

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 1
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

RULE 1118 FLARE MINIMIZATION PLAN

COMPANY NAME

TESORO REFINING AND MARKETING CO, LLC

EQUIPMENT LOCATION

A/N 549262

2101 E. PACIFIC COAST HIGHWAY

WILMINGTON, CA 90744

Facility ID#: 800436

Facility Type: NOx & SOx RECLAIM (Cycle 1), Title V

A/N 552108

23208 S. Alameda Street

Carson, CA

(Facility ID No. (151798).

Facility Type: NOx & SOx RECLAIM (Cycle 1), Title V

EQUIPMENT DESCRIPTION:

A/N 549262: Rule 1118 Flare Minimization Plan for Tesoro Los Angeles Refinery(LAR) located at 2101 E. Pacific Coast Hwy in Wilmington, California (Facility ID No. 800436)

A/N 552108: Rule 1118 Rule 1118 Flare Minimization Plan for Tesoro Sulfur Recovery Plant (SRP) located at 23208 S. Alameda Street in Carson, California (Facility ID No. (151798).

BACKGROUND:

Rule 1118-Control of Emissions from Refinery Flares was amended on November 4, 2005 to minimize flaring and reduce criteria pollutant emissions, such as SOx, NOx, PM₁₀, and CO, from flares at petroleum refineries, sulfur recovery plants, and hydrogen production plants. Rule 1118 set refinery specific annual SO₂ performance targets that decrease with time from years 2006 to 2012 to ensure that emissions from flares are reduced on a permanent basis. The SO₂ performance target for the Tesoro Los Angeles Refinery (LAR) applies to the combined emissions from the Los Angeles Refinery(LAR) and Sulfur Recovery Plant(SRP) Flares. The combined emissions from the LAR and SRP Flares exceeded the SO₂ Performance Target for calendar year 2012. A Notice of Sulfur Dioxide Exceedance for Calendar Year 2012 was issued to Tesoro on February 22, 2012, as required by Rule 1118(d)(2). Exceedance of the annual performance target by a subject facility triggers mitigation fees and the submittal of a Flare Minimization Plan as required by section 1118(d)(3)(A). The purpose of the Flare Minimization Plan 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, and procedures to minimize or eliminate, to the extent feasible and safe, this type of flaring in the future. Tesoro Refining & Marketing Company LLC submitted this FMP under 2

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 2
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

applications one for the Los Angeles Refinery (LAR) Flare System located at 2101 E. Pacific Coast Hwy in Wilmington, California (Facility ID No. 800436) and one for the associated Sulfur Recovery Plant (SRP) located at 23208 S. Alameda Street in Carson, California (Facility ID No. 151798).

FLARE OPERATIONS FOR LAR

The Los Angeles Refinery of Tesoro Refining & Marketing Company in Wilmington, California (herein referenced as LAR) operates two (2) general service flares that are subjected to the provisions of Rule 1118. The two flares, identified as the ‘East’ (Flare No. 1) and ‘West’ (Flare No. 2) flares, operate as an integrated flare system that services all the major process units in the refinery. The process units consist of the FCCU, DCU, HCU, Alkylation, HTU (4), CRU (2), Bensat, HGU, Isomerization, Depentanizer, Cogen (2), Crude Unit, and the Gas Compression Plant.

The following information was provided by Tesoro LAR:

Table 1 – LAR Flare Information

Flare ID	Type of Service	Pilot Gas	Purge Gas ¹	Flare Gas Vapor Recovery
East (No. 1)	General	NG	Nitrogen	Yes
West (No. 2)	General	NG	Nitrogen	Yes

¹NG will be used as backup

FLARE OPERATIONS FOR SRP

The Tesoro Refining and Marketing Company’s Sulfur Recovery Plant in Carson, California (herein referenced as SRP) operates two (2) general service flares that are subject to the requirements of Rule 1118. Flare C96 is the primary unit and flare C183 is a ‘portable rental’ unit used only when the primary flare is taken out of service for inspection and/or maintenance. C183 is only permitted to operate two weeks maximum while C96 undergoes its turnaround.

