

Section 29 - Leaks from Petroleum Refinery Equipment.

11/29/94

a. Applicability.

1. This Section applies to all equipment in volatile organic compound (VOC) service in any process unit at a petroleum refinery, regardless of size or throughput.
2. The requirements of paragraphs (d) through (h) of this Section do not apply to:
 - i. Any equipment in vacuum service.
 - ii. Any pressure relief valve that is connected to an operating flare header or vapor recovery device.
 - iii. Any liquid pump that has a dual mechanical pump seal with a barrier fluid system.
 - iv. Any compressor with a degassing vent that is routed to an operating VOC control device.
 - v. Pumps and valves in heavy liquid service except that if evidence of a leak is found by visual, audible, olfactory, or other detection method, the owner or operator shall confirm the presence of a leak using the methods specified in **Appendix "F"** of this regulation. If a leak is confirmed, the owner or operator shall repair the leak as specified in paragraph (g) of this Section.

- b. Definitions. As used in this Section, all terms not defined herein shall have the meaning given them in the November 15, 1990 Clean Air Act Amendments (CAAA), or in Section 2 of this regulation.

"[In] gas/vapor service" means that the piece of equipment in VOC service contains process fluid that is in the gaseous state at operating conditions.

"[In] heavy liquid service" means that the piece of equipment in VOC service is not in gas/vapor service or not in light liquid service.

"[In] light liquid service" means that the piece of equipment in VOC service either (1) contains a liquid that meets all of the conditions in definition A; or (2) meets the condition specified in definition B:

Definition A--(1) the vapor pressure of one or more of the components is greater than 0.3 kiloPascals (kPa) (0.044 inches of mercury [in. Hg]) at 20°C (68°F). Standard reference tests or ASTM D-2879 shall be used to determine the vapor pressures; (2) the total concentration of the pure components having a vapor pressure greater than 0.3 kPa (0.044 in. Hg) at 20°C (68°F) is equal to or greater than 20 percent by weight; and (3) the fluid is a liquid at operating conditions.

Definition B--Equipment is "in light liquid service" if the weight percent evaporated is greater than 10 percent at 150°C as determined by ASTM D86.

"[In] vacuum service" means that the equipment in VOC service is operating at an internal pressure that is at least 5 kPa (0.73 in. Hg) below ambient pressure.

"[In] VOC service" means that the piece of equipment contains or contacts a process fluid that is at least 10 percent VOC by weight. The provisions of paragraph (i)(2) of this Section specify how to determine that a piece of equipment is not in VOC service.

"Process unit" means components assembled to produce intermediate or final products from petroleum, unfinished petroleum derivatives, or other intermediates; a process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the product.

- c. Standards: General. The owner or operator of a petroleum refinery complex subject to this Section shall ensure that:
1. Any open-ended line or valve is sealed with a second valve, blind flange, cap, or plug except during operations requiring process fluid flow through the open-ended line or valve.
 2. When a second valve is used, each open-ended line or valve equipped with a second valve is operated in such a manner that the valve on the process fluid end is closed before the second valve is closed.
 3. When a double block-and-bleed system is used, the bleed valve or line is open only during operations that require venting of the line between the block valves and is closed at all other times.
- d. Standards: Equipment inspection program. The owner or operator of a petroleum refinery shall conduct the equipment inspection program described in paragraphs (d)(1) through (d)(3) of this Section using the test methods specified in **Appendix "F"** of this regulation.
1. The owner or operator of a petroleum refinery shall conduct quarterly

monitoring of each:

