

 SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING & COMPLIANCE DIVISION	APPL. NO.	DATE	PAGE
	549151, 555297	7/31/14	1 of 6
APPLICATION PROCESSING AND CALCULATIONS	PROCESSED BY	CHECKED BY	
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RULE 1118 FLARE MINIMIZATION PLAN

SUMMARY

A flare minimization plan was submitted by the combined Phillips 66 Wilmington and Carson facilities for approval as a result of their exceeding their performance target (<0.5 tons sulfur dioxide emissions per million barrels of crude processing capacity) for calendar year 2012. This flare minimization plan is required by Rule 1118(d)(3)(A), and must contain the information specified in Rule 1118(e)(1)-(4).

COMPANY INFORMATION

Company Name: Phillips 66 Company, Los Angeles Refinery
 Facility IDs: 171107 (Wilmington) and 171109 (Carson)
 Mailing Address: 1660 West Anaheim Street, Wilmington, CA 90744
 Equipment Location(s): 1660 West Anaheim Street, Wilmington, CA 90744 and
 1520 East Sepulveda Blvd, Carson, CA 90745
 Contact Person: Chip Stewart (310) 522-8039

BACKGROUND

The November 4, 2005 amendments to Rule 1118 include increasingly stringent performance targets for SO₂ emissions from flares. Between 2006 and 2012, these targets decreased from 1.5 to 0.5 tons/MMbbl crude capacity. Based on 2012 reported emissions, the combined facility had excess emissions more than 20% of the performance target. The consequences of failing to meet the applicable performance target include the requirement to submit a Flare Minimization Plan and the payment of a mitigation fee.

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.

Phillips 66 Company, Los Angeles Refinery is a petroleum refinery that includes operations at two separate facilities: the Wilmington Plant and the Carson Plant. At the Carson Plant, crude oil is separated into LPG, kerosene, diesel, naphtha, and gas oil. A portion of the gas oil is hydrotreated to remove sulfur and other impurities. The intermediate products (naphtha and treated/untreated gas oil) are then sent to the Wilmington Plant via pipeline for further refining including conversion, treating and blending to produce finished products such as gasoline, diesel, jet fuel and cutter stock which are sold to the general public and industry as transportation fuels. The Rule 1118 performance target is based on crude processing capacity, but only the Carson

 SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING & COMPLIANCE DIVISION	APPL. NO. 549151, 555297	DATE 7/31/14	PAGE 2 of 6
	PROCESSED BY J. West	CHECKED BY	
APPLICATION PROCESSING AND CALCULATIONS			

Plant processes crude oil. As a result, Rule 1118 treats all portions of the petroleum refining operation, including those at non-contiguous locations, as a single petroleum refinery. Thus, the Rule 1118 performance target for sulfur dioxide emissions is shared between the two facilities.

Phillips 66 Company operates central vapor recovery systems at each facility as well as a total of 6 flares as follows:

- The Wilmington plant has three general service flares and one clean service flare. The three Wilmington general service flares are designated as follows: North Flare (C706), Unicracker (UK) Flare (C748), and South Flare (C723). These three flares are all connected to the common vapor recovery system and are staged such that only one flare is operating at a time unless that flare's capacity is exceeded and additional flares are then brought online. The common vapor recovery system includes three vapor recovery compressors; two in the South area, and one in the North area. The LPG (clean service) Flare (C736) operates independently and does not have a vapor recovery system.
- The Carson plant has two general service flares: East Flare (C465) and West Flare (C469). These two flares are connected to a common vapor recovery system. The common vapor recovery system includes two vapor recovery compressors.

Phillips 66 Company's Rule 1118 performance targets and reported emissions for years 2006 to 2012 are listed in Table 1.

Table 1. Phillips 66's Flare SO₂ Emissions Targets and Emissions
(per Rule 1118 Implementation Guidance Document)

Calendar Year	Annual Performance Target (tons per million bbls crude processing capacity*)	Annual Refinery Performance Target (tons/year SO ₂)	Annual Reported SO ₂ Flare Emissions (tons/yr) by plant		Total Phillips 66 Annual Reported SO ₂ Flare Emissions (tons/yr)
			Wilmington Plant	Carson Plant	
2006	1.5	76.3	13.8	14.68	28.48
2007	1.5	76.3	1.17	67.23	68.40
2008	1.0	50.9	4.64	31.44	36.08
2009	1.0	50.9	4.56	10.28	14.84
2010	0.7	35.6	6.98	2.11	9.09
2011	0.7	35.6	4.88	17.41	22.29
2012	0.5	25.4	26.68	4.58	31.26

