

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 8	PAGE 2
	APPL. NO. 500933	DATE February 4, 2010
	PROCESSED BY: Connie Yee	CHECKED BY:

Calendar Year	Performance Target (tons per million barrels of crude processing capacity)	Refinery Performance Target (tons/year)	SO ₂ Flare Emissions (tons/year)
2008	1.0	29.6	42.79
2009	1.0	29.6	
2010	0.7	20.7	
2011	0.7	20.7	
2012	0.5	14.8	

Ultramar's 2004 crude processing capacity was 29,604,642 barrels

As noted in Table 1, Ultramar exceeded its annual SO_x performance target in calendar year 2008 by 13.19 tons (42.79 tons – 29.6 tons = 13.19 tons). In accordance with Rule 1118(e), Ultramar was required to submit a Flare Minimization Plan no later than 90 days from the end of a calendar year in which the facility exceeded the annual performance target and pay mitigation fees. Ultramar submitted Flare Minimization Plan A/N 500933 on July 28, 2009.

FEE:

Table 2. Plan Fee Evaluation

A/N	Description	BCAT	Fee Paid	Fee Required
500933	Rule 1118- Flare Minimization Plan	555057	\$505.35	\$505.35 + T & M

PLAN EVALUATION:

The specific focus/purpose of the flare minimization plan is to understand the reason why the refinery's Rule 1118 SO₂ performance target was exceeded (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.

Rule 1118(d)(3) and (e)(1) lists the requirements and the items the refinery shall include in their Flare Minimization Plan. Ultramar submitted the Rule 1118 compliance plan with all the required information indicated in Table 3:

Table 3: Check List for Rule 1118 Compliance Plan

Requirements	Compliance		Remarks
	Yes	No	
1. Submit a Flare Minimization Plan [Rule 1118(d)(3)(A)]	√		Ultramar submitted Flare Minimization Plan A/N 500933.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING & COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

PAGES 8	PAGE 3
APPL. NO. 500933	DATE February 4, 2010
PROCESSED BY: Connie Yee	CHECKED BY:

Requirements	Compliance		Remarks
	Yes	No	
2. Pay the District the mitigation fee [Rule 1118(d)(3)(B)]	√		<p>As noted in Table 1 above, Ultramar exceeded their SO_x performance target in calendar year 2008 by 13.19 tons (42.79 tons – 29.6 tons = 13.19 tons), which is greater than 20 percent (13.19 tons/29.6 tons * 100 = 44.6%) of the refinery specific performance target of 29.6 tons.</p> <p>In accordance with Rule 1118(d)(3)(B)(iii), if the excess emissions are greater than 20% of the specific performance target, Ultramar is subject to a mitigation fee of \$100,000 per ton of all SO_x emissions in excess of the performance target. Therefore, the mitigation fee is \$1,319,000 (13.19 tons x \$100,000 = \$1,319,000). Ultramar submitted a check in the amount of \$1,319,000 on July 28, 2009 to pay for the mitigation fee.</p>
3. Include a complete description and technical specifications for each flare and associated knock-out pots, surge drums, water seals and flare gas recovery systems [Rule 1118(e)(1)(A)]	√		Ultramar submitted a complete description and technical specifications for each of the four flares and associated equipment operated at the facility in plan A/N 500933.
4. Include a detailed process flow diagrams of all upstream equipment and process units venting to each flare, identifying the type and location of all control equipment [Rule 1118(e)(1)(B)]	√		In the Appendix of the Flare Minimization Plan, Ultramar submitted detailed process flow diagrams of all upstream equipment and process units venting to each flare, identifying the type and location of all control equipment. Ultramar has claimed confidential business information (CBI) for these diagrams.
5. Include refinery policies and procedures to be implemented and any equipment improvements to minimize flaring and flare emissions and comply with the performance targets of paragraph (d)(1)	√		See discussion below under “Rule 1118(e)(1)(C) Discussion”

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 8	PAGE 4
	APPL. NO. 500933	DATE February 4, 2010
	PROCESSED BY: Connie Yee	CHECKED BY:

Requirements	Compliance		Remarks
	Yes	No	
[Rule 1118(e)(1)(C)]			
6. Describe any flare gas recovery equipment and treatment system(s) to be installed to comply with the performance targets of paragraph (d)(1). [Rule 1118(e)(1)(D)]	√		Ultramar currently operates a flare gas recovery and flare gas treatment system (a.k.a, Vapor Recovery Unit 93). The vapor recovery unit has been effective in reducing the amount of gas flared. This is demonstrated by the fact the refinery's SOx emissions from flares in 2008 would have been in compliance with even its 2012 SO ₂ performance target (14.8 tons SO ₂) and was on track to have a record low emissions for flare SO ₂ emissions (42.79 tons – 38 tons = 4.79 tons) until the third-party oxygen supply valve failures in September and October 2008 which caused the refinery to exceed the SO ₂ performance target.

As a process background, the refinery operates a sulfur recovery unit (SRU). SRUs are proven and conventional operation in oil refining processes to convert undesirable sulfur that is removed from petroleum products to a saleable sulfur product and to also meet emission standards. The chemical process in the SRU utilizes air and oxygen to convert H₂S from the various hydrocarbon processing units in the refinery into molten liquid, elemental sulfur. When the SRUs are suddenly not available for processing the H₂S, the hydrogen sulfide (acid gas) feed to the SRUs is routed, by design, to one of the refinery's flare (namely, Phase 0 flare) for combustion for safety. See Appendix A for a simplified process diagram of the Sulfur Production at the refinery.

