

SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT

RULE 4403 COMPONENTS SERVING LIGHT CRUDE OIL OR GASES AT LIGHT CRUDE OIL AND GAS PRODUCTION FACILITIES AND COMPONENTS AT NATURAL GAS PROCESSING FACILITIES

(Adopted April 11, 1991); (Amended September 19, 1991; December 17, 1992; February 16, 1995; April 20, 2005)

1.0 Purpose

The purpose of this rule is to limit VOC emissions from components at light crude oil and natural gas facilities. The rule requires that all components be inspected in accordance with an operator management plan defined in this rule. Recordkeeping procedures, test methods, and tagging and repair requirements are specified.

2.0 Applicability

This rule shall apply to components serving light crude oil or gases at light crude oil and gas production facilities and components at natural gas processing facilities. The provisions of this rule shall expire on April 20, 2006.

3.0 Definitions

3.1 General

- 3.1.1 Background: a reading on a portable hydrocarbon detection instrument which is determined at least three (3) meters upwind from any component to be inspected and which is uninfluenced by any specific emission point.
- 3.1.2 Commercial Natural Gas: a mixture of gaseous hydrocarbons, chiefly methane and less than ten (10) percent by weight VOC, as determined according to test methods specified in Section 6.3.1, obtained from, or of such quality as that obtained from a company licensed to dispense such gas.
- 3.1.3 Component: any valve, pressure relief valve, flange, threaded connection, hatch, seal, packing, sealing mechanism, sight glass, meter, pump, compressor, or seal fluid system.
- 3.1.4 Component Type: any of the following groups: valves, pressure relief valves, flanges, threaded connections, hatches, sealing mechanisms, sight glasses, meters, pumps, compressors, or seal fluid systems.
- 3.1.5 Critical Process Unit: any process unit which would result in the automatic shutdown of other process units if it were shut down.

- 3.1.6 Essential Part: any component which cannot be taken out of service without reducing by more than 33 percent the throughput of the process unit which it serves.
- 3.1.7 Inaccessible: a location that is over 15 feet above ground when access is required from the ground; or a location that is over six (6) feet away from a platform when access is required from the platform.
- 3.1.8 Inspection: a survey of components to detect leaks using the test method in Section 6.3.4. Inspection is either of the following:
- 3.1.8.1 Operator Inspection: a survey of the components by the operator for the purpose of determining compliance with this rule; or
- 3.1.8.2 District Inspection: a survey of components by District personnel or their representatives.
- 3.1.9 Leak Minimization: reducing the leak to the lowest achievable level using best modern practices and without shutdown of the process which the component serves.
- 3.1.10 Turnaround: the scheduled shutdown of a unit for maintenance and repair work.
- 3.1.11 Statistically Representative Sample: the minimum number of components of a type to be inspected as determined by the following formula:
- $$S = N / \{1 + 0.0026 \times (N - 1)\}$$
- Where: S = sample size
N = total number of components of that type in the facility
- 3.1.12 Vacuum: operating under a negative pressure.
- 3.1.13 Volatile Organic Compound (VOC): defined in Rule 1020 (Definitions).

3.2 For Light Crude Oil and Gas Production Facilities:

3.2.1 Leak: any of the following:

3.2.1.1 the dripping at a rate of more than three (3) drops per minute of liquid containing VOCs; or

3.2.1.2 a reading as methane in excess of 20,000 ppm above background when measured at a distance of one (1) centimeter from the potential source in accordance with the test method in Section 6.3.4.

3.2.2 Light Crude Oil and Gas Production Facility: a facility at which light crude oil and natural gas production and handling are conducted, as defined in the Standard Industrial Classification Manual as Industry No. 1311 (Crude Petroleum and Natural Gas).

3.2.3 Light Crude Oil: crude oil with an API gravity equal to or greater than 30°, as determined by ASTM Method D-1298-85, and a TVP greater than 1.5 psia.

3.2.4 Notice to Repair: a written notice to an operator of a leak identified by the District.

3.3 For Natural Gas Processing Facilities:

3.3.1 Leak: any of the following:

3.3.1.1 the dripping at a rate of more than three (3) drops per minute of liquid containing VOCs; or

3.3.1.2 a reading as methane in excess of 10,000 ppm above background when measured at a distance of one (1) centimeter from the potential source in accordance with the test method in Section 6.3.4.

3.3.2 Natural Gas Processing Facility: a facility engaged in the separation of natural gas liquids from field gas and/or fractionating of natural gas liquids to natural gas products, such as ethane, propane, butane, and natural gasoline. Excluded from the definition are compressor stations, dehydration units, sweetening units, field treatment, underground storage facilities, liquefied natural gas units, and field gas gathering systems unless these facilities are located at a natural gas processing facility.