*Phillips 66's (as ConocoPhillips) 2004 crude processing capacity was 50,874,000 barrels

As noted in Table 1, Phillips 66 exceeded its annual SO₂ performance target in calendar year 2012. In accordance with Rule 1118(e)(1), Phillips 66 was required to submit a Flare

 SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING & COMPLIANCE DIVISION	APPL. NO. 549151, 555297	DATE 7/31/14	PAGE 3 of 6
	PROCESSED BY J. West	CHECKED BY	
APPLICATION PROCESSING AND CALCULATIONS			

Minimization Plan no later than 90 days from the end of a calendar year in which the facility exceeded the annual performance target, as well as pay the required mitigation fees. The facility paid the required mitigation fee on March 29, 2013. Since the combined facilities operating as a petroleum refinery under Rule 1118 exceeded the target, a single Flare Minimization Plan was prepared, but two plan applications (one for each facility) were submitted, so that the approved Flare Minimization Plan will be enforceable at both facilities. The Flare Minimization Plan was initially submitted under A/N 549151 on March 29, 2013, and included only information on the Wilmington facility. At the District's request, the Flare Minimization Plan was revised and resubmitted on August 12, 2013 to include information from both facilities. An additional plan application, AN 555297, was also submitted on that date for the Carson facility.

PLAN EVALUATION

The specific focus and 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) list the requirements and the items the refinery shall include in their Flare Minimization Plan. Phillips 66 submitted the Rule 1118 Flare Minimization Plan with all the required information indicated in Table 2.

Table 2. Checklist for Rule 1118 Flare Minimization Plan

Rule 1118 Requirement* [§ 63.1574(f)(2)]	Compliance?		Remarks
	Yes	No	
Submit a Flare Minimization Plan [1118(d)(3)(A)]	√		Phillips 66 submitted Flare Minimization Plan A/N 549151 (for the Wilmington Plant) on 3/29/13 and, upon request, provided updates including Flare Minimization Plan AN 555297 (for the Carson Plant) on 8/12/13.
Pay the District mitigation fees according to the following: (iii) If excess emissions are greater than twenty percent of the petroleum refinery specific performance target, \$100,000 per ton of all sulfur dioxide emission(s) in excess of the applicable performance target [1118(d)(3)(B)]	√		The facility paid the required mitigation fees..

 SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING & COMPLIANCE DIVISION	APPL. NO. 549151, 555297	DATE 7/31/14	PAGE 4 of 6
	PROCESSED BY J. West	CHECKED BY	
APPLICATION PROCESSING AND CALCULATIONS			

Rule 1118 Requirement* [§ 63.1574(f)(2)]	Compliance?		Remarks
Include a complete description and technical specifications for each flare and associated knock-out pots, surge drums, water seals and flare gas recovery systems [1118(e)(1)(A)]	√		Phillips 66 included this information in their plan application.
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. [1118(e)(1)(B)]	√		Diagrams included in plan application. Phillips 66 submitted these drawings in the Appendix to their plan. Phillips 66 has claimed confidential business information (CBI) for these diagrams.
Include refinery policies and procedures to be implemented and any equipment improvements to minimize flaring and flare emissions and comply with the 1118 performance target. [1118(e)(1)(C)]	√		Phillips 66 included descriptions of equipment improvements and revisions of refinery work practices in their plan submittal. See details below.
Describe any flare gas recovery equipment and treatment system(s) to be installed to comply with the 1118 performance target. [1118(e)(1)(D)]	√		Phillips 66 currently operates a flare gas recovery and flare gas treatment system. No additional systems or equipment are planned for installation.

EVENT DESCRIPTIONS & ANALYSIS

The facility identified specific flaring events as the cause of the exceedance of their 2012 Rule 1118 SO₂ emissions performance target. The facility has identified both corrective actions taken in the immediate aftermath of the flare events to reduce their severity and long-term corrective actions intended to prevent such incidents from recurring.

The FMP identified three major startup/shutdown activities as the cause of the bulk of 2012 flare emissions, and the cause for the 2012 exceedance of the annual SO₂ limit. The three turnarounds were the hydrotreater at the Carson Plant in January (contributing 4.6 tons of SO₂ emissions), the hydrogen plant (Unit 118) at Wilmington in July (contributing 6.3 tons), and the hydrocracker (Unit 120) start-up at Wilmington in November (contributing 10.5 tons).