The following information was provided by Tesoro:

Table 2 – SRP Flare Information

Flare Device ID	Type of Service	Pilot Gas	Purge Gas	Flare Gas Recovery System
C96	General	NG	NG	None
C183	General (backup)			

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 3
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

Tesoro's Rule 1118 established performance targets for years 2006 to 2012 and in perpetuity is as follows:

Table 3. Tesoro's Flare SO₂ Emission Performance and Emissions
(Per Rule 1118 Implementation Guidance Document)

Calendar Year	Performance Target (tons per million barrels of crude processing capacity)	Refinery Performance Target (lbs/year)	SO ₂ Flare Emissions (lbs/year)	Exceedance
2006	1.5	108,200	30,840	No
2007	1.5	108,200	20,179.8	No
2008	1.0	72,000	6,996.2	No
2009	1.0	72,000	37,095.0	No
2010	0.7	50,471	32,998.0	No
2011	0.7	50,471	24,466.0	No
2012	0.5	36,051	37,042.7	Yes 991.7 lbs/year =0.5 tons/year

Tesoro's 2012 crude processing capacity was 36,050,714 barrels

As noted in Table 1, Tesoro exceeded its annual SO_x performance target in calendar year 2012 by 991.7 lbs (37,042.7 lbs-36,051 lbs= 991.7 lbs). In accordance with Rule 1118(e), Tesoro 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. Tesoro submitted two Flare Minimization Plans one for the Refinery(LAR) A/N 549262 on April 3, 2013 and one for the Sulfur Recovery plant(SRP) A/N 552108 on May 15, 2013.

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. Tesoro submitted the Rule 1118 compliance plan with [all the required](#) information indicated in Table 5:

Table 5: Check List for Rule 1118 Compliance Plan

Requirements	Compliance		Remarks
	Yes	No	
1. Submit a Flare Minimization Plan [Rule 1118(d)(3)(A)]	√		Tesoro submitted two Flare Minimization Plans LAR- A/N 549262.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING & COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

PAGES 16	PAGE 4
APPL. NO. 549262	DATE February 4, 2014
PROCESSED BY: sandrawis	CHECKED BY:

Requirements	Compliance		Remarks
	Yes	No	
			SRP-A/N 552108
2. Pay the District the mitigation fee [Rule 1118(d)(3)(B)]	√		As noted in Table 1 above, Tesoro exceeded their SO _x performance target in calendar year 2012 by 991.7 lbs (37,042.7 lbs-36,051lbs= 991.7 lbs), which is less than 10 percent (991.7 lbs /36,051lbs * 100 = 2.75%) of the refinery specific performance target of 36,051lbs. Tesoro paid the required mitigation fees.
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)]	√		Tesoro submitted a complete description and technical specifications for each of the four flares and associated equipment operated at the facility in plan A/N 549262.and A/N 552108
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, Tesoro 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. Tesoro 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) [Rule 1118(e)(1)(C)]	√		See discussion below under “Rule 1118(e)(1)(C) Discussion”
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)]	√		Tesoro currently operates a flare gas recovery and flare gas treatment system.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 5
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

Event Description & Analysis

The facility identified that the exceedance of the SO2 Performance Target for Calendar Year 2012 was primarily the result of 2 unplanned flare events resulting from the unscheduled shutdown of the Delayed Coking Unit (DCU) Wet Gas Compressor C-87 which occurred on April 17, 2012, and August 31, 2012. These 2 unplanned flare events resulted in estimated SO2 emissions of 35,674 lbs which represented 96.4% of the total SO2 emissions from combustion of vent gases in the LAR Flare in 2012 and approximately 99% of the SO2 Performance Target of 36,051 lbs. An additional unplanned flare event resulting from an emergency shutdown of the Hydrocracking Unit (HCU) on August 18, 2012, resulted in an additional 739 lbs of SO2 being emitted from the LAR Flare. When combined with the estimated 35,674 lbs of SO2 from the DCU flare events, the SO2 emissions from the LAR Flare exceeded the SO2 Performance Target of 36,051 lbs.

