

RULE 1118. EMISSIONS FROM REFINERY FLARES

(a) Purpose and Applicability

The purpose of Rule 1118 is to monitor and gather data on refinery and related flaring operations for analysis to determine if there is a need for, or the level of, any controls required to minimize flare emissions. This rule applies to all gas flares used at petroleum refineries, sulfur recovery plants and hydrogen production plants.

(b) Definitions

For the purpose of this rule, the following definitions shall apply:

- (1) CLEAN SERVICE FLARE is a gas flare that is designed and configured by installation to combust only natural gas, hydrogen gas and/or liquefied petroleum gas, or any other gas(es) with a fixed composition and vented from specific equipment which has been determined to be equivalent and approved in writing by the Executive Officer.
- (2) EMERGENCY SERVICE FLARE is a gas flare other than clean service flare that is designed and configured by installation to combust only vent gases as a result of any situation arising from sudden and unforeseeable events beyond the reasonable control of the owner or operator of the gas flare which require immediate corrective action to restore normal and safe operation including emergency process upset condition, equipment malfunction or breakdown, electrical power failure, steam failure, cooling air or water failure, instrument air failure, reflux failure, heat exchanger tube failure, loss of heat, excess heat, fire and explosion.
- (3) FLARE EVENT is any intentional or unintentional release of vent gas to a gas flare. For a flare event that continues for more than 24 hours, each day of venting of gases shall constitute a flare event.
- (4) FLARE MONITORING SYSTEM is the monitoring and recording equipment used for the determination of gas flare operating parameters, including, but not limited to, standard volumetric flow rate, and/or on/off flow indication.

- (5) GAS FLARE is a combustion device used to dispose of combustible gases and a device which is not subject to RECLAIM at a RECLAIM facility. This consists of both ground and elevated flares.
 - (6) GENERAL SERVICE FLARE is a gas flare that is not defined in paragraphs (b)(2) or (b)(3) that is designed and configured by installation to combust vent gases as a result of any situation including, but not limited to, relief of excess operating pressures, tank vapor displacement, start-ups, shutdowns, process unit turnarounds and blowdowns, and scheduled and unscheduled maintenance and clean up.
 - (7) HYDROGEN PRODUCTION PLANT is a facility that produces hydrogen using refinery fuel gas, process gas or natural gas and which supplies hydrogen for petroleum refinery operations.
 - (8) PETROLEUM REFINERY is a facility that processes petroleum, as defined in the Standard Industrial Classification Manual as Industry No. 2911, Petroleum Refining.
 - (9) REPRESENTATIVE SAMPLE is a sample of vent gas collected from the location as approved in the Flare Monitoring and Recording Plan and analyzed utilizing test methods specified in subdivision (g). If sampling of vent gas is exempt due to a catastrophic event as specified in paragraph (h)(1) of this rule or not required due to flare events shorter than 30 minutes, the estimated higher (gross) heating value and total sulfur content shall be considered as a representative sample.
 - (10) RECORDABLE FLARE EVENT is any flare event for a specific flare during which the flow rate of vent gases to that flare exceeds 330 standard cubic feet per minute continuously for a period greater than 15 minutes, or any other flare event, as approved in writing by the Executive Officer.
 - (11) SULFUR RECOVERY PLANT is a facility that recovers sulfur compounds by treating sour water generated by petroleum refineries.
 - (12) VENT GAS is any gas disposed in a gas flare excluding assisting air or steam, flare pilot gas, and any continuous purge gases.
- (c) Flare Monitoring and Recording Plan Requirements
- (1) The owner or operator of a petroleum refinery, sulfur recovery plant or hydrogen production plant which is in operation as of February 13, 1998 shall, on or before May 14, 1998, submit a Flare Monitoring and Recording Plan, complete with an application and appropriate fees, for

each facility to the Executive Officer for approval. This plan shall constitute a plan for the purpose of fees assessed under Rule 306. Each Flare Monitoring and Recording Plan shall contain the information described in paragraph (c)(3) of this rule.

