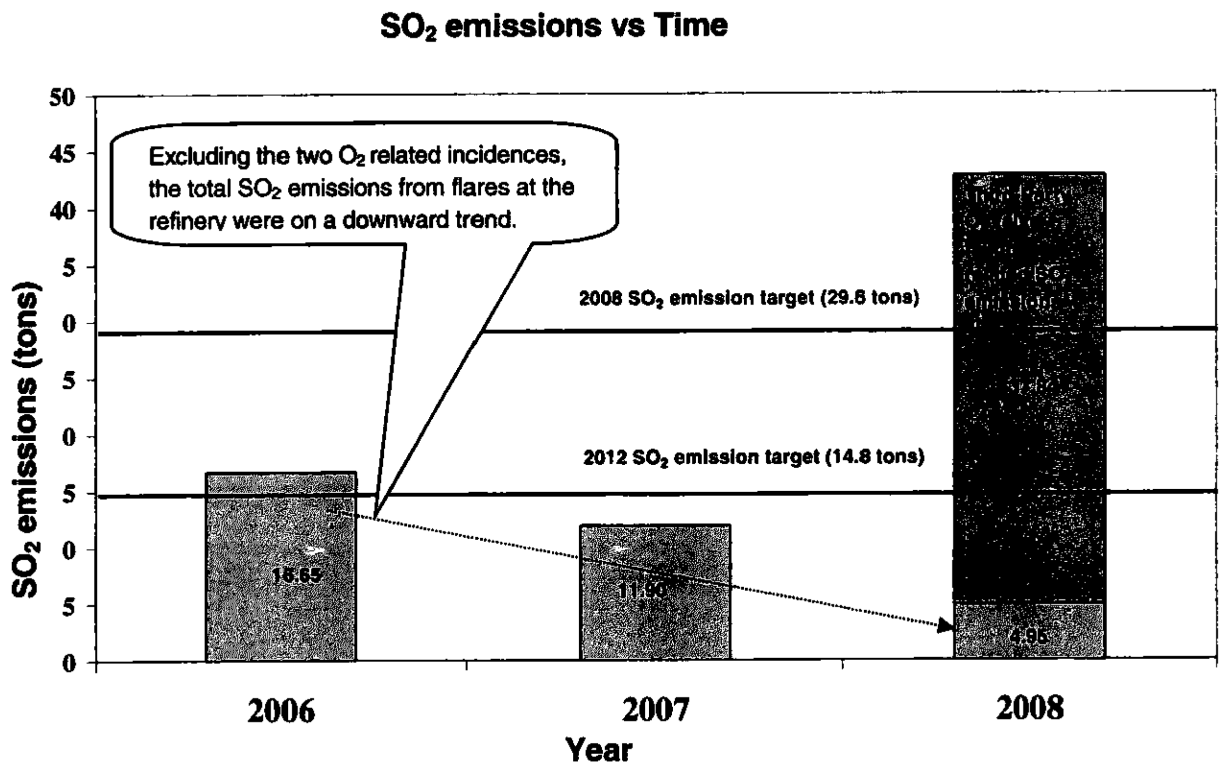
Calendar Year	Refinery Performance Target (tons/yr)
2006	44.4
2008	29.6
2010	20.7
2012	14.8

The Table below provides the annual SO_2 emission target and the SO_2 emissions performance for the Wilmington Refinery since the revised rule became effective and the annual performance targets were adopted in 2006.

Table 1.3: Wilmington Refinery SO_2 Emissions History

Calendar Year	SO_2 Performance Target (Tons/yr)	SO_2 Flare Emissions (Tons/yr)
2006	44.4	16.65
2007	44.4	11.90
2008	29.6	42.79