Table 6

Estimated Vent Gas Flow and SO2 Emissions For Tesoro LAR Flare In 2012

Type/Source	Vent Gas Flow (scf)	SO2 Emissions from Combustion of Vent Gases (Lbs)	SO2 Emissions (% of Total)
Main Categories			
Total	4,743,569	37,018	----
Planned	41,032	32	0.1
Unplanned	4,702,537	36,986	99.9
Unplanned Events			
DCU C-87 Shutdowns	3,941,911	35,674	96.4
HCU Emergency Shutdown	353,244	739	2.0
Other Unplanned	407,382	573	1.5

As can be seen in Table 6 above, SO2 emissions from planned activities i.e. shutdowns, start ups, turnarounds and maintenance were only estimated to be 32 lbs which represents only 0.1% of the total SO2 emissions from the LAR Flare in 2012.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 6
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

Results of Investigations into Cause(s) of the Major Flare Events in 2012 that Caused the Exceedance of the SO2 Performance Target in 2012 and Corrective Actions Taken and/or To Be Taken To Prevent Reoccurrence will be summarized in the table below and followed by detailed description of every incident

Incident Date	Cause	Corrective Action Taken	Completion Date
<u>April 17, 2012</u> DCU wet gas compressor C-87 shutdown	<p>DCU cooling water booster Pump - 2402 bypass left closed during maintenance schedule resulted in an overpressure of DCU Fractionator overhead accumulator and a process upset. C-87 was shutdown after high motor amperage.</p> <p>After stabilizing the operation, DCU wet gas gas compressor C-87 would not start due to an open neutral wire.</p>	<p>1. Regard the bypass of Pump P-2402, 3 actions were taken:</p> <ul style="list-style-type: none"> • Locking open bypass valve. • Updating the training manual • Retraining operational personnel. <p>2. Regard open neutral wire which prevent the restart of C-87, 2 actions were taken:</p> <ul style="list-style-type: none"> • The open neutral wire was switched to an existing spare wire. • Start/stop circuits for critical compressors were tested for integrity 	<p>1. Completed on 7/30/2012</p> <p>2. Completed on 7/30/2012</p>
<u>August 18, 2012</u> HCU emergency shutdown	HCU 2 nd Stage Charge Pump P-1386 was leaking due to the leakage of the outboard seal. The outboard seal was overcompressed by 2 out of the 3 set screws that held the seal sleeve tight to the shaft had moved outwards which overcompressed the seal. The shutdown of the HCU 2 nd Stage Charge Pump P-1386 resulted in process upset leads to shutdown	<p>1. Replace P-1386 pump seal with dual seals.</p> <p>2. Replacing the 3 set screws with more robust clamping (more than 3 set screws)</p>	<p>1. Completed during HCU turnaround in February 2014.</p> <p>2. Completed during HCU turnaround in February 2014</p>

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 7
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

	of the HCU.		
<u>August 31, 2012</u> DCU wet gas compressor C-87 shutdown	Unscheduled shutdown of DCU C-87 due to tripping of circuit breaker 10C. Electrical ground fault occurred at circuit breaker 10C3 which should have tripped by itself but failed to trip before the higher level bus 10C reacted. The tripping of Bus 10C caused power loss to circuit breaker 10C5 which supplies power to DCU C-87.	1. Locating the ground fault. Replacing 150 feet of cable 2. Reset the protective device settings on Bus 10C allowing each lower level protective device (10C3, 10C5, etc.) to react at appropriate time prior to set point for 10C.	1. Completed on September 23, 2012 2. Completed on August 1, 2013