- (2) The owner or operator of a new or an existing non-operating petroleum refinery, sulfur recovery plant or hydrogen production plant starting or restarting operations on or after February 13, 1998 shall:
 - (A) Provide the Executive Officer a written notice of the date of start-up no later than seven (7) days prior to starting or commencing operations.
 - (B) On or before 90 days after the start-up notice, submit a Flare Monitoring and Recording Plan, complete with an application and appropriate fees, to the Executive Officer for approval. This plan shall constitute a plan for the purpose of fees assessed under Rule 306. Each Flare Monitoring and Recording Plan shall contain the information described in paragraph (c)(3) of this rule.
- (3) Each Flare Monitoring and Recording Plan shall include, at a minimum, the following:
 - (A) A facility plot plan showing the location of each gas flare in relation to the general plant layout.
 - (B) Type of flare service, as defined in subdivision (b), and information regarding design capacity, operation and maintenance for each gas flare.
 - (C) The following information regarding pilot and purge gas for each gas flare:
 - (i) Type(s) of gas used;
 - (ii) Actual set operating flow rate in standard cubic feet per minute;
 - (iii) Maximum total sulfur content expected for each type of gas used; and
 - (iv) Average higher (gross) heating value expected for each type of gas used.
 - (D) Drawing(s), preferably to scale with dimensions, and an as built process flow diagram of the gas flare(s) identifying major components, such as flare header, flare stack, flare tip(s) or

burner(s), purge gas system, pilot gas system, ignition system, assist system, water seal, knockout drum and molecular seal.

- (E) A representative flow diagram showing the interconnections of the gas flare system(s) with vapor recovery system(s), process units and other equipment as applicable.
- (F) A complete description of the assist system process control, flame detection system and pilot ignition system.
- (G) A complete description of the gas flaring process for an integrated gas flaring system which describes the method of operation of the gas flares (e.g. sequential, etc.).
- (H) A complete description of the vapor recovery system(s) which have interconnection to a gas flare, such as compressor description(s), design capacities of each compressor and the vapor recovery system, and the method currently used to determine and record the amount of vapors recovered.
- (I) Drawing(s) with dimensions, preferably to scale, showing the following information for proposed vent gas:
 - (i) sampling locations; and,
 - (ii) flow meter device and/or on/off flow indicators locations and the method used to determine the location.
- (J) A detailed description of manufacturer's specifications, including but not limited to, make, model, type, range, precision, accuracy, calibration, maintenance, a quality assurance procedure and any other specifications and information referenced in Attachment A for all existing and proposed flow metering devices or on/off flow indicating devices for vent gas.
- (K) A complete description and the data used to determine and to set the actuating and deactuating and the method to be used for verification of each setting for each on/off flow indicator.
- (L) A complete description of proposed analytical and sampling methods or estimation methods, if applicable, for determining higher (gross) heating value and total sulfur content of the flare vent gas.
- (M) A complete description of the proposed data recording, collection and management and any other specifications and information referenced in Attachment A for each flare monitoring system.

- (N) A complete description of proposed method to determine, monitor and record total volume of gases vented to a flare for each flare event.
- (O) A detailed description of proposed method to calculate criteria pollutant emissions for flares using Attachment B Guidelines for Calculating Flare Emissions and proposed emission factors with supporting data.
- (P) A schedule for the installation and operation of each flare monitoring system.
- (Q) A complete description of the proposed method to alert personnel designated to collect samples that a recordable flare event has started.
- (R) A complete description of any proposed alternative criteria to determine a recordable flare event for each specific flare, if any, and detailed information used for the basis of establishing such criteria.
- (S) A request to use the alternative sampling program pursuant to subparagraph (d)(4)(C), if applicable, with a complete description of proposed Quality Assurance/Quality Control procedures to be used in a test program to determine the correlation between the results from the alternative sampling program and the testing and monitoring methods specified in subdivision (g).
- (T) A complete description of the method to determine emissions associated with recordable events during periods when the flare monitoring system is out of service pursuant to subparagraph (d)(5)(A).

(d) **Operation Monitoring and Recording Requirements**

The owner or operator of a gas flare subject to this rule shall comply with the following:

- (1) On or before six (6) months after approval of the Flare Monitoring and Recording Plan, or other date as specified by the Executive Officer, start monitoring and recording in accordance with subdivision (d) and, where the plan is approved, in accordance with the Flare Monitoring and Recording Plan.

- (2) Notwithstanding the provisions in Rule 430 - Breakdown Provisions and Rule 2004 - Requirements, the Operation Monitoring and Recording Requirements of this rule shall be applicable during all periods including breakdowns except as specified in subparagraph (d)(5)(A).
- (3) Perform monitoring and recording of the operating parameters, as applicable, according to the monitoring and recording requirements and frequency shown in Table 1 (including footnotes) below except as specified in paragraphs (d)(4) and (d)(5).