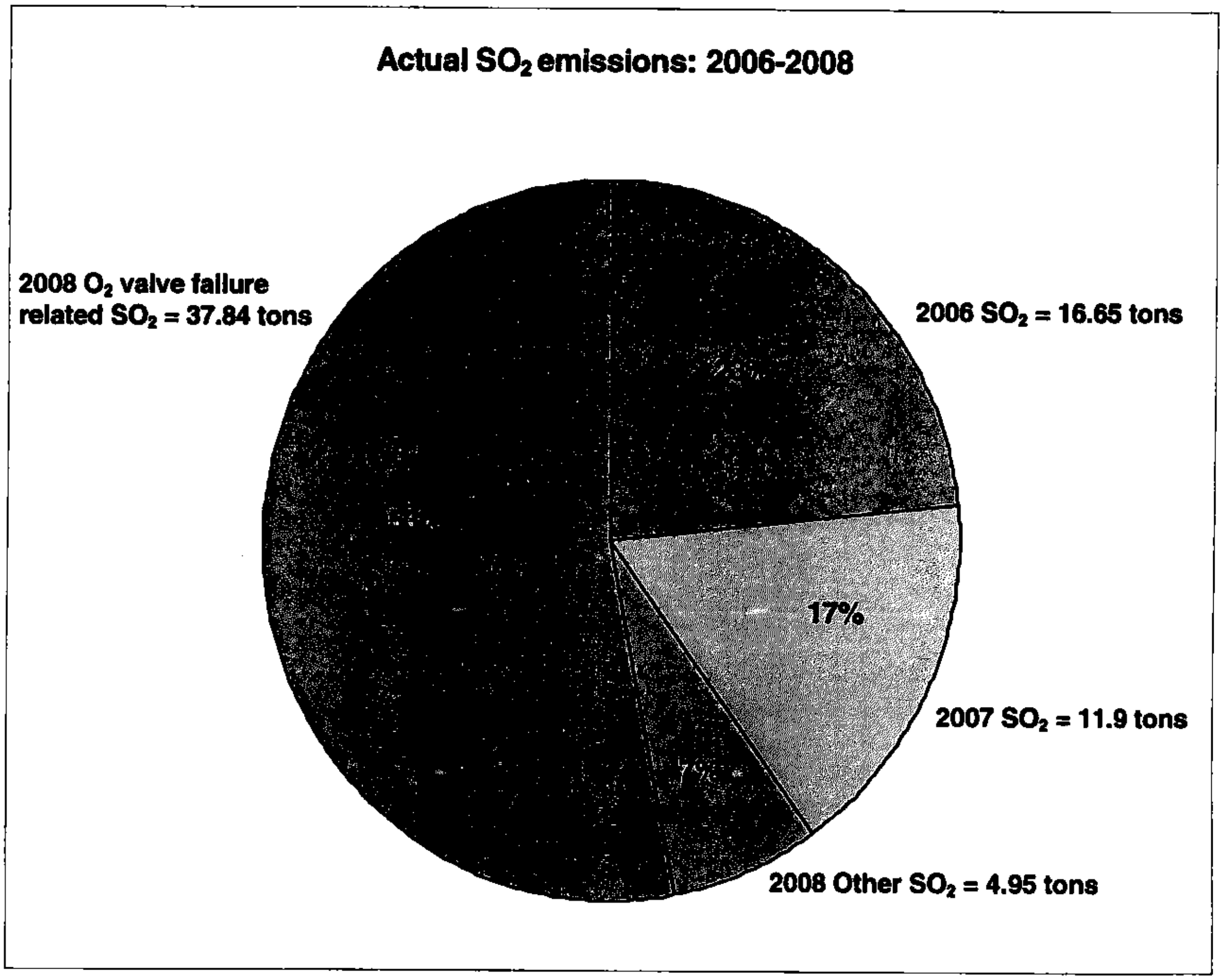
With the exception of 2008, the historic annual SO_2 emissions from the flaring at the Wilmington Refinery have been well within the 2006 and 2008 annual emission performance targets. As the Chart 1.1 below indicates, the Wilmington Refinery performance in nearly all years would be in compliance with <u>even</u> the 2012 SO_2 performance target of 14.8 tons per annum. In 2008, the Wilmington Refinery was on track to have a record performance year for flare SO_2 emissions until the third-party oxygen supply valve failures in September and October 2008 caused the refinery to exceed its annual SO_2 performance target. As noted above, the SCAQMD determined that the SO_2 emissions of 42.79 tons in calendar year 2008 exceeded the Wilmington Refinery's 2008 performance target of 29.6 tons, and therefore, triggered the requirement to submit a FMP. As the Chart details, 37.84 tons of the total 42.79 flare SO_2 emissions for 2008 were related to the third-party oxygen supply valve failures.



Pursuant to Rule 1118(k)(2), SO_2 flare emissions from emergency third-party outages have been excluded

<u>**Chart 1.1: Historic Annual SO_2 Emissions from the Wilmington Refinery Flares**</u>

As the Chart 1.2 below shows, over 50% of the entire flare SO_2 emissions from the 2006 - 2008 period are due to the third-party oxygen supply valve failures, which shutdown the Wilmington Refinery's SRUs and triggered flaring and related SO_2 emissions.



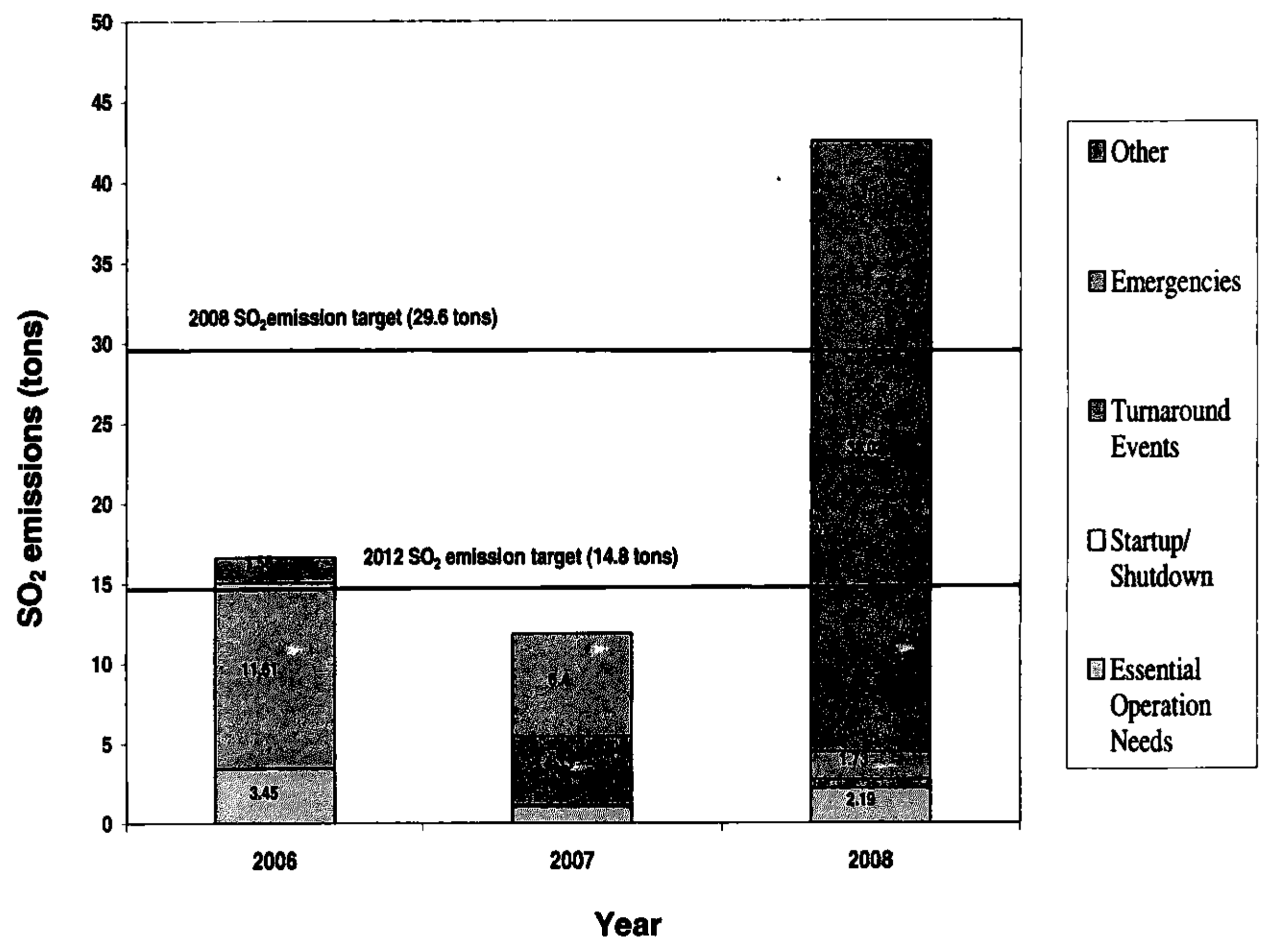
<u>Chart 1.2: Actual Performance at the Wilmington Refinery</u>