Detailed Description of Every Incident

APRIL 17, 2012 DCU WET GAS COMPRESSOR C-87 SHUTDOWN

Incident Description

The Specific Cause Analysis Flare Event which occurred at the DCU at the Los Angeles Refinery on April 17, 2012, resulted from a safety shutdown of DCU Wet Gas Compressor C-87 initiated by high motor amperage caused by a process upset resulting from loss of cooling water to the Vacuum Ejector and Fractionator Overhead Condensers due to a procedural error during the shutdown of DCU Cooling Water Booster Pump P-2402. This resulted in an increase in pressure in the DCU Fractionator Overhead Accumulator and opening of a pressure controller to the DCU Flare Header to relieve the pressure as designed. The vent gas flow from the DCU to the Refinery Flare Gas Recovery Header exceeded the capacity of the FGRS Compressors resulting in vent gas flow to the LAR Flare at approximately 9:02 am on April 17, 2012. The duration of the flaring incident was significantly extended beyond the first attempt to restart C-87 at approximately 9:20 am on April 17, 2012, due to an open neutral wire in the C-87 start circuit. Had there not been an issue with the open neutral wire in the C-87 start circuit which prevented the restart of C-87 at 9:20 am, it is estimated that SO₂ emissions from the LAR Flare would have been limited to 2800 lbs as compared to the estimated SO₂ emissions from this flare event of approximately 25300 lb.

Corrective Actions Taken and/or To Be Taken To Prevent Reoccurrence

Immediate Corrective action(s) taken prior to completion of the investigation:

Tesoro staff identified the open neutral wire on C-87, switched to the spare neutral wire, tested the breaker and turned C-87 over to Operations for restart. C-87 was restarted. The start up of C-

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 8
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

87 was successful in stopping vent gas flow from the DCU to the Refinery Flare Gas Recovery Header. This reduced the vent gas flow to the Refinery Flare Gas Recovery Header such that the water seal level in the Flare KO/H₂O Seal Drum could be restored and the FGRS Compressors returned to service. **This was successful in stopping vent gas flow to the LAR Flare at approximately 2:37 pm on April 17, 2012.**

Long-Term Corrective Action

Operations Procedures and Corrective actions taken for the safety shutdown of DCU Wet Gas Compressor C-87 are outlined below:

1. With regard to the causal factor concerning the line-up of the bypass system for DCU Cooling Water Booster Pump P-2402 during shutdown of the pump for scheduled maintenance:
 - a. Evaluate and implement corrective actions to ensure that the Cooling Water Booster Pump bypass system is available at all times. This may include locking open valves, installing a sign(s), developing a job aid, updating the training manual and conducting refresher training for Operations personnel. - **Completed on 7/30/12**
 - b. Evaluate the need to create a process to ensure availability of all critical back-up equipment such as auto-start pumps, bypass systems, etc. – **Completed on 9/30/12**
2. With regard to the causal factor related to communication between the Console and Field Operator during shutdown of DCU Cooling Water Booster Pump P-2402, determine and implement a method to ensure adequate Console and Field communication during start up, shutdown and switching activities– **Completed on 7/30/12**
3. With regard to the causal factor related to the open neutral wire which prevented the timely restart of C-87 and significantly extended the duration of this Specific Cause Analysis Flare Event, review and determine if start/stop circuits for critical compressors with potential environmental impacts can be tested for integrity. – **Completed on 7/30/12**

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 9
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

AUGUST 18, 2012 EMERGENCY SHUTDOWN OF THE HCU

Incident Description

There was an emergency shutdown of the Hydrocracking Unit(HCU) due to a hydrocarbon release resulting from failure of the pump seal for HCU 2nd Stage Charge Pump, P-1386. An initial inspection of the HCU 2nd Stage Charge Pump, P-1386 was conducted as part of completing the repairs to the pump. During the repair, mechanical noted the outboard seal, not the inboard seal, was leaking

Immediate Corrective action(s) taken prior to completion of the investigation

The HCU 2nd Stage Charge Pump, P-1386, was shut down and secured for inspection and repair. Repairs including installation of rebuilt seals and replacement of the bearings were completed in preparation for start up.