- i. Compressor.
 - ii. Pump in light liquid service.
 - iii. Valve in light liquid service, except as provided in paragraphs (e) and (f) of this Section.
 - iv. Valve in gas/vapor service, except as provided in paragraphs (e) and (f) of this Section.
 - v. Pressure relief valve in gas/vapor service, except as provided in paragraphs (e) and (f) of this Section.
2. The owner or operator of a petroleum refinery shall conduct a weekly visual inspection of each pump in light liquid service.
 3. The owner or operator of a petroleum refinery shall monitor each pressure relief valve after each overpressure relief to ensure that the valve has properly reseated and is not leaking.
 4. When an instrument reading of 10,000 parts per million (ppm) or greater is measured, it shall be determined that a leak has been detected.
 5. If there are indications of liquid dripping from the equipment, it shall be determined that a leak has been detected.
 6. When a leak is detected, the owner or operator shall affix a weatherproof, readily visible tag in a bright color bearing the equipment identification number and the date on which the leak was detected. This tag shall remain in place until the leaking equipment is repaired. The requirements of this paragraph apply to any leak detected by the equipment inspection program and to any leak from any equipment that is detected on the basis of sight, sound, or smell.
- e. Standards: Alternative standards for valves:
- Skip period leak detection and repair.
 1. An owner or operator shall comply initially with the requirements for valves in gas/vapor service and valves in light liquid service, as described in paragraph (d) of this Section.
 2. After two consecutive quarterly leak detection periods with the percent of

valves leaking equal to or less than 2.0, an owner or operator may begin to skip one of the quarterly leak detection periods for the valves in gas/vapor and light liquid service.

3. After five consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0, an owner or operator may begin to skip 3 of the quarterly leak detection periods for the valves in gas/vapor and light liquid.
4. If the percent of valves leaking is greater than 2.0, the owner or operator shall comply with the requirements as described in paragraph (d) of this Section but can again elect to use the requirements in paragraph (e) of this Section.
5. The percent of valves leaking shall be determined by dividing the sum of valves found leaking during current monitoring and valves for which repair has been delayed by the total number of valves subject to the requirements of this Section.
6. An owner or operator shall keep a record of the percent of valves found leaking during each leak detection period.

f. Standards: Alternative standards for unsafe-to-monitor valves and difficult-to-monitor valves.

1. Any valve that is designated, as described in paragraph (j)(5)(i) of this Section, as an unsafe-to-monitor valve is exempt from the requirements of paragraph (d) if:
 - i. The owner or operator of the valve demonstrates that the valve is unsafe to monitor because monitoring personnel would be exposed to an immediate danger as a consequence of complying with paragraph (d).
 - ii. The owner or operator of the valve adheres to a written plan that requires monitoring of the valve as frequently as practicable during safe-to-monitor times.
2. Any valve that is designated, as described in paragraph (j)(5)(i), as a difficult-to-monitor valve is exempt from the requirements of paragraph (d) if:
 - i. The owner or operator of the valve demonstrates that the valve cannot be monitored without elevating the monitoring personnel more than 2 meters (m) (6.6 feet [ft]) above a support surface.

- ii. The owner or operator of the valve follows a written plan that requires monitoring of the valve at least once per calendar year.

g. Standards: Equipment repair program. The owner or operator of a petroleum refinery shall:

1. Make a first attempt at repair for any leak not later than 5 calendar days after the leak is detected.
2. Repair any leak as soon as practicable, but not later than 15 calendar days after it is detected except as provided in paragraph (h) of this Section.

h. Standards: Delay of repair.

1. Delay of repair of equipment for which a leak has been detected is allowed if the repair is technically infeasible without a process unit shutdown. Repair of such equipment shall occur before the end of the next process unit shutdown.
2. Delay of repair of equipment is allowed for equipment that is isolated from the process and that does not remain in VOC service.
3. Delay of repair beyond a process unit shutdown is allowed for a valve, if valve assembly replacement is necessary during the process unit shutdown, valve assembly supplies have been depleted, and valve assembly supplies had been sufficiently stocked before the supplies were depleted. Delay of repair beyond the next process unit shutdown is not allowed unless the next process unit shutdown occurs sooner than 6 months after the first process unit shutdown.

i. Test methods and procedures.

1. In conducting the tests required to comply with paragraph (d) of this Section, the owner or operator shall use the test methods specified in **Appendix "F"** of this regulation.
2. The owner or operator shall test each piece of equipment as required under paragraph (d) of this Section unless it is demonstrated that a process unit is not in VOC service, i.e., that the VOC content would never be reasonably expected to exceed 10 percent by weight. For purposes of this demonstration, the following methods and procedures shall be used:
 - i. Procedures that conform to the general methods in ASTM E260, E168, and E169 shall be used to determine the percent VOC content in the process fluid that is contained in or contacts a piece of equipment.