1.2 Wilmington Refinery Historic Flaring

The following section briefly describes the historical trend and types of flaring events. It should be noted from the onset that the Wilmington Refinery has no routine process flaring and only flares for safety reasons related to emergencies, turnarounds, shutdown/startup, essential operation needs, and other non-routine events.

As noted above, the reason for the two flaring events in September and October 2008 that led to the Wilmington Refinery exceeding its 2008 performance target as determined by the SCAQMD were related to the third-party oxygen supply valve failures. As a result, this type of flaring does not qualify as flaring associated with planned turnarounds and other scheduled maintenance, essential operational needs, or emergencies. Accordingly, the provisions of Rule 1118(e)(1)(C)(i) – (iii) do not apply to the non-routine flaring events that led to the Wilmington Refinery exceeding its 2008 performance target. However, the Chart 1.3 below shows the contribution of these event types toward the total SO_2 emissions from flaring at the Wilmington Refinery for years 2006 through 2008.

SO_2 emissions by event type



Pursuant to Rule 1118(k)(2), SO_2 flare emissions from emergency third-party outages have been excluded

Chart 1.3: SO_2 Emissions by Flaring Event Type

1.2.1. Turnarounds, Startup/Shutdowns, and Essential Operation Need Flaring Activities

Chart 1.3 above reveals that the SO_2 flaring emissions from turnarounds ("TAR"), shutdown/startup activities ("SD/SU"), and essential operation needs ("EON") were relatively minor for period of 2006 - 2008.

The contribution of TAR activities to the total SO_2 flare emissions for 2006 was insignificant as can be seen from Chart 1.3. The Wilmington Refinery maintenance and operations personnel continue to strive to reduce and minimize flaring emissions due to TAR events with the implementation of best practices and procedures specifically designed to safely minimize, and to the extent feasible, eliminate flaring.

In 2007, the SO_2 flare emissions associated with the TAR activities were higher than usual. However, most of this anomaly can be attributed to the SD/SU of new equipment associated with a SCAQMD mandated capital project to modify the Alkylation Unit and associated units to use. While these emissions were classified as TAR activities, they are higher than expected for future TAR emissions from a typical turnaround associated with equipment in this operating area of the refinery.

For 2008, there were no significant SO_2 flaring emissions associated with TAR, SD/SU, and/or EON activities.

Accordingly, the Wilmington Refinery has over the past years implemented a concerted effort in policy, procedure, and other best practices to safely minimize, and to the extent feasible, eliminate flaring emissions associated with these event types.

1.2.2. Emergency Events

For 2006 and 2007, the emissions related to emergency flaring were not significant, given the annual SO_2 performance target. In the year 2006, the majority of the emissions from emergency flaring were related to equipment malfunctions. In the year 2007, the majority of the emissions from emergency flaring were from the shutdown of one of the Sulfur Recovery Units (SRU#2) due to a low flame count.

For 2008, there were no significant SO_2 flaring emissions associated with emergency events.

2.0 Description And Technical Specifications For Each Flare And Associated Equipment

Rule 1118(e)(1)(A) requires that a FMP include a complete description and technical specifications for each flare and associated knock-out pots, surge drums, water seals and flare gas recovery systems. This section provides this required information.

From the onset, it is important to appreciate that every refinery is different. Each is unique in its configuration, the environment in which it operates and the complexities of balancing the fuel gas, power, flare gas recovery and flaring systems with process operations. This is true for every refinery in the South Coast Air Basin, the United States, and throughout the world. Factors that differ significantly between refineries include:

- Refinery age and the historical development at the refinery site;
- Crude feedstocks that are processed;
- Size, capacity, and throughput of processing units;
- Reliability of electrical power systems;
- Processing configuration, complexity, and extent of upgrading capacity;
- Unit integration or ability of units to operate independently;
- Extent of investment by ownership over the years;
- Locally available resources (e.g., power, water, and land);
- Local regulatory climate; and
- Demand for different products within the local market.