4.0 Exemptions

4.1 For Light Crude Oil and Gas Production Facilities:

- 4.1.1 The requirements of this rule shall not apply to components handling only commercial natural gas.
- 4.1.2 The requirements of this rule shall not apply to any component exclusively handling heavy liquid streams which have less than ten (10) percent by weight evaporation at 150°C as determined by ASTM Method D-86-78 and provided the operator so identifies such components in a written heavy liquid stream inspection list.
- 4.1.3 The requirements of this rule shall not apply to components handling liquids, after initial oil/water separation, provided the liquid has a water content of 90 percent or greater by volume.
- 4.1.4 The requirements of this rule shall not apply to components subject to the requirements of Rule 4623 (Storage of Organic Liquids) or Rule 4401 (Steam Enhanced Crude Oil Production Well Vents).
- 4.1.5 The requirements of Section 5.1 shall not apply to threaded connections provided that the operator performs an inspection of each threaded connection after assembly in accordance with the test method in Section 6.3.4 to establish such connections do not leak under operating conditions, and provided such connections are visually inspected at least quarterly and no leakage is detected. This procedure shall also apply to threaded connections in service prior to the adoption of this rule.
- 4.1.6 The requirements of this rule shall not apply to components handling streams with a VOC content (excluding ethane if the ethane stream being handled is less than 20 percent by volume) less than ten (10) percent by weight, as determined by the test methods in Section 6.3.1, provided such components are so identified in the operator management plan.

4.2 For Natural Gas Processing Facilities:

- 4.2.1 The requirements of Section 5.2.9 shall not apply to components which are an essential part of a critical process unit which cannot be immediately shutdown for repair of leaks provided such components are so identified in the operator management plan, and provided the requirements of Section 5.3.1.1, 6.2, and 6.4 are met. This exemption shall not apply to essential parts which can be repaired without shutdown of a critical process.

- 4.2.2 The requirements of this rule shall not apply to components operating under a vacuum.
- 4.2.3 Except for the requirements of Sections 5.2.7, 5.2.8, 5.2.9, 5.3, 6.2 and 6.4, the requirements of this rule shall not apply to components handling streams with a VOC (excluding ethane if the ethane content of the stream being handled is less than 20 percent by volume) content less than one (1) percent by weight, as determined in accordance with the test methods in Section 6.3.1, provided such components are so identified in the operator management plan.
- 4.2.4 The requirements of Section 5.2 shall not apply to flanges and threaded connections provided that the operator inspects each flange and threaded connection after assembly in accordance with the test method in Section 6.3.4 to establish such connections do not have leaks under operating conditions, and provided such connections are visually inspected at least quarterly and no leakage is detected. This procedure shall also apply to flanges and threaded connections in service prior to the adoption of this rule.
- 4.2.5 Except for the requirements of Section 5.2.7, 5.2.8, 5.2.9, 5.3, 6.2 and 6.4, the requirements of this rule shall not apply to any component exclusively handling heavy liquid streams which have less than ten (10) percent by weight evaporation at 150°C as determined by ASTM Method D-86-78 and provided the operator so identifies such components as outlined in Section 6.1.
- 4.2.6 The requirements of this rule shall not apply to components handling only commercial natural gas.

5.0 Requirements

5.1 For Light Crude Oil and Gas Production Facilities:

- 5.1.1 Each hatch shall be closed at all times except during sampling or attended maintenance operations.
- 5.1.2 All components containing VOCs shall be inspected by the facility operator annually to ensure compliance with the provisions of this rule. The inspections shall be conducted in accordance with the test method in Section 6.3.4. However, if two (2) percent or more of the components of any type subject to the requirements of this rule are found to leak during an annual inspection, the inspection frequency for that component type shall be changed from annual to quarterly. If less than two (2) percent of all of the components of that type subject to the prohibitions of this rule are subsequently found to be leaking during five (5) consecutive quarterly

inspections, the inspection frequency for that component type may be changed from quarterly to annual.

- 5.1.3 Components that are located in inaccessible locations or in areas which cause inspection to be unsafe for personnel shall be identified in the operator management plan approved by the APCO as described in Section 6.1 of this rule. Components located in unsafe areas shall be inspected and repaired at the next process unit turnaround and inaccessible components shall be inspected at least annually.
- 5.1.4 A facility operator, upon detection of a leaking component, shall affix to that component a weatherproof readily visible tag bearing the date on which the leak is detected. The tag shall remain in place until the leaking component is repaired, reinspected and found to be in compliance with the requirements of this rule.
- 5.1.5 An operator shall reinspect a component for leaks within thirty working days after the date on which the component is repaired.
- 5.1.6 Emissions from components which have been tagged by the facility operator for repair within 15 calendar days or which have been repaired and are awaiting re-inspection pursuant to Section 5.3 shall not be in violation per Section 5.1.2.
- 5.1.7 A facility operator shall be in violation of Section 5.1 of this rule when the number of leaks of a component type exceeds one (1) component, or two (2) percent of the total number of components of that type that were inspected, whichever is greater, and that are subject to the requirements of this rule. For inspections conducted by District personnel to determine compliance with the rule, the number of components inspected shall constitute a statistically representative sample for each component type.