TABLE 1

TYPE OF FLARE	OPERATING PARAMETER	MONITORING AND RECORDING
Clean Service	Gas Flow ¹	Measured and Recorded ² Continuously with Flow Meter(s) and/or On/Off Flow Indicator(s)
	Gas Heat Content ³	Calculated or Representative Sample for Each Flare Event ⁴
	Total Sulfur Content	Calculated or Representative Sample for Each Flare Event ⁴
Emergency Service	Gas Flow ¹	Measured and Recorded ² Continuously with Flow Meter(s) and/or On/Off Flow Indicator(s)
	Gas Heat Content ³	Representative Sample for Each Recordable Flare Event ⁴
	Total Sulfur Content	Representative Sample for Each Recordable Flare Event ⁴
General Service	Gas Flow ¹	Measured and Recorded ² Continuously with Flow Meter(s) with or without on/off flow indicator(s)
	Gas Heat Content ³	Representative Sample for Each Recordable Flare Event ⁴
	Total Sulfur Content	Representative Sample for Each Recordable Flare Event ⁴

- 1. Standard Cubic Feet Per Minute.
- 2. All flow meters, flow indicators and recorders shall meet or exceed the minimum specifications in Attachment A.
- 3. Higher (Gross) Heating Value in British Thermal Units per Standard Cubic Foot.
- 4. Sample shall be taken within 30 minutes of the start of each flare event. If the flare event is over in less than 30 minutes, estimation may be used instead of a representative sample.

- (4) Flare Vent Gas Sampling
- (A) In cases where sampling of vent gas is not performed pursuant to paragraph (h)(1), the owner or operator of a gas flare shall identify for each flare event, the cause of event, the process system(s) involved, date and time event started and duration and any other information related to the type of vent gas (e.g. total sulfur content, heat content) which is necessary to calculate flare emissions.
 - (B) The owner or operator of a gas flare may comply with the vent gas sampling requirements of paragraph (d)(3) based on alternative criteria for determining a recordable flare event for each specific flare, provided that such alternative criteria are submitted as part of the Flare Monitoring and Recording Plan in subparagraph (c)(3)(R), and are approved in writing by the Executive Officer.
 - (C) During the initial six months interim period of monitoring and recording or other interim period not to exceed nine months from the start of monitoring and recording, as approved in writing by the Executive Officer, an alternative sampling program for recordable flare events for each gas flare may be used provided the following requirements are met:
 - (i) A request to use an alternative sampling program has been submitted by the flare owner or operator as part of the Flare Monitoring and Recording Plan pursuant to subparagraph (c)(3)(S).
 - (ii) The vent gas(es) to each flare shall be sampled and analyzed for total sulfur and higher (gross) heating value in accordance with methods specified in subdivision (g), once a week. If there is a recordable flare event in any week, the sampling and analysis shall be conducted during such event.
 - (iii) The vent gas(es) to each flare shall be sampled and analyzed in accordance with Table 1, once a week during a recordable flare event other than the flare event specified in clause (d)(4)(C)(ii), if such a recordable event occurs during that week.

- (iv) The vent gas(es) to each flare shall be sampled and analyzed in accordance with Table 1 for all recordable flare events that are the result of any process unit shutdowns.
 - (v) The vent gas(es) to each flare shall be sampled and analyzed for all other recordable flare events to measure hydrogen sulfide concentrations in the vent gas using a colorimetric method or other methods as specified in the Flare Monitoring and Recording Plan pursuant to subparagraph (c)(3)(S) and as approved in writing by the Executive Officer.
- (D) After the initial six months period of monitoring and recording, the owner or operator of a gas flare may, based on the monitoring data, request a change in the vent gas sampling requirement of paragraph (d)(3) and/or propose an alternative criteria for determining a recordable flare event for each specific flare, provided that the owner or operator of the gas flare submits an application for the modification to the Flare Monitoring and Recording Plan and can demonstrate, and obtain written approval of the Executive Officer that an alternative vent gas sampling and/or an alternative criteria for determining a recordable flare event for each specific flare is adequate to determine the quality of vent gas(es) and to calculate emissions from all such flare events.
- (E) After the initial six months period of monitoring and recording, the Executive Officer may revise any alternative criteria for determining a recordable event for each specific flare or any alternative vent gas sampling which have been previously proposed by the owner or operator of a gas flare and approved by the Executive Officer, if the Executive Officer determines that the alternative(s) is not adequate based on the monitoring data or other information to determine the quality of vent gas(es) and to calculate emissions from all such flare events. The owner or operator of the gas flare shall use the revised criteria for determining a recordable event or vent gas sampling to monitor and record flare events no later than 30 days after written notification by the Executive Officer.