As background, the Wilmington Refinery has four flares and a central vapor recovery system[1]. There are three general service flares (Phase 0, Phase 1, and Phase 2) and one clean service flare (LPG). The flares are generally referred to by their flare names. The general service flares were named according to the phase of original refinery construction in which they were built - Phase 0, Phase 1, and Phase 2. The general service flares are connected to all the process units so that the relief from any unit can be sent to any flare. The clean service flare is named for its service to the LPG area of the refinery.

[1] The Wilmington Refinery refers to its flare gas recover system as the Vapor Recovery System.

The following tables provide general, pilot, and purge gas details for each flare. Sections 2.1–2.5 below provide further description on each flare and the flare gas recovery system. Note that the flare system overview drawings for each flare and the flare gas recovery system are provided in the Appendix, which is considered CBI.

Table 2.1: General Service Flare Information

Flare Name **ID No.**	**Phase0** **89-FT-900**	**Phase1** **89-FT-9000**	**Phase2** **75-FT-1**
Description	This flare is used to safely combust hydrogen sulfide and ammonia gas streams from the Sulfur Recovery Unit as well as hydrocarbon and hydrogen containing streams from Platformer hydrogen production.	This flare is used to safely combust vent gas streams primarily from the Crude, Coker, Vacuum, Platformer, Unibon and Hydrotreating units.	This flare is used to safely combust vent gas streams primarily from the Merox, Fluid Catalytic Cracking, and Alkylation units.
Capacity	200,000 lbs/hr	383,700 lbs/hr	536,600 lbs/hr
Operation	Each general service flare is operated independently. Limited connections between flares are used to divert vent gas flows during outages for inspection and maintenance.		
Maintenance	Routine inspection and maintenance performed.		

Table 2.2: Clean Service Flare Information

Flare Name **ID No.**	**LPG Flare** **82-FT-1**
Description	This flare is dedicated to the LPG unit.
Capacity	26,718 lbs/hr
Operation	Operated independently of the general service flares.
Maintenance	Routine inspection and maintenance performed.

Table 2.3: Pilot Gas Information

Flare Name ID No.	Phase0 Flare 89-FT-900	Phase1 Flare 89-FT-9000	Phase2 Flare 75-FT-1	LPG Flare 82-FT-1
Type of gas used	Purchased Natural Gas	Purchased Natural Gas	Purchased Natural Gas	Refinery Propane
Operating flow rate	2.25 scfm	2.5 scfm	2.5 scfm	1.67 scfm
Maximum total sulfur content	10 ppm	10 ppm	10 ppm	2.5 ppm
Average HHV of gas used	1010 Btu/scf	1010 Btu/scf	1010 Btu/scf	3500 Btu/scf

Table 2.4: Purge Gas Information

Flare Name ID No.	Phase0 Flare 89-FT-900	Phase1 Flare 89-FT-9000	Phase2 Flare 75-FT-1	LPG Flare 82-FT-1
Type of gas used	Purchased Natural Gas	Purchased Natural Gas	Purchased Natural Gas	Refinery Propane
Operating flow rate	25 scfm	25 scfm	25 scfm	1.67 scfm
Maximum total sulfur content	10 ppm	10 ppm	10 ppm	2.5 ppm
Average HHV of gas used	1010 Btu/scf	1010 Btu/scf	1010 Btu/scf	3500 Btu/scf

2.1 Phase 0 Flare

The sour gas and hydrocarbon ("HC") vapor relief from the units listed in the Table below are flared during emergency, EON, and other non-routine events via the Phase 0 Flare Seal Drum and Phase 0 Flare, also known as acid gas flare. The Phase 0 Flare Seal Drum has a water seal height of 33 inches. The relief from these units can also be diverted to the Phase 1 Flare when Phase 0 Flare is shut down for emergency or maintenance operations. The detailed drawings for the Phase 0 flare and related upstream process units are provided in drawing numbers 2, 6, and 11-19 of the Appendix, which are considered CBI.

Table 2.5: Refinery Process Units Venting to the Phase 0 Flare

Unit Number	Unit Name
33	Ammonia Storage
39 and 41	Tail Gas treating Unit
40	Sulfur Recovery Unit
45, 46, and 51	Amine Treating Unit
48 and 49	Sour Water Treating Unit
54	Sour Water Stripper
55	Amine Regeneration Unit
70	Platformer
86	Boiler Feed Water System
88	Fuel Gas and Thermal DeNOX
97	Flare Gas treating Unit

2.2 Phase 1 Flare

The Phase 1 Flare is used for flaring the HC vapor relief from the processing units shown in the Table below during emergency, TAR, SD/SU, EON, and other non-routine events. The HC relief from these units is routed through a separate header into a Liquid Blowdown Drum. The HC vapor relief from the Liquid Blowdown Drum is routed to Phase 1 Flare via the Flare Knockout Drum. The flare knockout drum normally has a liquid seal height of 84 inches.

Table 2.6: Refinery Process Units (Hydrocarbon) Venting to the Phase 1 Flare

Unit Number	Unit Name
10 and 11	Crude Unit
30 and 31	Delayed Coking Unit
43 and 44	Light Ends Recovery Units
56	Naphtha Hydrotreater
58	Gas Oil Hydrotreater
60	Naphtha Hydrotreater
80	Gas Oil Unibon
88	Fuel Gas Treating Unit

The HC relief from these units can be also be diverted to the Phase 0 and Phase 2 Flares when the Phase 1 flare is shutdown for an emergency or maintenance. The Phase 1 Flare system also collects the liquid relief from the process units listed in the Table below.

Table 2.7: Refinery Process Units (Liquid) Venting to the Phase 1 Flare

Unit Number	Unit Name
56	Naphtha Hydrotreater
60	Naphtha Hydrotreater
70	Platformer
80	Gas Oil Unibon

As mentioned earlier, the liquid relief from these units are collected separately in a liquid collection main header and routed to a Liquid Blowdown Drum.