5.2 For Natural Gas Processing Facilities:

- 5.2.1 Each hatch shall be closed at all times except during sampling or attended maintenance operations.
- 5.2.2 Each open-ended line shall be sealed with two (2) valves, blind flange, cap or plug except when open end is in use.
- 5.2.3 All components, excluding flanges and threaded connections, handling VOCs shall be inspected at least quarterly to detect any leaks. All flanges and threaded connections handling VOCs shall be inspected at least annually to detect any leaks. If less than two (2) percent of any component type subject to the prohibitions of this rule, except for pressure relief valves,

pumps, and compressors, are found to leak during each of five (5) consecutive quarterly inspections, the inspection frequency for that component type may be changed from quarterly to annual. If any annual inspection shows that two (2) percent or more of all of a specific component type subject to the prohibitions of this rule are leaking, then quarterly inspections of that component type shall be resumed.

- 5.2.4 Components that are located in inaccessible locations or in areas unsafe for personnel shall be inspected and repaired at least annually and during shutdown, and such components shall be identified in the operator management plan approved by the APCO as described in Section 6.10 of this rule.
- 5.2.5 All pumps shall be visually inspected at least weekly to detect any liquid leaks.
- 5.2.6 Each pressure relief valve shall be inspected in accordance with the test method in Section 6.3.4 within one (1) working day after venting to atmosphere.
- 5.2.7 Any leaking component shall be identified by the operator affixing a weatherproof, readily visible tag bearing the date on which the leak is detected. The tag shall remain in place until repair and re-inspection documents compliance with the requirements of this rule.
- 5.2.8 Any leak detected on the basis of sight, smell, or sound shall be identified by the operator affixing a weatherproof readily visible tag bearing the date on which the leak is detected and the tag shall remain in place until repair and reinspection documents compliance whether or not operator inspection is otherwise required by this rule.
- 5.2.9 Any leaking component and any leak shall be repaired to a leak-free condition and reinspected within 15 calendar days.
- 5.2.10 A facility operator shall be in violation of this rule when the number of leaks of a component type exceeds one component, or two (2) percent of the total number of components of that type that were inspected, whichever is greater, and that are subject to the requirements of this rule. For inspections conducted by District personnel to determine compliance with the rule, the number of components inspected shall constitute a statistically representative sample for each component type.

5.3 Repair of Components

5.3.1 Any component leak shall be repaired to a leak-free condition or vented to a flare satisfying the requirements of 40 CFR 60.18 or to a vapor control device that is at least 95 percent efficient as measured by EPA Method 25 within fifteen (15) calendar days of detection. The APCO may grant a ten (10) calendar day extension provided the operator demonstrates that necessary and sufficient actions are being taken to correct the leak within this time period.

5.3.1.1 If the leaking component is an essential part of a critical process identified in the operator management plan and which cannot be immediately shut down for repairs, the operator shall:

5.3.1.1.1 minimize the leak within 15 calendar days, and

5.3.1.1.2 if the leak which has been minimized still exceeds the limits in Section 3.2.1 or 3.3.1, as applicable, the essential component shall be repaired to eliminate the leak during the next process unit turnaround, but in no case later than one year from the date of the original leak detection.

5.3.2 Any component leak identified by a Notice to Repair issued by the District shall be repaired and re-inspected as specified in Sections 5.1.4, 5.1.5, 5.2.7, 5.2.8 and 5.2.9, as appropriate.

6.0 Administrative Requirements

6.1 Operator Management Plans

6.1.1 Each operator shall submit a management plan to the APCO. The management plan shall describe how the operator will comply with the requirements of this rule.

The management plan must include:

6.1.1.1 a description of any hazard which might affect the safety of an inspector;

6.1.1.2 identification of process units which cannot be immediately shutdown for repair of leaks;

6.1.1.3 a heavy liquid stream inspection exemption list identifying process components exclusively handling heavy liquids.