Long-Term Corrective Actions Taken and/or To Be Taken To Prevent Reoccurrence

Corrective actions identified as a result of the investigation into this Specific Cause Analysis Flare Event are:

1. Upgrade P1386 Seal to Dual Seal (with Secondary Containment) and more robust clamping (more than 3 set screws) during HCU turnaround. Install seal flush if required. – **Complete during next scheduled turnaround currently scheduled for March 2014**
2. Implement practice of using set screw torque table whenever feasible. Add it to pump repair procedure and train machinist. – **Completed on November 1, 2012**
3. Mechanical Inspectors to perform periodic rounds and visually inspect pump seal sleeves on critical pumps. – **Completed on October 1, 2012**
4. Mechanical Inspectors to review similar seal flush designs in their area to insure that there are no issues. – **Completed on December 31, 2012**

AUGUST 31, 2012

LOSS OF POWER FROM LAR SUBSTATION 10 RESULTING IN DCU WET GAS COMPRESSOR C-87 SHUTDOWN

Incident Description

On August 31, 2012, C-87 tripped. This caused the suction pressure of the compressor to increase and subsequently cause the pressure relief valve(PRV) to open as designed for venting DCU Fractionator Overhead gases to the Refinery Flare Gas Recovery Header. The vent gas flow rate in the Refinery Flare Gas Recovery Header exceeded the capacity of the Flare Gas Recovery System (FGRS) Compressors and proceeded to blow out the water level in the Flare KO/H2O Seal Drum resulting in vent gas flow to the LAR Flare.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 10
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

Results of Investigation Into Cause

The follow-up investigation confirmed that the unscheduled shutdown of DCU C-87 on August 31, 2012, was caused due to the tripping of circuit breaker 10C3 which in turn caused some other circuit breakers to trip on the same bus, i.e. Bus 10C. Circuit breaker 10C3 had a ground fault which operated the ground relay as well as a lock out relay that locked out all the other circuit breakers on Bus 10C including circuit breaker 10C5 which supplies power to DCU C-87. The lock out relay is designed to protect the other circuit breakers and equipment from damage. The cause for the failure of 10C3 was a ground fault between phase A and the underground conduit that feeds transformer TR61. The most likely cause of this cable failure is deterioration over time.

Immediate Corrective action(s) taken prior to completion of the investigation:

1. Tesoro staff isolated the electrical problem to a ground fault between Transformers 61 and 62 (TR-61 and TR-62) and Breaker 10C3 on Bus 10 C in Substation 10. This allowed Breaker 10C5 on Bus 10C which provides power to the motor for DCU C-87 to be reset. Once power was restored, C-87 was turned over to Operations for start up. C-87 was restarted at approximately 10 pm on August 31, 2012. This reduced the vent gas flow to the Refinery Flare Gas Recovery Header such that the water seal level in the Flare Knockout (KO)/Water (H2O) Seal Drum could be restored and vent gas flow to the LAR Flare was stopped at approximately 10:16 pm on August 31, 2012. Portable generators were brought in to provide power to equipment at the DCU and GCP on 10C3.
2. During the follow-up investigation, the location of the ground fault was located. The existing cable was pulled out, the integrity of the conduit was verified, and approximately 150 feet of replacement cable was pulled/installed. This work was completed on September 23, 2012.
3. After checking the system, approval was given to reset Breaker 10C3 and remove the portable generators. This allowed the equipment affected by the loss of power due to the isolation of 10C3 to be restarted on normal power from LAR Substation 10 on September 26 & 27, 2012.

Long Term Corrective Actions Taken and/or To Be Taken To Prevent Reoccurrence

Corrective actions identified as a result of the investigation into this Specific Cause Analysis Flare Event are:

An additional item identified as a result of the investigation into the unscheduled shutdown of DCU C-87 on August 31, 2012, was to evaluate an independent power supply for C-87 outside of Bus C. This evaluation was completed on February 28, 2013. LAR Technical Staff has evaluated the idea of relocating the electrical feeder breaker 10C5 for C-87 Gas Compressor motor M-1005

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 11
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

to a separate bus in Substation 10; the objective is to mitigate the nuisance tripping of the compressor due to electrical faults emanating from the adjacent feeder branches. The findings show that it is not necessary to move the C-87 feeder to a separate bus; the breaker 10C5 is already providing a dedicated service and protections to the compressor motor at the Bus 10C. A simplified line drawing of Substation 10 is included as Appendix E submitted by Tesoro of this FMP.