The detailed drawings for the Phase 1 Flare and related upstream process units are provided in drawing numbers 3, 7, and 20-29 of the Appendix, which are considered CBI.

2.3 Phase 2 Flare

The Phase 2 Flare handles the HC relief from the process units shown in the Table below during emergency, TAR, SD/SU, EON, and other non-routine events. The HC relief from these units is routed through two separate headers to a Liquid Blowdown Drum.

Table 2.8: Refinery Process Units (Hydrocarbon) Venting to the Phase 2 Flare

Unit Number	Unit Name
50	Fuel Gas Treating Unit
61	FCC Power Recovery Unit
63	FCC Gas Concentration Unit
64	Field Butane Merox Unit
65	LPG Merox Unit
66	FCC Gasoline Merox Unit
67	Alkyl Feed Dryer
68	HF Alkyl Unit
69	Butamer Unit
81	North Tank Farm
83	Effluent and Slop Oil System

HC vapor relief from the Liquid Blowdown Drum is discharged to Phase 2 Flare via a Flare Knockout Drum. The flare knockout drum normally has a liquid seal height of 96 inches. The Phase 2 Flare system also collects the liquid relief from the process units listed in the Table below.

Table 2.9: Refinery Process Units (Liquid) Venting to the Phase 2 Flare

Unit Number	Unit Name
63	FCC Gas Concentration Unit
64	Field Butane Merox Unit
65	LPG Merox Unit
66	FCC Gasoline Merox Unit
69	Butamer Unit

As mentioned above, the liquid relief from these units is routed separately via a liquid collection main header to the Liquid Blowdown Drum.

HC relief, which may be acidic from HF Alkylation Unit (Unit 68), is collected in a separate 10 inch relief header and sent to a Liquid Knockout Drum and scrubber for acid neutralization before connecting to the HC vapor collection header within the HF Alkylation Unit.

HC vapor relief from the process units above can also be diverted to the Phase 0 and Phase 1 Flares when the Phase 2 flare is shutdown for emergency or maintenance.

The detailed drawings for the Phase 2 Flare and related upstream process units are provided in drawing numbers 4, 8, and 30-38 of the Appendix, which are considered CBI.

2.4 LPG Flare

The LPG Flare is a Clean Service Flare dedicated to the LPG storage and loading unit. It is not integrated with the Phase 0, Phase 1, and Phase 2 Flares. The system overview for the LPG Flare is provided in drawing number 5 of the Appendix. The LPG flare detailed drawing is provided in drawing number 9 of the Appendix. Both drawings are considered CBI.

2.5 Vapor Recovery System

The Vapor Recovery System recovers light hydrocarbons discharged into the flare/vapor recovery header by the process units. To prevent air entrainment into the system and to provide positive pressure for the flare gas recovery compressors, a constant back pressure is maintained via water boots and water seals in the flare knockout drums. The back pressure is maintained by controlling the water seal level in the knockout drum. Without adequate water seal, the gases are released and combusted in the flares.

Recovered gases are compressed downstream to the gas treating units for sulfur removal and reuse in the refinery as fuel gas and/or sales gas. A flow meter is used to monitor the total amount of gases recovered through the vapor recovery system. When the primary flare gas recovery compressor is out of service, a spare compressor is used. A detailed drawing of the system is provided in drawing number 10 of the Appendix, which is considered CBI.

3.0 Detailed Process Flow Diagrams Of All Upstream Equipment And Process Units Venting To Each Flare

Rule 1118(e)(1)(B) requires that a FMP also include detailed process flow diagrams of all upstream equipment and process units venting to each flare, identifying the type and location of all control equipment. This information is previously discussed in Section 2 and is provided in drawings that are contained in the Appendix, which is considered CBI.

4.0 Refinery Policies And Procedures To Be Implemented And Any Equipment Improvements To Minimize Flaring And Flare Emissions And Comply With The Performance Targets

Rule 1118(e)(1)(C) requires that an FMP also include refinery policies and procedures to be implemented and any equipment improvements to minimize flaring and flare emissions and comply with the performance targets:

(i) Planned turnarounds and other scheduled maintenance, based on an evaluation of these activities during the previous five years;

(ii) Essential operational needs and the technical reason for which the vent gas cannot be prevented from being flared during each specific situation, based on supporting documentation on flare gas recovery systems, excess gas storage and gas treating capacity available for each flare; and

(iii) Emergencies, including procedures that will be used to prevent recurring equipment breakdowns and process upset, based on an evaluation of the adequacy of maintenance schedules for equipment, process and control instrumentation.

As discussed above, the purpose of the FMP is to provide a description of equipment to be installed and policies and procedures to be implemented to avoid future exceedances of the performance targets. (See SCAQMD Governing Board Letter, November 4, 2005, Agenda No. 35, p. 9). Taking this purpose and intent, the Wilmington Refinery interprets the above language to mean that the specific focus of the FMP should be on the reason why the refinery's Rule 1118 SO_2 performance target was exceeded in the first place (i.e., the type of flaring that led to the exceedance) and the steps (i.e., prevention measures, corrective actions, policies, procedures, etc.) taken to minimize or eliminate, to the extent feasible and safe, this type of flaring in the future.

