

Legal Disclaimer & User's Notice

Unofficial electronic version of the Oil and Gas Methane Regulation

Unofficial Electronic Version

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Official Legal Edition

The official legal edition of title 17, CCR, sections 95665-95677 and appendices A-G is available at the OAL website: <http://oal.ca.gov/publications/ccr/>

→ "Title 17. Public Health"

→ "Division 3. Air Resources"

→ "Chapter 1. Air Resources Board"

→ "Subchapter 10. Climate Change"

→ "Article 4. Regulations to Achieve Greenhouse Gas Emission Reductions"

→ "Subarticle 13. Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities"

Subarticle 13: Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities

§ 95665. Purpose and Scope.

The purpose of this subarticle is to establish greenhouse gas emission standards for crude oil and natural gas facilities in sectors identified in section 95666. This subarticle is designed to serve the purposes of the California Global Warming Solutions Act, AB 32, as codified in sections 38500-38599 of the Health and Safety Code.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95666. Applicability.

- (a) This subarticle applies to owners or operators of equipment and components associated with facilities located within California, including California waters, in the sectors listed below, regardless of emissions level or well status:
- (1) Onshore and offshore crude oil or natural gas production;
 - (2) Crude oil, condensate, and produced water separation and storage;
 - (3) Natural gas underground storage;
 - (4) Natural gas gathering and boosting stations;
 - (5) Natural gas processing plants; and
 - (6) Natural gas transmission compressor stations.
- (b) Owners and operators shall ensure that their facilities, equipment, and components comply at all times with all requirements of this subarticle, including all of the standards and requirements identified in section 95668. Owners and operators are jointly and severally liable for compliance with this subarticle.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95667. Definitions.

- (a) For the purposes of this subarticle, the following definitions apply:
- (1) "Air district or local air district" means the local Air Quality Management District or the local Air Pollution Control District.
 - (2) "API gravity" means a scale used to reflect the specific gravity (SG) of a fluid such as crude oil, condensate, produced water, or natural gas. The API gravity is calculated as $[(141.5/SG) - 131.5]$, where SG is the specific gravity of the fluid at 60°F, and where API refers to the American Petroleum Institute.
 - (3) "Blowout" means the uncontrolled flow of gas, liquids, or solids (or a mixture thereof) from a well to the surface.
 - (4) "California waters" means any surface or groundwater, including saline waters, within the territorial boundaries of the state. California's territorial boundaries extend three nautical miles beyond the outermost islands, reefs, and rocks, and include all waters between the islands and the coast.
 - (5) "CARB" means the California Air Resources Board.
 - (6) "Centrifugal compressor" means equipment that increases the pressure of natural gas by centrifugal action through an impeller. Screw, sliding vane, and liquid ring compressors are not centrifugal compressors for the purpose of this subarticle.
 - (7) "Centrifugal compressor seal" means a wet or dry seal around the compressor shaft where the shaft exits the compressor case.
 - (8) "Circulation tank" means a tank or portable tank used to circulate, store, or hold liquids or solids from a crude oil or natural gas well during or following a well stimulation treatment but prior to the well being put into production.
 - (9) "Commercial quality natural gas" means a mixture of gaseous hydrocarbons with at least 80 percent methane by volume and less than 10 percent by weight volatile organic compounds and meets the criteria specified in Public Utilities Commission General Order 58-A (November 10, 2016), which is incorporated herein by reference.

- (10) "Component" means a valve, fitting, flange, threaded-connection, process drain, stuffing box, pressure-vacuum valve, pressure-relief device, pipes, seal fluid system, diaphragm, hatch, sight-glass, meter, open-ended line, well casing, natural gas powered pneumatic controller, natural gas powered pneumatic pump, or reciprocating compressor rod packing or seal for compressors located at onshore or offshore crude oil or natural gas production facilities.
- (11) "Condensate" means hydrocarbon or other liquid, excluding steam, either produced or separated from crude oil or natural gas during production and which condenses due to changes in pressure or temperature.
- (12) "Continuous bleed" means the continuous venting of natural gas from a gas powered pneumatic controller to the atmosphere. Continuous bleed pneumatic controllers are those that vent continuously in order to operate.
- (13) "Critical component" means any component that would require the shutdown of a critical process unit if that component was shutdown or disabled.
- (14) "Critical process unit" means a process unit or group of components that must remain in service because of its importance to the overall process that requires it to continue to operate, and has no equivalent equipment to replace it or cannot be bypassed, and it is technically infeasible to repair leaks from that process unit without shutting it down and opening the process unit to the atmosphere.
- (15) "Crude oil" means a mixture of hydrocarbons that exists in liquid or semi-solid phase in natural underground reservoirs and remains liquid or semi-solid at atmospheric pressure after passing through surface separating facilities.
- (16) "Crude oil and produced water separation and storage" means all activities associated with separating, storing or holding of emulsion, crude oil, condensate, or produced water at facilities to which this subarticle applies.
- (17) "Direct measurement" means a flow rate measurement performed using one of the following methods:
 - (A) High-volume sampling performed in accordance with Appendix G;
or