As a result of completing the above evaluation, an additional corrective action was identified. The last episode of power loss for the entire Bus 10C originated from an electrical ground fault on the adjacent feeder 10C3. Breaker 10C3 did not clear the fault sufficiently fast enough, but the main breaker 10C1 sensed the fault and opened, thus dropping power to the entire Bus 10C to prevent further damage to other loads on the same bus. Because the ground fault started on feeder 10C3, the feeder breaker 10C3 should have cleared without allowing the fault current to propagate upwards, causing the upstream protective device (10C1) to trip. The cause is a lack of good coordination between downstream and upstream devices. Subsequent investigation confirmed that the time settings and current magnitudes for feeders 10C3 and 10C5 were set much higher than the 10C1. Therefore, the 10C1 will clear sooner before allowing feeder branches to clear first. Because of this coordination problem; LAR will perform a full coordination study for the protective device settings on Bus 10C. Once the correct and coordinated settings are determined, each protective device will be reset and tested according to the correct and coordinated value. This procedure will prevent the same episode from happening again in the future. This procedure **was completed by August 1, 2013.**

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 12
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

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;

Tesoro found that the historic SO₂ flaring emissions Planned turnarounds and other scheduled maintenance were relatively minor.

Tables 7 and 8, below, provide a comparison of vent gas flows and SO₂ emissions from planned shutdowns and start ups to the total Calendar Year vent gas flow and SO₂ emissions for 2008-2012 for LAR and SRP.

Table 7-Comparison of Estimated Vent Gas Flow and SO₂ Emissions For Tesoro LAR Flare For Planned Activities Per Calendar Year Totals For 2008-2012

Year	Total Vent Gas Flow (scf)	Total SO ₂ Emissions (Lbs)	Vent Gas Flow From Planned Activities (scf)	SO ₂ Emissions From Planned Activities (Lbs)	SO ₂ Emissions (% of Total)
2008	52,717,574	6,681	31,951,282	350	5.2
2009	48,753,435	37,092	42,827,995	23,465	63.3
2010	26,405,440	33,153	6,086,953	6,736	20.3
2011	10,877,917	8,013	4,127,909	2,829	35.3
2012	4,743,569	37,018	48,707	32	0.1

Table 8-Comparison of Estimated Vent Gas Flow and SO₂ Emissions For Tesoro SRP Flare For Planned Activities Per Calendar Year Totals For 2008-2012

Year	Total Vent Gas Flow (scf)	Total SO ₂ Emissions (Lbs)	Vent Gas Flow From Planned Activities (scf)	SO ₂ Emissions From Planned Activities (Lbs)	SO ₂ Emissions (% of Total)
2008	99,327	1087	59483	230	21.1
2009	427,423	644	377,128	637	99.0
2010	81,687	754	0	0	0.0
2011	290,126	58	210,641	58	87.8
2012	0	0	0	0	NA

The data shows a decrease in vent gas flows from planned unit shutdowns and start ups from 2008-2012 and a decrease in SO₂ emissions from 2009- 2012, this is somewhat dependent on the number and type of units scheduled for turnarounds or maintenance downperiods. Developing procedures to optimize the recovery capacity of the new FGRS Compressors which were installed and operational by December 2008 has resulted in a reduction of vent gas flow and SO₂ emissions from the LAR Flare.

In 2012, there were 7 flare events due to planned shutdowns or start-ups at LAR which resulted in 48,707scf of vent gas flow and 32 lbs of SO₂ emissions as shown in Table 7. There were no applicable SO₂ emissions from combustion of vent gases in the SRP Flare during calendar year

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 13
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

2012 as shown in Table 8. These minor flare events did not contribute significant vent gas flow or SO₂ emissions from the LAR Flare during calendar year 2012.

Therefore, no additional policies, procedures or equipment improvements need to be implemented at LAR to comply with the SO₂ Performance Target.

(ii) Essential operational needs and the technical reason for which the vent gas cannot be prevented from being flared during each specific situation;

(a) Temporary fuel gas system imbalance due to:

Tesoro LAR and SRP do not currently have any agreements to supply gas compliant with Rule 431.1 to an electric generation unit. In 2012, there was 1 flare event due to a fuel gas imbalance at LAR which resulted in 10,474 scf of vent gas flow and 2 lbs of SO₂ emissions. The flare event did not contribute significant vent gas flow or SO₂ emissions from the LAR Flare during calendar year 2012. Therefore current procedures for control of pressure in the Refinery Fuel Gas Mix Drum (FGMD) to stay below the pressure controller set points and to recover from temporary fuel gas imbalances caused by the sudden shutdown of refinery fuel gas combustion devices were determined to be adequate.