(5) Flare Monitoring System

(A) Any continuous flare monitoring system, used to ensure compliance with paragraph (d)(3) of this rule, shall be maintained in good operating condition at all times when the gas flare that it serves is operational, except when out of service due to:

- (i) Breakdowns and unplanned system maintenance, which shall not exceed 48 hours, cumulatively, per quarter for each reporting period; or,
- (ii) Planned maintenance, which shall not exceed 14 days, per 18 month period commencing the start of flare monitoring and recording, provided that a written notification detailing the reason for maintenance and methods that will be used during the maintenance period to determine emissions associated with recordable flare events is provided to the Executive Officer prior to, or within 24 hours of, removal of the continuous monitoring system from service.

(B) A flare monitoring system may be used to measure and record the operating parameters required in paragraph (d)(3) of this rule for more than one gas flare provided that:

- (i) All the gases being measured and recorded are delivered to the flare(s) for combustion; and,
- (ii) If the flare monitoring system is used to measure and record the operating parameters for emergency service flares, as well as general service flares, the flare monitoring system shall consist of a continuous vent gas flow meter and recorder that meets the requirements specified in Attachment A.

(e) Recordkeeping Requirements

The owner or operator of a gas flare shall maintain records in a manner approved by the Executive Officer for all the information required to be monitored under paragraphs (d)(3), (d)(4) and (d)(5) of this rule, as applicable, for a period of two (2) years and make such records available to the Executive Officer upon request.

(f) Reporting Requirements

The owner or operator of a gas flare shall submit a quarterly report to the Executive Officer on or before 30 days after the end of each quarter. Each quarterly report shall include the following:

- (1) The information required to be monitored under paragraphs (d)(3), (d)(4) and (d)(5) of this rule.
- (2) The daily and quarterly emissions of criteria pollutants from each flare along with all information used to calculate each flare's emissions, such as volumes, heating values, and sulfur contents of the representative samples of vent gases, etc.
- (3) A complete description of the assumptions used to determine the heating value and sulfur content for each representative sample that is estimated as allowed by the rule or when a representative sample is not available.
- (4) Flare monitoring system downtime periods, including dates and times and explanation for each period.
- (5) A copy of written notices for all reportable air releases related to any flare event, as required by 40 CFR, Part 302 - Designation, Reportable Quantities, and Notification and 40 CFR, Part 355 - Emergency Planning and Notification, if applicable.

(g) Testing and Monitoring Methods

(1) For the purpose of this rule, the test methods listed below shall be used. Alternative test methods may be used if it is determined to be equivalent and approved in writing by the Executive Officer, and, if applicable by the California Air Resources Board, and the U.S. Environmental Protection Agency.

- (A) The higher (gross) heating value of vent gases shall be determined by ASTM Method D 2382-88, ASTM Method D 3588-91 or ASTM Method D 4891-89.
 - (B) The total sulfur content shall be determined by District Method 307-91 or ASTM Method D 5504-94.
 - (C) The gas flow shall be determined by a flow measuring device that meets or exceeds the specifications described in Attachment A, as applicable.
- (2) Analysis for higher (gross) heating value and total sulfur content shall be:
- (A) Conducted by a District approved lab; or,

- (B) Conducted by the owner or operator of a gas flare if the District has provided prior written approval of QA/QC and standard operating procedures. All analytical reports shall be signed by the facility official responsible for analytical equipment to certify the accuracy of the reports.
 - (3) Notwithstanding paragraphs (g)(1) and (g)(2), continuous monitoring systems certified under Rule 2011 - Requirements for Monitoring, Reporting and Recordkeeping of Oxides of Sulfur (SO_x) Emissions and Rule 2012 - Requirements for Monitoring, Reporting and Recordkeeping of Oxides of Nitrogen (NO_x) Emissions may be used for the monitoring of vent gases.
- (h) Exemptions
- Sampling and analyses of representative samples for heating values and sulfur contents pursuant to paragraph (d)(3) may not be required for any flare event that:
- (1) is a result of a catastrophic event including a major fire or an explosion at the facility, or
 - (2) constitutes a safety hazard to the sampling personnel at the sampling location approved in the Flare Monitoring and Recording Plan during the entire flare event, provided that a sample is collected at an alternative location where it is safe. The owner or operator shall demonstrate to the Executive Officer that the sample collected at an alternative location is representative of the flare event.