- (B) Measurement with a calibrated flow measuring instrument that meets the requirements in US EPA Method 2D (40 CFR Part 60, Appendix A-1, January 14, 2019, which is incorporated herein by reference) and is calibrated on an annual basis according to the requirements in US EPA Method 2D (40 CFR Part 60, Appendix A-1, January 14, 2019).
- (18) "Emissions" means the discharge of natural gas into the atmosphere.
- (19) "Emulsion" means any mixture of crude oil, condensate, or produced water with varying quantities of natural gas entrained in the liquids.
- (20) "Equipment" means any stationary or portable machinery, object, or contrivance covered by this subarticle, as set out by sections 95666 and 95668.
- (21) "Facility" means any building, structure, or installation to which this subarticle applies and which has the potential to emit natural gas. Facilities include all buildings, structures, or installations which:
 - (A) Are under the same ownership or operation, or which are owned or operated by entities which are under common control;
 - (B) Belong to the same industrial grouping either by virtue of falling within the same two-digit standard industrial classification code or by virtue of being part of a common industrial process, manufacturing process, or connected process involving a common raw material; and
 - (C) Are located on one or more contiguous or adjacent properties.
- (22) "First attempt at repair" means actions to attempt to repair a leak that do not require the disconnection of the component, replacement of parts, or the use of a specialized crew or equipment (e.g., tightening, lubrication, or adjustment).
- (23) "Fitting" means a component, excluding flanges and threaded connectors, used to attach or connect pipes or piping systems. Examples of "fittings" include quick-disconnect fittings, push-in fittings, and cam-locks.
- (24) "Flash or flashing" means a process during which gas dissolved in crude oil, condensate, or produced water under pressure is released when the liquids are subject to a decrease in pressure, such as when the liquids are transferred from an underground reservoir to the earth's surface or from a pressure vessel to an atmospheric tank.

- (25) "Flash analysis testing" means the determination of emissions from crude oil, condensate, and produced water by using sampling and laboratory procedures used for measuring the volume and composition of gases released from the liquids, including the molecular weight, the weight percent of individual compounds, and a gas-oil or gas-water ratio.
- (26) "Fuel gas system" means, for the purposes of this subarticle, any system that supplies natural gas as a fuel source to on-site natural gas powered equipment other than a vapor control device.
- (27) "Gas blanket system" means a gas phase maintained above a liquid in a tank where the tank is maintained under a positive pressure.
- (28) "Gas disposal well" means, for the purpose of this subarticle, any well that is used for the subsurface injection of natural gas for disposal.
- (29) "Gauge tank" means a tank found upstream of a separator and tank system which is used for measuring the amount of liquid produced by an oil well and receives or stores crude oil, condensate, or produced water.
- (30) "Idle well" means any well that for a period of 24 consecutive months has not either produced oil or natural gas, produced water to be used in production stimulation, or been used for enhanced oil recovery, reservoir pressure management, or injection. An idle well does not include an active observation well. An idle well continues to be an idle well until one of the following occurs:
 - (A) The well has been properly abandoned in accordance with Public Resources Code Section 3208; or
 - (B) Since the well became an idle well, the well has for a continuous six-month period either maintained production of oil or natural gas, maintained production of water used in production stimulation, or been used for enhanced oil recovery, reservoir pressure management, or injection.
- (31) "Inaccessible component" means any component located over fifteen feet above ground when access is required from the ground; or any component located over six (6) feet away from a platform or a permanent support surface when access is required from the platform.