Specific work practices have been identified by the facility to reduce emissions from hydrogen plant (H₂) and hydrotreating turnarounds. Policies have been implemented to include consideration of flare minimization and flare emissions minimization as part of turnaround planning activities. In addition, a major capital improvement was made to the flare gas recovery system at the South end of the Wilmington plant.

 <p style="text-align: center;">SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING & COMPLIANCE DIVISION</p> <p style="text-align: center;">APPLICATION PROCESSING AND CALCULATIONS</p>	<p style="text-align: center;">APPL. NO. 549151, 555297</p>	<p style="text-align: center;">DATE 7/31/14</p>	<p style="text-align: center;">PAGE 5 of 6</p>
	<p style="text-align: center;">PROCESSED BY J. West</p>	<p style="text-align: center;">CHECKED BY</p>	

Upgrades to South Vapor Recovery System

The power source of one of the vapor recovery compressors at the Wilmington plant was upgraded from a natural gas IC engine to an electric motor with belt drive. This change improved compressor reliability and improved the compressor’s ability to handle variable hydrocarbon recovery system load and gas composition variations. The improved compressor performance is anticipated to reduce flaring during startup and shutdown activities such as those associated with turnarounds, potentially reducing annual SO₂ emissions from flares as much as 6.5 tons.

Work Practices to Reduce Flaring During Turnarounds

The facility has adopted a new policy of holding a pre-turnaround planning meeting specifically to discuss minimization of flaring and flaring emissions. As a result of this policy, the facility has developed a compendium of “Turnaround Flaring Mitigation Practices”, which are used to reduce flaring in turnarounds, when planned and controlled depressurization is possible. In addition, specific procedures were developed for the Wilmington Plant’s Unit 118 H2 Plant and the Carson Plant’s Hydrotreating Units (both the HDT, which contributed to the 2012 exceedance and the DHT-3, another hydrotreating unit which benefits from the same flare minimization procedure). These two procedures were used in 2013 and proved beneficial.

Modifications to Wilmington H2 Plant Unit 118 Shutdown Procedure

Although the H2 plant generally sends clean service gas to the flare, the vapor recovery system continually receives potentially sour gases from throughout the refinery. When a flare event occurs, both the clean service streams from the H2 plant and the sour gases from other locations in the refinery may be routed to the flare because there is only one flare gas recovery header for the entire refinery.

As a result of FMP analysis, revisions were made to the shutdown procedures for the Wilmington Plant’s Unit 118 H2 Plant that include purging the flare header with low-sulfur gas (sending it to the vapor recovery system) to minimize the sulfur content of gases in the flare header prior to initiating H2 plant shutdown venting. In addition, the shutdown procedure now includes allowing the H2 plant’s Pressure Swing Adsorption Units (PSAs) to trip automatically; this occurs when the minimum operating pressure is reached. Previously, the PSAs may have been shut down manually before the minimum pressure was reached. The automatic PSA shutdown procedure minimizes the volume of gas that is vented to the flare as well as the duration of the flare event.

Modifications to Carson Hydrotreating Units’ Shutdown Procedures

As a result of FMP analysis, revisions were made to the shutdown procedures for the Carson Plant’s Hydrotreating Units (The HDT and DHT-3 units). The changes to the procedure include maximizing product recycle and replacing feedstock with low-sulfur feed to reduce sulfur content in the unit, slowing the depressurization rate of the unit to a vent rate within the vapor recovery system capacity until the pressure is below 10 psig, venting to the flare through the DEA contactor, which reduces sulfur content, and using steam to purge the reactor as a final

 SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING & COMPLIANCE DIVISION APPLICATION PROCESSING AND CALCULATIONS	APPL. NO. 549151, 555297	DATE 7/31/14	PAGE 6 of 6
	PROCESSED BY J. West	CHECKED BY	

step. These procedural changes will reduce the sulfur content of the vent gas as well as significantly reduce the volume of gas flared and the duration of the flare event.

RECOMMENDATIONS

The Rule 1118 Revised Flare Minimization Plan submitted by Phillips 66 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 proposed mitigation measures taken and planned include no changes to the facility permit. Section I of each facility permit will be revised to reference the facility's submitted Flare Minimization Plan, AN 549151 for the Wilmington Plant, and AN 555297 for the Carson Plant.