At the Ultramar refinery, the oxygen for the SRUs is produced and provided by a third-party oxygen supplier (PraxAir, Inc.) 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.

In 2008, this oxygen supply from the third-party unexpectedly shutoff on two separate occasions. According to Ultramar, these two events caused the refinery to exceed its annual SOx performance target in calendar year 2008 of 29.6 tons. The two events that occurred in the third and fourth quarter of 2008 were:

- (1) On Sunday, September 28, 2008, a third-party oxygen supply valve to Ultramar's SRU Trains 1 and 2 (Process 11, Systems 1 and 2) unexpectedly shut off flow. This in turn led to the SRUs shutting down. As a result, high concentration hydrogen sulfide (H₂S) 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

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 8	PAGE 5
	APPL. NO. 500933	DATE February 4, 2010
	PROCESSED BY: Connie Yee	CHECKED BY:

avoid an atmospheric release and for safety purposes. This flaring resulted in approximately 22 tons of SO₂ emissions.

- (2) On Sunday, October 12, 2008, the oxygen flow to the refinery shut off again and a similar flaring event occurred lasting approximately two hours and resulted in approximately 16 tons of SO₂ emissions.

These two oxygen valve failures thus triggered the unplanned flaring and contributed to a total of 38 tons of SO₂ emissions. Up until these two flaring events, the refinery was running about 17% of its total allowable 2008 SO₂ performance target of 29.6 tons. The total amount of SO₂ emission from flaring in 2008 was 42.79 tons (~85,590 lbs), which represents an exceedance of 13.19 tons SO₂ from their annual performance target (42.79-29.6 tons SO₂). According to Ultramar, 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.

The cause of the two flaring events was later determined to be due to a faulty valve positioner on the oxygen supply valve and unexpectedly shut off oxygen flow to the SRUs. Additionally, it was determined that the vibration or degradation of components located within the oxygen supply valve control box may have contributed to the unexpected shut off of oxygen flow to the SRUs. Ultramar notes that 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. Only the third-party oxygen supplier has access to it. One of the reasons that the flaring events lasted as long as they did was that the refinery had to wait for the third-party oxygen supplier to unlock the gate, evaluate the valve, and then bypass it. Both occurrences happened on a Sunday. The refinery was not provided access to the oxygen supply valve 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 refinery but also 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.

In both flaring instances, the refinery undertook the following corrective actions during or immediately thereafter to minimize or eliminate, to the extent feasible and safe, flaring:

- 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.

Rule 1118(e)(1)(C) Discussion

Rule 1118(e)(1)(C) requires the refinery to examine 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;

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 8	PAGE 6
	APPL. NO. 500933	DATE February 4, 2010
	PROCESSED BY: Connie Yee	CHECKED BY:

- (ii) Essential operational needs and the technical reason for which the vent gas cannot be prevented from being flared during each specific situation; and
- (iii) Emergencies, including procedures that will be used to prevent recurring equipment breakdowns and process upset.

Ultramar found that the historic SO₂ flaring emissions from turnarounds, essential operational needs, and emergencies were relatively minor.

Table 4. SO₂ Emissions from Flares By Event Type

Event Type	SO ₂ Emissions, tons		
	Year 2006	Year 2007	Year 2008
Turnarounds		4.33 ^a	~0.85
Essential Operational Needs	3.45	~1.17	2.19
Emergency	11.61 ^b	6.4 ^c	1.73
Other	1.56		38.02 ^d
Total	15.06	11.90	42.79

- a Largely due to turnaround to modify the Alkylation Unit to incorporate Reduced Volatility Alkylation Process (ReVAP)
- b Due to equipment malfunctions
- c Due to shutdown of SRU because of low flame count
- d Due to third-party oxygen supply shut off to SRUs and subsequent SRUs shut down

Long Term Corrective Actions Taken to Prevent a Similar Flaring Event

Following the two flaring events in September and October 2008, the refinery undertook a detailed evaluation of the root cause that let or contributed to the events that caused the SO_x exceedance. This evaluation included consideration of possible enhancements around policy, procedure, and new equipment that would significantly help to prevent future events of this type.

The final result of this evaluation was the decision by the refinery to establish a redundant source of oxygen for the SRUs. As a result, the refinery installed a backup liquid oxygen supply system. The redundant backup liquid oxygen system is designed to makeup oxygen to the SRUs in the event of the loss of supply from the third-party oxygen supply header.

The following is a description of 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. The redundant/backup system will consist of a cryogenic liquid oxygen tank which stores liquid oxygen and provide approximately 12 hours of backup oxygen supply to the SRUs. When the system is operational, liquid oxygen will be pressure transferred to the 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, Ultramar installed a second vaporizer and related control system as a conservative measure.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 8	PAGE 7
	APPL. NO. 500933	DATE February 4, 2010
	PROCESSED BY: Connie Yee	CHECKED BY:

RECOMMENDATION:

The Rule 1118 Flare Minimization Plan submitted by Ultramar complies with the requirements specified in this rule. Rule 1118(e)(2) requires a 60-day Public Notice to be completed prior to approval of the Flare Minimization Plan submitted. The new backup liquid oxygen supply system is exempt from permit per Rule 219(m)(2). Therefore, no changes to the Ultramar's Facility Permit are required, but the plan will be incorporated into Section I of the Facility Permit.

(H:\reclaim\Ipparkcyee\Ultramar\Plan_R1118_500933.doc)