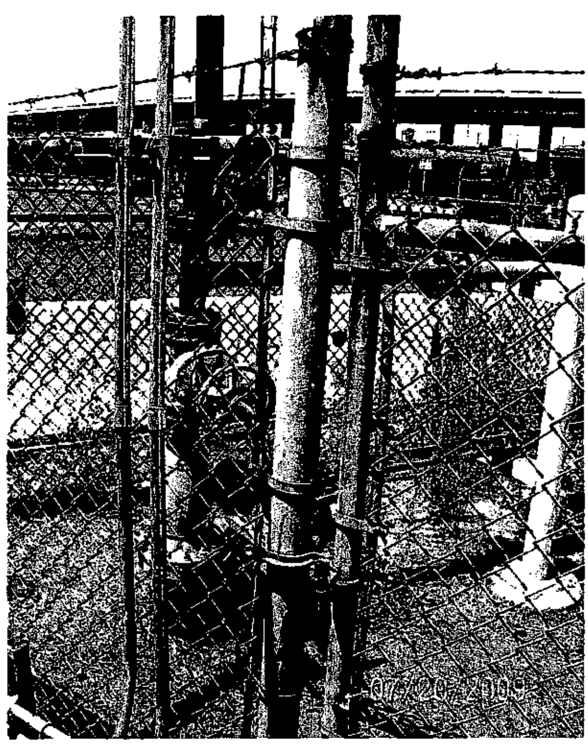
As noted above, the reason for the two flaring events in September and October 2008 that caused the Wilmington Refinery to exceed its 2008 SO_2 performance target, as determined by the SCAQMD, was related to the third-party oxygen supply valve failures. However, this type of non-routine flaring does not qualify as flaring associated with planned turnarounds and other scheduled maintenance, essential operational needs, or emergencies. Since the provisions of Rule 1118(e)(1)(C)(i) – (iii) do not apply to the flaring events that caused the Wilmington Refinery to exceed its 2008 performance target, this section as it relates to Rule 1118(e)(1)(C) will focus on the prevention measures taken during and immediately thereafter the two flaring events in September and October 2008 to minimize flaring and the corrective actions subsequently taken to safely minimize or eliminate, to the extent feasible, this type of flaring in the future.

The Wilmington Refinery has already in place the policies, procedures, and equipment (i.e., flare gas recover and flare gas treatment) to address planned turnarounds and other scheduled maintenance, essential operational needs, or emergencies flaring covered by 1118(e)(1)(C)(i) – (iii). This is demonstrated above by the fact that the Wilmington Refinery's historic performance would be in compliance with even its 2012 SO_2 performance target and was on track in 2008 to have a record performance year for flare SO_2 emissions until the third-party oxygen supply valve failures in September and October 2008 caused the refinery to exceed its SO_2 performance target. Accordingly, there currently is no need for changes in the refinery's flare policies, procedures, and equipment related to flaring covered by 1118(e)(1)(C)(i) – (iii).

4.1 Evaluation of the Two 2008 Flaring Events that Led to the Exceedance of the 2008 Performance Target

The Wilmington Refinery was running at about 17% of its total allowable 2008 SO_2 performance target until the last month of the third quarter of 2008. On September 28, 2008, the third-party oxygen supply valve to Sulfur Recovery Unit Trains 1 and 2 (Facility Permit Process 11, Systems 1 and 2) (collectively "SRUs") unexpectedly shut off flow to the SRUs. This in turn led to the SRUs shutting down. As a result, high concentration hydrogen sulfide ("H_2S") gas normally treated by the SRUs was sent to the Phase 0 Flare (Process 17, System 3) for approximately two and half hours in order to avoid an atmospheric release and for safety purposes. This brief flaring resulted in approximately 22 tons of SO_2 emissions. Subsequently, on October 12, 2008, a similar flaring event occurred lasting approximately two hours and resulted in approximately 16 tons of SO_2 emissions. Prior to these flaring events, for the past decade the oxygen supply valve operated without any unexpected shutdowns, and therefore, did not contribute to any additional flaring.

As process background, the oxygen for refinery SRU operations is produced and provided by a third-party oxygen supplier pursuant to an Oxygen Supply Agreement. Under the agreement, the third-party oxygen supplier produces oxygen at its offsite facility and supplies the contractually required oxygen to the refinery SRUs via pipeline that runs from the third-party oxygen supplier's facility through the refinery. The oxygen supply valve that failed during the September and October 2008 flaring events and the valve's control box are owned, maintained and operated by the third-party oxygen supplier. Furthermore, the oxygen supply valve and its control box are fenced in and the gate is locked and only the third-party oxygen supplier has access to it. (See picture below). One of the reasons that the flaring events, although brief, lasted as long as they did was that the Wilmington Refinery had to wait, in both cases, for the third-party oxygen supplier to unlock the gate, evaluate the valve, and then bypass it. The refinery is not provided access to the oxygen supply valve by the third-party supplier as the oxygen supply valve and control box are part of a larger oxygen supply network that the third-party supplier operates and controls that delivers oxygen not only to the Wilmington Refinery but to other industrial users. The third-party oxygen supplier believes that it needs this type of control in order to maintain the requisite oxygen supply pressures and safely operate the supply network.



The oxygen supplied by the third-party supplier is needed to help enhance the SRUs' capacity to treat high concentration H_2S gas from the refinery's amine system and hydrotreaters. The SRUs are a proven and conventional operation in the oil refining process. They serve to convert undesirable sulfur that is removed from petroleum products at the refinery to a saleable sulfur product. The chemical process in the SRU utilizes oxygen to convert H_2S from the various hydrocarbon processing units in the refinery into molten liquid, elemental sulfur. When the SRUs are suddenly not available for processing the H_2S (as in the case with the loss of oxygen), the hydrogen sulfide (acid gas) feed to the SRUs is safely routed, by design, to the refinery's Phase 0 Flare for combustion.