- ii. Where the test methods in paragraph (i)(2)(i) also measure exempt compounds, these compounds may be excluded from the total quantity of organic compounds in determining the VOC content of the process fluid.
 - iii. Engineering judgment may be used to estimate the VOC content, if a piece of equipment had not been shown previously to be in VOC service. If the Department disagrees with the judgment, paragraphs (i)(2)(i) and (i)(2)(ii) of this Section shall be used to resolve the disagreement.
 - 3. The owner or operator shall demonstrate that a piece of equipment is in light liquid service by showing one of the following:
 - i. All of the following conditions apply:
 - A. The vapor pressure of one or more of the components is greater than 0.3 kPa at 20°C (0.044 in. Hg at 68°F); standard reference texts or ASTM D2879 shall be used to determine the vapor pressures.
 - B. The total concentration of the pure components having a vapor pressure greater than 0.3 kPa at 20°C (0.044 in. Hg at 68°F) is equal to or greater than 20 percent by weight.
 - C. The fluid is a liquid at operating conditions.
 - ii. The percent VOC evaporated is greater than 10 percent at 150°C (302°F) as determined by ASTM D86.
 - 4. Samples used in conjunction with paragraphs (i)(2) and (i)(3) of this Section shall be representative of the process fluid that is contained in or contacts the equipment.
- j. Recordkeeping requirements.
- 1. Each owner or operator subject to the provisions of this Section shall comply with the recordkeeping requirements of this Section. Except as noted, these records shall be maintained in a readily accessible location for a minimum of 5 years and shall be made available to the Department immediately upon verbal or written request.

2. An owner or operator of more than one affected facility subject to the provisions of this Section may comply with the recordkeeping requirements for these facilities in one recordkeeping system if the system identifies each record by each facility.
3. When each leak is detected as specified in paragraph (d) of this Section, the following information shall be recorded in a log and shall be kept for 5 years in a readily accessible location:
 - i. The instrument and operator identification numbers and the equipment identification number.
 - ii. The date the leak was detected and the dates of each attempt to repair the leak.
 - iii. The repair methods employed in each attempt to repair the leak.
 - iv. The notation "Above 10,000" if the maximum instrument reading measured by the methods specified in **Appendix "F"** of this regulation after each repair attempt is equal to or greater than 10,000 ppm.
 - v. The notation "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.
 - vi. The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without a process shutdown.
 - vii. The expected date of successful repair of the leak if a leak is not repaired within 15 calendar days.
 - viii. The dates of process unit shutdowns that occur while the equipment is unrepaired.
 - ix. The date of successful repair of the leak.
4. A list of identification numbers of equipment in vacuum service shall be recorded in a log that is kept in a readily accessible location.
5. The following information pertaining to all valves subject to the requirements of

paragraph (f) of this Section shall be recorded in a log that is kept for 5 years in a readily accessible location:

- i. A list of identification numbers for valves that are designated as unsafe to monitor, an explanation for each valve stating why the valve is unsafe to monitor, and the plan for monitoring each valve.
- ii. A list of identification numbers for valves that are designated as difficult to monitor, an explanation for each valve stating why the valve is difficult to monitor, and the schedule for monitoring each valve.

6. The following information for valves complying with paragraph (e) of this Section shall be recorded in a log that is kept for 5 years in a readily accessible location:

- i. A schedule of monitoring.
- ii. The percent of valves found leaking during each monitoring period as noted in paragraph (e)(6) of this Section.

7. Information and data used to demonstrate that a piece of equipment is not in VOC service shall be recorded in a log that is kept for 5 years in a readily accessible location for use in determining exemptions as provided in paragraph (a) of this Section.

k. Reporting. The owner or operator of any facility containing sources subject to this Section shall comply with the requirements in Section 5 of this regulation.