

ENGINEERING EVALUATION REPORT

REVISED FLARE MONITORING AND RECORDING PLAN

COMPANY NAME, MAILING AND LOCATION ADDRESS:

Name: Tesoro Refining and Marketing Company, LLC.
Sulfur Recovery Plant (SRP)
ID# 151798
Title V: Yes
RECLAIM: NOX, SOX
Zone: Coastal
Cycle: 1

Mailing: P.O. Box 817
Wilmington, CA 90748-0817

Location: 23208 South Alameda Street
Carson, CA 90810

Contact: Robert Stockdale
(310) 522-6281

BACKGROUND:

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.

Rule 1118 was amended on November 4, 2005 to enhance monitoring requirements for flares and reduce flare related emissions. Stricter requirements for monitoring, record keeping, and reporting of flare activities were imposed to better quantify flare emissions. Such data are crucial in ensuring petroleum refineries do not exceed the performance targets for SOx emissions pursuant to paragraph (d) of Rule 1118. As a support facility for the LAR, flare emissions from the SRP are combined with the LAR for Rule 1118(d) compliance determination.

Due to technical challenges and the complexity of technologies feasible to continuously monitor total sulfur concentrations (TSC) and higher heating values (HHV) of flare vent gases, all South Coast refineries, including the SRP, was unable to comply with the monitoring requirements in Table 1 of Rule 1118(g)(3) by the compliance deadline of July 1, 2007. The AQMD Governing Board foresaw this difficulty and adopted a resolution with the November 4, 2005 amendment of Rule 1118 that directed District staff to work closely with the Western States Petroleum Association (WSPA) and its members to develop the technologies. Two test trials were conducted at two separate South Coast refineries to demonstrate the feasibilities of commercially available analyzers. BP volunteered to conduct a pilot test for a total sulfur analyzer while Chevron agreed to conduct a demonstration project for a HHV analyzer. Completion of these pilot projects and obtaining District

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approvals for the technologies did not happen until March 2008 for the HHV analyzer and May 2008 for the TSC analyzer.

Tesoro, along with other refineries, filed a regular variance petition for relief from Rule 1118 requirements on March 6, 2007. The Hearing Board held a common hearing for all the refineries on April 24 through April 26, 2007 and the SRP variance petition, case no. 4982-76, was granted. The SRP was ordered to comply with an Increment of Progress for the variance that specified a schedule for installing and testing of the analyzers on their flare. Final compliance with the variance order was achieved by October 31, 2009 and final certification of the flare analyzers was recently attained on March 20, 2013 from the District.

The SRP is subject to the provisions of paragraph (f) of Rule 1118. As such, a revised Flare Monitoring and Recording Plan (FMRP) was required to be submitted to the District for approval by 6/30/06 pursuant to Rule 1118(f)(1)(A). Equilon LLC (the facility owner at the time) submitted a revised flare plan for approval under A/N 458546 on 7/6/06. After the facility changed ownership from Equilon LLC to Tesoro Refining and Marketing Company on 5/11/07, a revised plan was submitted under A/N 474258 by Tesoro on 10/2/07 because compliance plans are not transferable. Subsequently, several amendments to the plan were submitted on 6/13/08 and 1/15/10. These amendments have been incorporated in revised plan application under 474258. The revised flare plan, as approved, will supersede the previously approved flare plan on 12/2/05 under A/N 348197. The revised flare plan submitted by Equilon under A/N 458546 has been cancelled.

The following information was provided by Tesoro:

TABLE 1: Flare Information

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

In the revised plan, Tesoro proposes to use the following methods to monitor and record the operating parameters of the flares:

TABLE 2: Vent Gas Monitoring¹ Methods

Flare Device ID	Gas Flow	Gas Higher Heating Value (HHV)	Total Sulfur (TS) Concentration
C96	Flow Meter	HHV Analyzer	TS Analyzers (2 total)
C183	Type: Ultrasonic Make: Panametrics Model: GF868 Range: 0.1 – 250fps	Type: GC Make: Siemens Model: Maxum Edition II Range: 0-3500 BTU/ft3	Type: PUVF Make: Thermo Model: SOLA II Range: 10 - 2500 ppm Range: 2500 – 150000 ppm

¹Monitoring is continuous. Additional analyzer specifications are contained in Tesoro SRP's QAQC plan.