- 6.1.1.4 specific identification of the resource commitment to a program to implement, inspect, and repair components;
 - 6.1.1.5 a detailed schedule of quarterly inspections to be conducted in accordance with the test method in Section 6.3.4, including identification of components for which an exemption in accordance with Section 4.0 of this rule is requested; and
 - 6.1.1.6 repair procedures, to be used within 15 calendar days following leak detection, which result in compliance with the requirements of this rule.
- 6.1.2 The operator of a new facility or a facility to be modified shall submit a new or modified operator management plan to the APCO with the application for Authority to Construct.
- 6.1.3 Each management plan shall:
- 6.1.3.1 specify a qualified contractor or establish an employee training program by the date of adoption; and
 - 6.1.3.2 provide leak detection training (using the test method in Section 6.3.4) for new operators, and for experienced operators as necessary.
- 6.1.4 Changes to the management plan must be submitted to the APCO before implementation.
- 6.2 Recordkeeping
- 6.2.1 Each operator shall maintain an inspection log containing, at a minimum, the following:
- 6.2.1.1 name, location, type of components, and description of any unit where leaking components are found;
 - 6.2.1.2 date of leak detection, emission level (ppm) of leak, and method of detection;
 - 6.2.1.3 date and emission level of recheck after leak is repaired;
 - 6.2.1.4 total number of components inspected, and total number and percentage of leaking components found;

6.2.1.5 Identification and location of essential parts of critical process units found leaking that cannot be repaired until the next process unit turnaround; and .

6.2.1.6 method used to minimize the leak from essential parts of critical process units which cannot be repaired until the next process unit turnaround.

6.2.2 Copies of the inspection log shall be retained by the operator for a minimum of two (2) years after the date of an entry.

6.2.3 Copies of the inspection log shall be made available upon request to District personnel.

6.3 Test Methods

6.3.1 Analysis of Samples: Samples shall be analyzed by using ASTM Methods E-260-73, E-168-67, or E-169-63, and halogenated exempt compounds shall be analyzed by ARB Method 432.

6.3.2 Determination of Emissions: Emissions of VOC shall be measured by EPA Method 25, 25a, or 25b, as applicable, and analysis of halogenated exempt compounds shall be analyzed by ARB Method 422.

6.3.3 The True Vapor Pressure (TVP) of organic liquids, including light crude and petroleum distillates, shall be determined by measuring the Reid Vapor Pressure using ASTM Method No. D-323-82 and converting the result to TVP at maximum liquid storage temperature. The conversion of RVP to TVP shall be done by using the nomographs in AP-42, Chapter 12.3, Figure 12.3-1A (True vapor pressure of crude oils with a Reid vapor pressure of 2 to 15 pounds per square inch) and Figure 12.3-2A (true vapor pressure of refined petroleum stocks with a Reid vapor pressure of 1 to 20 pounds per square inch). If the nomograph scales do not encompass the necessary quantities necessary for its use, the conversion of RVP to TVP shall be done by using the conversion equations in AP-42, Chapter 12.3, Figure 12.3-1B (Equation for true vapor pressure of crude oils with a Reid vapor pressure of 2 to 15 pounds per square inch) and Figure 12.3-2B (Equation for true vapor pressure of refined petroleum stocks with a Reid vapor pressure of 1 to 20 pounds per square inch). Organic liquids listed in Table 1 shall be deemed to be in compliance with the appropriate vapor pressure limits for the material, provided actual storage temperature does not exceed the corresponding maximum temperature listed.

6.3.4 Leak detection shall be performed in accordance with EPA Method 21, with the instrument calibrated with methane.

6.3.5 API gravity of crude oil shall be determined by using ASTM D-1298-85.

6.4 Exempt Components

A facility operator claiming an exemption from the provisions of this rule, as specified in Section 4.0, shall provide to the APCO, upon request, information and supporting test data consistent with the appropriate requirements of the rule to demonstrate that a component is exempt from any portion of the rule.

6.5 Violations

The failure of a person to meet any requirements of this rule shall constitute a violation of this rule.

7.0 Compliance

By August 16, 1995, be in full compliance with the February 16, 1995 amendments to the rule. All other provisions of this rule shall remain in effect until April 19, 2006.

Table 1
STORAGE TEMPERATURE VERSUS VAPOR PRESSURE

ORGANIC LIQUID	Reference Properties		Maximum Temp °F Not to Exceed	
	Gravity °API	Initial Boiling Point (°F)	0.5 (psia)	1.5 (psia)
Middle Distillates				
Kerosene	42.5	350	195	250
Diesel	36.4	372	230	290
Gas Oil	26.2	390	249	310
Stove Oil	23	421	275	340
Jet Fuels				
JP-1	43.1	330	165	230
JP-3	54.7	110	---	25
JP-4	51.5	150	20	68
JP-5	39.6	355	205	260
JP-7	44-50	360	205	260
Fuel Oil				
No. 1	42.5	350	195	250
No. 2	36.4	372	230	290
No. 3	26.2	390	249	310
No. 4	23	421	275	340
No. 5	19.9	560	380	465
Residual	19.27	---	405	---
No. 6	16.2	625	450	---
Asphalts				
60-100 pen.	---	---	490	550
120-150 pen.	---	---	450	500
200-300 pen.	---	---	360	420