A combination of air and oxygen is used in the refinery's SRUs to convert H_2S to elemental sulfur. The use of oxygen increases the ability to convert H_2S streams by reducing the presence of nitrogen (an inert gas) from the process. Similar capacity could be achieved in an air only system, but would require large, energy consuming, labor- and maintenance-intensive, and costly blowers to move large volumes of air through the SRU reactor furnaces to accomplish the H_2S conversion. As a result, this would be a far less efficient process.

As part of the Wilmington Refinery's comprehensive approach in minimizing or eliminating, to the extent feasible and safe, future SO_2 flare emissions, the refinery undertook a detailed analysis in order to determine the root cause that led or could have contributed to the two flaring events. Based on this analysis, it was determined that the valve positioner on the oxygen supply valve was faulty and unexpectedly shut off oxygen flow to the SRUs – as noted above. Additionally, it was determined that vibration or degradation of component(s) located within the oxygen supply valve control box may have contributed to the unexpected shut off of oxygen flow to the SRUs.

However, as noted above, in discussions with the SCAQMD regarding these flaring events, the SCAQMD has decided to impute the third-party oxygen supplier's conduct to the Wilmington Refinery due to the fact that the flaring associated with the oxygen supply valve shut downs in September and October 2008 occurred at the Wilmington Refinery's Phase 0 Flare.

4.2 Flaring Prevention Measures Implemented During and Corrective Actions Taken Shortly After the Two 2008 Flaring Events that Led to the Exceedance of the 2008 Performance Target

In both flaring instances, the Wilmington Refinery took proactive measures to mitigate the extent of the flaring events by bypassing the failed oxygen supply valve, which allowed oxygen flow back to the SRUs. The Refinery also immediately shifted refinery operations to minimize H_2S production and reduce flaring emissions associated with the two flaring events. These operational moves helped the refinery to maintain a minimum safe, environmentally sound, and stable rate of production, while minimizing H_2S generation. It should be emphasized that this transition from "normal" operation to the minimum safe and stable rate of production can never be instantaneous due to safety reasons and will always have some lag time, given the complex and highly integrated operations of any conventional oil refinery.

It is worth noting that the Wilmington Refinery's response time related to the October 2008 flare event was improved and faster compared to the September 2008 flare event based on the lessons learned from the first flaring event – leading to lower SO_2 emissions from the second flaring event.

In response to the two flaring events, the Wilmington Refinery undertook the following corrective actions during or immediately thereafter to minimize or eliminate, to the extent feasible and safe, flaring associated with another oxygen supply valve failure:

- Bypassing the valve until the valve shutdown problem was corrected;
- Requiring the third-party oxygen supplier to replace the oxygen supply valve and control box; and

- Requiring the third-party oxygen supplier to put the valve and control box on a preventative maintenance schedule.

To date, these implemented measures have prevented a similar type of flaring event from occurring.

4.3 Long-Term Corrective Actions Taken to Prevent a Similar Flaring Event

As mentioned above, as part of the Wilmington Refinery's comprehensive approach in minimizing or eliminating, to the extent feasible and safe, future SO_2 flare emissions, the refinery undertook a detailed evaluation of the root cause that led or contributed to the two flaring events. This evaluation also included consideration of possible enhancements around policy, procedure, and new equipment that would significantly help to prevent future events of this type. While the SO_2 emissions target for 2009 is 29.6 tons per year for the Wilmington Refinery, this evaluation used the 2012 SO_2 emission target (14.8 tons per year) as the objective basis for future performance.

The final result of this evaluation was the decision by, the Wilmington Refinery to establish a redundant source of oxygen for the SRUs, which was to install a backup liquid oxygen supply system. The following paragraphs describe the backup supply system that was installed at the end of March 2009 as a result of this analysis and plan implementation. This backup system provides 100% redundancy to the third-party oxygen supplier's existing supply system and will prevent similar lost oxygen related non-routine flaring events in the future.

As shown in the Figure 4.1 below, the redundant/backup system will consist of a cryogenic liquid oxygen tank which can store liquid oxygen and provide approximately 12 hrs of backup oxygen supply to the Wilmington Refinery SRUs. When the system is operational, liquid oxygen will be pressure transferred to two steam-heated, water bath vaporizers. The gaseous oxygen product from the vaporizers flows to the oxygen supply pipeline and ultimately to the SRUs. Although one vaporizer is enough to supply oxygen to the SRUs, the Wilmington Refinery installed a second vaporizer and related control system as a conservative measure.

This redundant backup liquid oxygen system is designed to makeup oxygen to the SRUs in the event of loss of supply from the third-party oxygen supply header.