TABLE 3: Pilot, Purge Gas and Visible Emissions Monitoring Methods

Flare Device ID	Pilot Gas (type)	Pilot Gas Flow (typical), Scfm	Purge Gas (type)	Purge Gas Flow (typical), Scfm	Pilot Flame Detection	Visible Emissions Detection
C96	Natural Gas	6	Natural Gas	3-15	Thermocouple	Color video
C183						

FLARE OPERATIONS

The SRP flare serves the sour water/amine strippers that are part of the sulfur recovery processes for the Tesoro Los Angeles Refinery (LAR). The primary function of the SRP flare is to burn non-routine hydrocarbon flash gas from the rich DEA solution used to remove hydrogen sulfide from refinery-produced fuel gas and liquid propane/propylene. This hydrocarbon flash gas characteristically contains about 7% hydrogen sulfide, prior to dilution with the natural gas purge. A vapor recovery compressor (C-115) normally recovers this gas and treats it to remove H₂S prior to use as fuel gas. Only abnormal quantities of hydrocarbons, caused by temporary fuel gas system imbalance from emergency shutdown of fuel gas combustion device(s), that exceed the design capacity C-115 are sent to the flare. Flaring may also occur when the C-115 is taken out of service for periodic maintenance by Variance/Alternative Operating Condition (AOC) coverage approved by the District Hearing Board.

The SRP has fixed roof storage tanks that are blanketed with NG and any excess amount is also recovered by C-115. Following compression, the gas is scrubbed with lean DEA in the vapor recovery absorber V-1256 prior to use in the SRP fuel gas system. The SRP does not have a flare gas recovery system. There is no interconnection between the flare header and C-115 (other than the common connection to the rich DEA flash drum). C-115 recovers the gases from the flash drum during normal operation, and excessive volumes of flash gas, which may exceed compressor capacity during process upsets described above, will automatically vent to the flare system.

PLAN EVALUATION

PLAN COMPLETENESS

A Revised Flare Monitoring and Recording Plan shall contain, at minimum, all of the information specified by paragraphs (f)(3)(A) through (f)(3)(Q) of Rule 1118. As shown in Table 1, Tesoro's proposed plan has the required information specified by paragraph (f)(3) of the rule.

TABLE 1: Checklist for a Revised Flare Monitoring and Recording Plan

Requirements	Rule 1118 (f)(3)	Yes	Comment
A facility plot plan showing locations of flares	(A)	√	See Appendix A of the revised plan dated 12/29/09.

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Requirements	Rule 1118 (f)(3)	Yes	Comment
Flare information: (1) type of service (2) design capacity (3) operation and maintenance	(B)	√ √ √	See Section 2, page 1-2 of the revised plan dated 12/29/09.
Pilot and purge gas information: (1) type of gas used (2) actual set operating flow rate (3) Expected maximum total sulfur content (4) Expected average higher heating value	(C)	√ √ √ √	See Section 2, page 2-3 of the revised plan dated 12/29/09.
As built process flow diagrams and drawings identifying flare header, flare stack, flare tip/ burners, purge gas system, pilot gas system, ignition system, assist system, knockout drum, water and molecular seal, etc...	(D)	√	See Appendix B of the revised plan dated 12/29/09.
Flow diagrams showing the interconnections of the flares to vapor recovery system and process unit	(E)	√	See Appendix B of the revised plan dated 12/29/09. No flare gas recovery system installed except for VRS serving process storage tanks and rich DEA flash drum
Descriptions of the assist system process control, flame detection system and pilot ignition system.	(F)	√	See Section 2, page 3-4 of the revised plan dated 12/29/09.
Description of the gas flaring process if an integrated gas flaring system is being operated.	(G)	√	See Section 2, page 4 of the revised plan dated 12/29/09.
Description of the vapor recovery system: (1) type of compressor (2) design capacity of each compressor (3) design capacity of vapor recovery system (4) method to record amount of vapors recovered	(H)	√ √ √ ---	See Section 2, page 5 of the revised plan. No flare gas recovery system installed but a VRS is used to recover excess blanket gas from storage tanks and flash gas from DEA flash drum.