Therefore, no additional policies, procedures or equipment improvements need to be implemented to comply with the SO₂ Performance Targets.

(b) Relief valve leakage due to malfunction;

All PRVs at LAR are upstream of the FGRS Compressors. Therefore, leakage from PRV malfunctions is recovered by the FGRS Compressors. In the event that a PRV relieves to the Refinery Flare Gas Recovery Header, the PRV is checked to insure it is functional and has reseated properly. The spare is put in service until the PRV has been checked.

At the SRP, PRVs are downstream from any Vapor Recovery System Compressors. PRVs at the SRP are checked annually for leakage Rule 1118(c)(1)(C). In addition any relief valve leakage will be identified by an increase in the Total Sulfur Concentration (TSC) in the SRP Flare Header as measured by the TSC analyzers installed in accordance with the requirements of Rule 1118(g)(3).

There were no flare events at LAR or the SRP in calendar year 2012 resulting from relief valve leakage.

Therefore, no additional policies, procedures or equipment improvements need to be implemented to comply with the SO₂ Performance Target.

(c) Venting of streams that cannot be recovered due to incompatibility with recovery system equipment or with refinery fuel gas systems

This would normally occur during planned unit shutdown or start ups when vessels are being cleared and decontaminated in preparation for maintenance. Recovering of high

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 14
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

volume process unit purges with nitrogen or unit steam outs is not always feasible due to incompatibility with the refinery fuel gas system and FGRS Compressors, respectively. High volume nitrogen purges for vessel clearing to the Flare Gas Recovery Header results in a decrease in the Higher Heating Value (HHV) of the refinery fuel gas and can upset the operation of refinery process heaters. When nitrogen pressure popping is utilized to clear vessels to the Flare Gas Recovery Header, the FGRS Compressors remain in service and recover vent gases from the pressure popping steps up to the recovery capacity of the compressors. High volumes of vent gases from vessel steam outs can result in elevated vent gas temperatures in the Flare Gas Recovery Header. The FGRS Compressors have safety shutdowns that are initiated by high Flare Gas Recovery Header and/or FGRS Compressor Ring Water Temperature which could require shutdown/circulation of the FGRS. The set point for the safety shutdowns for Flare Gas Recovery Header Suction and Compressor Discharge Temperature is 176 F.

The vent gas flow and SO2 emissions from the venting streams that cannot be recovered would be included in the vent gas flow from Planned Activities. Additionally, flaring of inerts(ie nitrogen) purging/clearing of vessels is not a significant source of SO2 as the vessels have already been stripped/cleared to the refinery fuel gas system using hydrogen prior to venting to the Refinery Flare Gas Recovery Header. As indicated, in Table 7 on page11 and Table 4.6 on Page 4-12 of the FMP, the SO2 emissions from all Planned Activities in 2012 was only 32 lbs and therefore did not contribute to the exceedance of the SO2 Performance Target in 2012. Vent gas flows from all Planned Activities have decreased significantly since 2009.

Therefore, no additional policies, procedures or equipment improvements need to be implemented to comply with the SO2 Performance Target.

(d) Venting of clean service streams to a clean service flare or a general service flare;
This is not an issue at LAR or SRP. SRP does not have or vent any clean service streams to the SRP Flare. Any treated LPGs at LAR that would be vented to the Refinery Flare Gas Recovery Header are vented at a controlled rate such that the vent gases are recovered by the FGRS Compressors.

Therefore, no additional policies, procedures or equipment improvements need to be implemented to comply with the SO2 Performance Target.