ATTACHMENT A

FLARE MONITORING SYSTEM REQUIREMENTS

The components of each flare monitoring system must meet or exceed the minimum specifications listed below. Components with other specifications may be used provided the owner or operator of a gas flare can demonstrate that the specifications are equivalent and has been approved by the Executive Officer.

1. Continuous Flow Measuring Device

The volumetric flow measuring device may consist of one or more flow meters, and, as combined, shall meet the following specifications.

Velocity Range:	1-250 ft/sec
Repeatability:	$\pm 1\%$ of reading within a flow velocity of 1-100 ft/s
Accuracy:	$\pm 5\%$ of reading over flow range of 1-250 ft/s
Installation:	Applicable AGA, ANSI, API, or equivalent standard; hot tap capability
Flow Rate Determination:	Applicable AGA, ANSI, API, or equivalent standard

The volumetric gas flow rate, corrected to 1 atmosphere pressure and 68 °F, must be determined and recorded on a continuous basis.

2. On/Off Flow Indicator

The on/off flow indicator is a device which is used to demonstrate the flow of vent gas during a flare event, and shall meet or exceed specifications as approved by the Executive Officer. The on/off flow indicator setting shall be verifiable.

3. Data Recording System

All data as generated by the above flow meters and the on/off flow indicators must be continuously recorded by strip chart recorders or computers.

The strip chart must have a minimum chart width of 10 inches, a readability of 0.5% of the span, and a minimum of 100 chart divisions. The computer must have the capability to generate one-minute average data from that which is continuously generated by the flow meters and the on/off limit switch.

ATTACHMENT B

GUIDELINES FOR CALCULATING FLARE EMISSIONS

The following methods shall be used to calculate flare emissions. An alternative method may be used, provided it has been approved as equivalent in writing by the Executive Officer.

1. Pilot and Purge Gas

Use the following parameters to calculate emissions:

- a) Type of gas used
- b) Actual set operating flow rate
- c) Maximum expected total sulfur content
- d) Average higher (gross) heating value
- e) Appropriate emission factors for type of gas used

2. Vent Gas

Use the higher (gross) heating value, total sulfur content as calculated or determined from the representative sample, approved emission factors and the appropriate method to determine the flow rate as follows.

Single On/Off Flow Indicator Switch

The flow rate setting of the on/off flow indicator switch if the switch is not actuated or the maximum design capacity of the flare for the flow rate for each flare event.

Multiple On/Off Flow Indicator Switch

- a) The flow rate setting of the first stage on/off flow indicator switch if the switch is not actuated.
- b) When an on/off switch is actuated assume the flow rate is the flow rate that would actuate the on/off switch set at the next highest flow rate.
- c) Use the maximum design capacity of the flare for the flow rate when the on/off switch set for the highest flow rate is actuated.

Flow Meters Only

- a) Use the recorded flow meter data until the maximum range is exceeded.
- b) When the maximum range of the flow meter is exceeded, assume the flow rate is the maximum design capacity of the flare.
- c) When the flow rate is below the valid lower range of the flow meter, assume the flow rate is at the lower range.

Combination of Flow Meters and On/Off Flow Indicator Switches

- a) Use the recorded flow meter data until the maximum range is exceeded.
- b) When the maximum range of the flow meter is exceeded, assume the flow rate is the flow rate that would actuate the on/off switch set at the next highest flow rate.
- c) Use the maximum design capacity of the flare for the flow rate when the on/off switch set for the highest flow rate is actuated.
- d) When the flow rate is below the valid lower range of the flow meter, assume the flow rate is at the lower range.
- e) When the flow rate is below the valid lower range of the flow meter and the set flow rate of an on/off switch, assume the flow rate is the flow rate that would actuate the on/off switch.