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Requirements	Rule 1118 (f)(3)	Yes	Comment
Drawings with dimension showing: (1) location of sampling equipment (2) locations of HHV, Ts analyzers (3) location of flow meter (4) location of on/off indicator	(I)	√ √ √ ---	See Section 2, page 5 and Appendix B. Tesoro to submit supplemental dwg with more details per AI request dated 2/24/12. No on/off flow indicator used.
Manufacturer's specifications for existing and proposed flow meters and on/off flow indicator, HHV and Ts analyzers: (1) make, model and type (2) range, precision and accuracy (3) calibration, maintenance and quality assurance procedures	(J)	√ √ √	See Section 2, page 5, 6, Appendix D and G of revised plan dated 12/29/09.
Description and data used to determine actuating and de-actuating settings for on/off flow indicator, and method to verify these settings.	(K)	---	N/A. On/off flow indicator not used.
Description of analytical and sampling methods or estimation method, if applicable, to determine high heating value and total sulfur content of vent gases.	(L)	√	See Section 2, page 7 of the revised plan dated 12/29/09.
Description of data recording, collection and management system..	(M)	√	See Section 2, page 8-9 of the revised plan dated 12/29/09.
Description of proposed method to determine, monitor and record total gas volume, HHV and total sulfur concentrations of vent gases.	(N)	√	See Section 2, page 8-9 of the revised plan dated 12/29/09.
Schedule for installation and operation of flare monitoring system..	(O)	√	Please note that schedule in Table 8 has been modified in accordance with Variance, Case No. 4892-76. Final compliance with variance was achieved on 10/1/09.
Description of any proposed alternative criteria to determine a sampling event for each specific flare.	(P)	--	No alternative is being proposed by Tesoro
A request to use an alternative sampling program pursuant to paragraph (g)(4)(C)	(Q)	√	See Section 2, page 10 of revised plan dated 12/29/09.

RECOMMENDATIONS:

The SRP's revised Flare Monitoring and Recording Plan contains all of the requirements pursuant to Rule 1118 (f)(3). Therefore, the plan is recommended for approval with the following conditions:

1. The owner/operator shall perform monitoring and recording of the operating parameters for the following flares in accordance with this approved compliance plan and other applicable requirements of Rule 1118(g). The monitoring and recording shall be performed at all times except when the flare monitoring system is out of service for reasons described in Rule 1118 (g)(5)(A).

Flare Device ID	C96	C183* (rental flare)
Flare Type	General Service	General Service

* Applicable only when flare is in service.

2. A flare event occurs when the flow velocity of vent gas in a flare equals to 0.10 feet per second or greater. The flare event ends when the flow velocity drops below 0.12 feet per second.
3. A flare event lasting 24 hours or less which continues into the next calendar day shall be considered a single flare event even when the event occurs in two consecutive days. When a flare event continues for more than 24 hours, each calendar day shall be a separate flare event.
4. The continuous HHV analyzer, total sulfur analyzers and gas flow meter used in this flare plan shall meet or exceed the minimum specifications described in Attachment A of Rule 1118. The flare monitoring system shall also be certified by the AQMD. For quality assurance procedures, the owner/operator shall follow the Guidelines for Rule 1118 Flare Monitoring System Quality Assurance and Quality Control Plan published by the SCAQMD.
5. When the maximum range of a flow meter is exceeded, the flow rate shall be assumed to be the maximum design capacity of the flare.
6. Volumetric flow rates of vent gases shall be corrected to standard conditions of 14.7 psia and 68°F.
7. Whenever the flow meter, HHV and/or TSC analyzer(s) is down due to breakdowns or maintenance, the owner or operator shall use the data substitution method referenced in Attachment B of Rule 1118 to calculate and report flare emissions except when an alternative data substitution procedure has been approved in writing by the District. Analyzer(s) downtime shall be limited pursuant to Rule 1118(g)(5)(A).
8. The owner/operator shall calculate emissions of criteria pollutants from each flare and each flare event using the methods described in Attachment B of Rule 1118.
9. The owner/operator shall install and maintain a flow meter to monitor and record the pilot and purge gas flow to the flares. In the event the pilot and/or purge gas flow meter is out of service, the monitoring/recording system shall default to the maximum design flow rate of the pilot and/or purge gas system(s).