(e) Intermittent minor venting from: (1) Sight glasses; (2) Compressor bottles;(3) Sampling systems; or (4) Pump or compressor vents; or

All such minor venting is done to the Refinery Flare Gas Recovery Header upstream of the FGRS Compressors and is normally recovered by the FGRS compressors. On occasion there is a sudden spike in vent gas flow to the Refinery Flare Gas Recovery Header which momentarily exceeds the recovery capacity of the FGRS Compressors. In 2012, there were 6 flare events due to intermittent minor venting at LAR which resulted in 10,862 scf

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 15
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

of vent gas flow and 3 lbs of SO2 emissions. These minor flare events did not contribute significant vent gas flow or SO2 emissions from the LAR Flare during calendar year 2012. There were no applicable SO2 emissions from combustion of vent gases in the SRP Flare during calendar year 2012.

Therefore, no additional policies, procedures or equipment improvements need to be implemented to comply with the SO2 Performance Target.

(f) An emergency situation in the process operation resulting from the vessel operating pressure rising above pressure relief devices' set points, or maximum vessel operating temperature set point.

Process upsets and/or emergency situations resulting from vessel pressures or temperatures rising above pressure and/or temperature set points are managed in accordance with a standing instruction which authorizes Operations personnel to stabilize, slowdown, or shutdown and restart operating units. In 2012 there were 2 flare events due to process upsets which resulted in sudden increases in unit pressures at LAR which resulted in 13,325 scf of vent gas flow and 31 lbs of SO2 emissions. These minor flare events did not contribute significant vent gas flow or SO2 emissions from the LAR Flare during calendar year 2012. There were no applicable SO2 emissions from combustion of vent gases in the SRP Flare during calendar year 2012.

Therefore, no additional policies, procedures or equipment improvements need to be implemented to comply with the SO2 Performance Target.

(iii) Emergencies, including procedures that will be used to prevent recurring equipment breakdowns and process upset.

As part of the 5-year look back for 2008-2012 to evaluate flare flow and SO2 emissions from planned activities discussed above, Tesoro also reviewed emergency flare events. Table 8 below provides a comparison of vent gas flows and SO2 emissions from emergency flare events to the total Calendar Year vent gas flow and SO2 emissions for 2008-2012.

Table 8-Comparison of Estimated Vent Gas Flow and SO2 Emissions For Tesoro LAR Flare To Emergency Flaring Per Calendar Year Totals For 2008-2012

Year	Total Vent Gas Flow (scf)	Total SO2 Emissions (Lbs)	Vent Gas Flow From Emergency Flare Events (scf)	SO2 Emissions From Emergency Flare Events (Lbs)	SO2 Emissions (% of Total)
2008	52,717,574	6,681	8,360,292	1,146	17.1
2009	48,753,435	37,092	576,319	373	1.0
2010	26,405,440	33,153	20,392,505	21,944	66.2
2011	10,877,917	8,013	6,659,831	4,997	62.4
2012	4,743,569	37,018	4,644,282	36,944	99.8

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING & COMPLIANCE</i> APPLICATION PROCESSING AND CALCULATIONS	PAGES 16	PAGE 16
	APPL. NO. 549262	DATE February 4, 2014
	PROCESSED BY: sandrawis	CHECKED BY:

The vent gas flow to the LAR Flare for all flare events has decreased every year from 2008 to 2012 while the vent gas flow to the LAR Flare during emergency flare events did not show the same trend of annual decreases until 2010. As discussed in the Analysis of Flare Events Resulting In The Exceedance Of The SO2 Performance Target In Calendar Year 2012 and Corrective Actions Taken and/or To Be Taken To Prevent Reoccurrence Section (in Section 3 of the FMP document submitted by Tesoro in the application), the exceedance of the SO2 Performance Target in Calendar Year 2012 resulted from 2 flare events involving unscheduled shutdowns of the DCU Wet Gas Compressor C-87 due to internal electrical/power supply issues. As summarized from page 7 to page 10 of this evaluation, immediate and long-term corrective actions have been taken to improve the reliability of the electric power supply for C-87.

RECOMMENDATION:

The Rule 1118 Flare Minimization Plan submitted by Tesoro 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. No changes to the Tesoro's Facility Permit are required, but the plan will be incorporated into Section I of the Facility Permit.