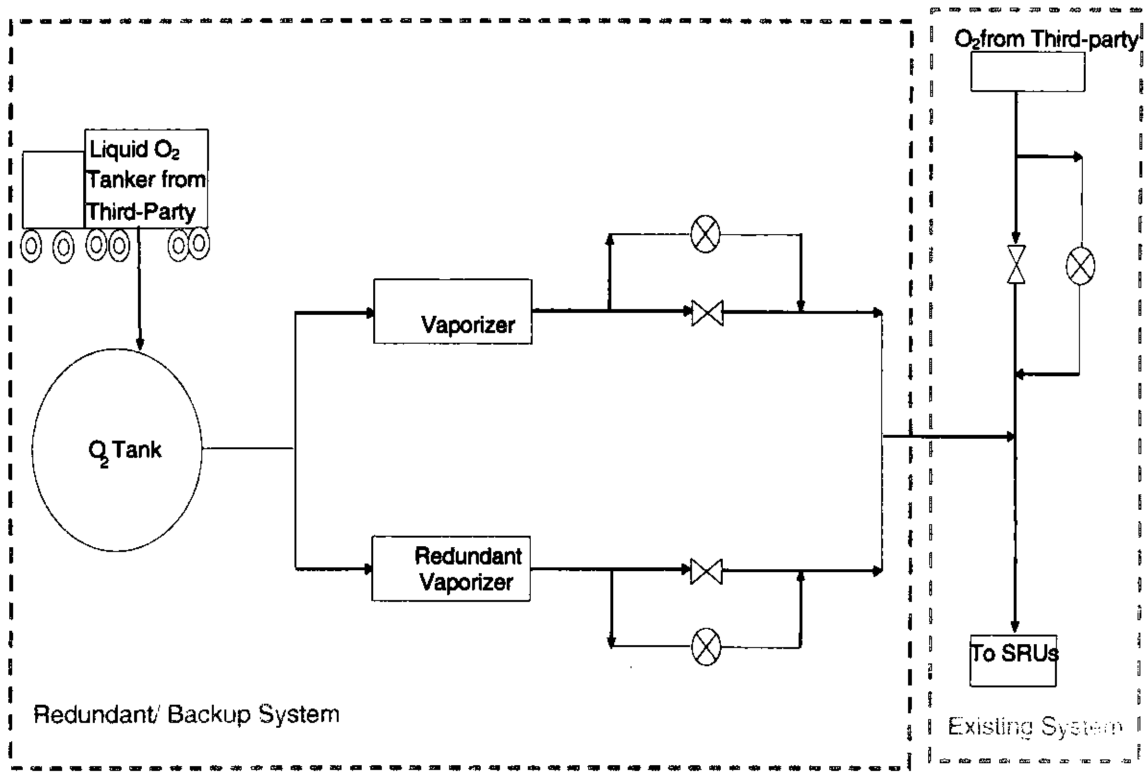
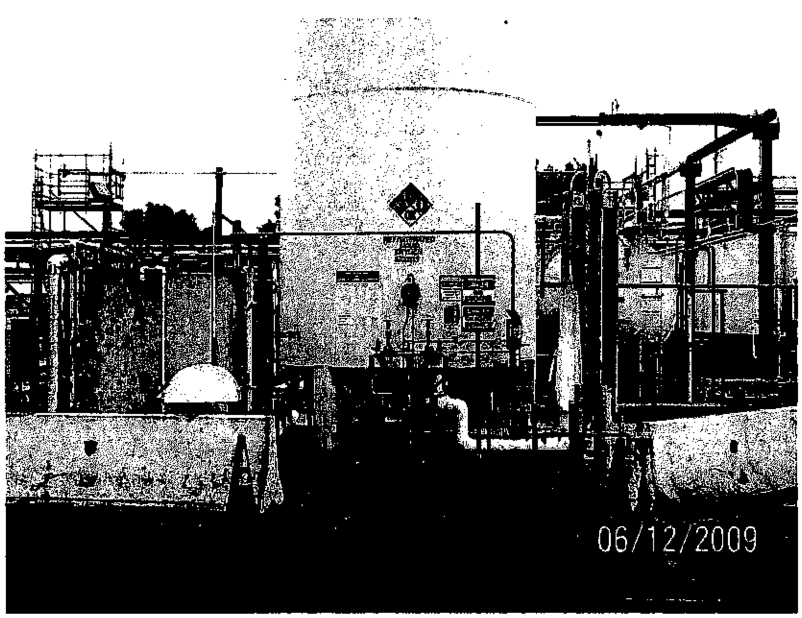


Figure 4.1: Overview of the Backup Liquid Oxygen Supply System

The construction cost for the backup liquid oxygen system, as a corrective action, was approximately $400,000 (i.e., tank, foundation, piping connections, utilities, etc.). The monthly leasing and operation cost is approximately $3,500. (See picture below).



4.4 Flare Gas Recovery Equipment And Treatment System(S) To Be Installed To Comply With The Performance Targets

Rule 1118(e)(1)(D) also requires that a FMP include a discussion regarding any flare gas recovery equipment and treatment system(s) to be installed to comply with the facility SO_2 performance targets. For the purposes of this FMP and addressing the root cause of the two 2008 flaring events that led to the exceedance of the Wilmington Refinery's 2008 performance target, no flare gas recovery equipment or treatment system(s) were installed nor is it required to be installed. As discussed above, the two flaring events have been addressed by the flaring prevention measures implemented during the events, corrective actions taken immediately thereafter the events, and the long-term corrective action of installing a backup liquid oxygen supply system.

As noted above, the Wilmington Refinery currently has flare gas recovery and flare gas treatment systems. (See Section 2).

5.0 Conclusion

But for the September and October 2008 flaring events, the Wilmington Refinery would have been well below its 2008 SO_2 performance target of 29.6 tons. If these events were excluded from the refinery's 2008 performance target, the Wilmington Refinery's SO_2 flaring emissions would have been well below its 2012 performance target. The Wilmington Refinery has had exceptional performance historically in keeping its flare emissions well below the Rule 1118 SO_2 performance targets.

Unfortunately, the failure of an oxygen supply valve (owned, maintained, operated, and controlled by the third-party oxygen supplier) caused the two non-routine flaring events that have led the SCAQMD to require the Wilmington Refinery to develop and submit this FMP.

The Wilmington Refinery believes that the information presented in this plan meets the requirements and intent of Rule 1118(e)(1) and the SCAQMD should timely approve the FMP.

As discussed above, the Wilmington Refinery has implemented several significant preventive measures and corrective actions to minimize the potential for this type of flaring in the future. The Wilmington Refinery believes in particular that the installation of the backup (redundant) liquid oxygen supply system, at considerable cost, should eliminate, to the extent feasible and safe, this type of flaring in the future.