10. The owner/operator shall monitor the flares at all times for presence of a pilot flame using a thermocouple that will alarm the owner or operator in the event of a flame out. In the event of a pilot flame out, the owner/operator shall re-ignite the pilot immediately.
11. The owner/operator shall notify the Executive Officer within one hour of any unplanned flare event with emissions exceeding either 100 pounds of VOC or 500 pounds of sulfur dioxide, or exceeding 500,000 standard cubic feet of flared vent gas. The owner/operator shall also notify the Executive Officer by telephone at least 24 hours prior to the start of a planned flare event with emissions exceeding either 100 pounds of VOC or 500 pounds of sulfur dioxide, or 500,000 standard cubic feet of combusted vent gas.
12. The owner/operator shall conduct a Specific Cause Analysis for any flare event, excluding planned shutdown, planned startup and turnaround, resulting in any of the followings: (a) 100 pounds of VOC emissions. (b) 500 pounds of sulfur dioxide emissions. (c) 500,000 standard cubic feet of vent gas combusted. The analysis shall identify the cause and duration of the flare event and describe any mitigation and corrective action taken to prevent recurrence of a similar flare event in the future. Unless an extension is granted, the owner/operator shall submit Specific Cause Analysis to the Executive Officer within 30 days of the event.
13. The owner/operator shall conduct an analysis and determine the relative cause for a flare event that results in combustion of more than 5,000 standard cubic feet of vent gas. A Specific Cause Analysis may be submitted to satisfy this condition.
14. For the purpose of Rule 1118(d)(1), flare emissions from this facility and Tesoro LAR (ID 800436) shall be considered as flare emissions from a single petroleum refinery.
15. The owner/operator shall maintain records in a manner approved by the Executive Officer for the following.
 - a. Flare event data collected pursuant to paragraph (g)(3), (g)(4), (g)(5), (g)(6) and subparagraph (g)(8)(C) of Rule 1118 as applicable.
 - b. Total daily and quarterly emissions of criteria pollutant from each flare and each flare event along with all information specified by Rule 1118(i)(5)(B).
 - c. Pilot flame failure report.
 - d. Planned and unplanned flare monitoring system downtime reports that include date, time and explanation for taking the system out of service and date, time the system returned to normal operations.
 - e. Information to substantiate any exemptions taken under Rule 1118(k).
 - f. Specific Cause Analysis completed pursuant to Condition No. 12.
 - g. Relative Cause Analysis completed pursuant to Condition No. 13.
 - h. Annual acoustical pressure relief device leak survey.
 - i. Combined annual sulfur dioxide emissions for all flares at Tesoro SRP (ID 151798) and Tesoro LAR (ID 800363) normalized over the combined crude oil processing capacity in calendar year 2004 pursuant to Condition No. 14.
 - j. Video records pursuant to Rule 1118(g)(7).

Within 30 days after the end of each calendar quarter, the owner/operator shall submit a quarterly report to the AQMD Refinery Compliance Team to the below address. Items (a) through (g) shall be submitted quarterly in electronic format. Hard copy of item (h) shall be submitted with the quarterly report for the quarter which the survey was conducted. Hard

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copy of item (i) shall be submitted with the last quarterly report for the year. Item (j) shall be made available to the Executive Officer upon request.

All records required by this condition shall be certified for accuracy in writing by the responsible facility official and maintained for at least five years.

SOUTH COAST AIR QUALITY MGMT DISTRICT

REFINERY COMPLIANCE

1500 WEST CARSON STREET, SUITE 115

LONG BEACH, CA 90810