- (32) "Intermittent bleed" means the intermittent venting of natural gas from a gas powered pneumatic controller to the atmosphere. Intermittent bleed pneumatic controllers may vent all or a portion of their supply gas when control action is necessary but do not vent continuously.
- (33) "Leak or fugitive leak" means the unintentional release of emissions at a rate greater than or equal to the leak thresholds specified in this subarticle.
- (34) "Leak detection and repair or LDAR" means the inspection of components to detect leaks of total hydrocarbons and the repair of components with leaks above the standards specified in this subarticle and within the timeframes specified in this subarticle.
- (35) "Liquids unloading" means an activity conducted with the use of pressurized natural gas to remove liquids that accumulate at the bottom of a natural gas well and obstruct gas flow.
- (36) "Natural gas" means a naturally occurring mixture or process derivative of hydrocarbon and non-hydrocarbon gases. Its constituents include the greenhouse gases methane and carbon dioxide, as well as heavier hydrocarbons. Natural gas may be field quality (which varies widely) or pipeline quality.
- (37) "Natural gas gathering and boosting station" means all equipment and components located within a facility fence line associated with collecting natural gas from multiple wells and moving it toward a natural gas processing plant, transmission pipeline, or distribution pipeline.
- (38) "Natural gas processing plant" means a plant used for the separation of natural gas liquids (NGLs) or non-methane gases from produced natural gas, or the separation of NGLs into one or more component mixtures.
- (39) "Natural gas transmission compressor station" means all equipment and components located within a facility fence line associated with moving natural gas from production fields or natural gas processing plants through natural gas transmission pipelines, or within natural gas underground storage fields.
- (40) "Natural gas transmission pipeline" means a state rate-regulated Intrastate pipeline, or a pipeline that falls under the "Hinshaw Exemption" as referenced in section 1(c) of the Natural Gas Act, 15 U.S.C. sections 717-717z.

- (41) "Natural gas underground storage" means all equipment and components associated with the temporary subsurface storage of natural gas in depleted crude oil or natural gas reservoirs or salt dome caverns. Natural gas storage does not include gas disposal wells.
- (42) "Non-associated gas" means natural gas that is not produced as a byproduct of crude oil production but may or may not be produced with condensate.
- (43) "Offshore" means all marine waters located within the boundaries of the State of California.
- (44) "Onshore" means all lands located within the boundaries of the State of California.
- (45) "Operator" means any entity, including an owner or contractor, having operational control of components or equipment, including leased, contracted, or rented components and equipment to which this subarticle applies.
- (46) "Optical gas imaging" means an instrument that makes emissions visible that may otherwise be invisible to the naked eye.
- (47) "Owner" means the entity that owns or operates components or equipment to which this subarticle applies.
- (48) "Photo-ionization detector or PID instrument" means a gas detection device that utilizes ultra-violet light to ionize gas molecules and is commonly employed in the detection of non-methane volatile organic compounds.
- (49) "Pneumatic controller" means an instrument used to maintain a process condition such as liquid level, pressure, pressure differential, and temperature.
- (50) "Pneumatic pump" means a device that uses natural gas or compressed air to power a piston or diaphragm in order to circulate or pump liquids.
- (51) "Pond" means an excavation that is used for the routine storage or disposal of produced water and which is not used for crude oil separation or processing.

- (52) "Portable equipment" means equipment designed for, and capable of, being carried or moved from one location to another and which it resides for less than 365 days. Portability indicators include the presence of wheels, skids, carrying handles, dolly, trailer, or platform.
- (53) "Portable pressurized separator" means a pressure vessel that can be moved from one location to another by attachment to a motor vehicle without having to be dismantled and is capable of separating and sampling crude oil, condensate, or produced water at the temperature and pressure of the separator required for sampling.
- (54) "Portable tank" means a tank that can be moved from one location to another by attachment to a motor vehicle without having to be dismantled.
- (55) "Pressure separator" means a pressure vessel used for the primary purpose of separating crude oil and produced water or for separating natural gas and produced water.
- (56) "Pressure vessel" means any hollow container used to hold gas or liquid and rated, as indicated by an ASME pressure rating stamp, and operated to contain normal working pressures of at least 15 psig without continuous vapor loss to the atmosphere.
- (57) "Production" means all activities associated with the production or recovery of emulsion, crude oil, condensate, produced water, or natural gas at facilities to which this subarticle applies.
- (58) "Produced water" means water recovered from an underground reservoir as a result of crude oil, condensate, or natural gas production and which may be recycled, disposed, or re-injected into an underground reservoir.
- (59) "Reciprocating natural gas compressor" means equipment that increases the pressure of natural gas by positive displacement of a piston in a compression cylinder and is powered by an internal combustion engine or electric motor with a horsepower rating supplied by the manufacturer.
- (60) "Reciprocating natural gas compressor rod packing" means a seal comprising of a series of flexible rings in machined metal cups that fit around the reciprocating compressor piston rod to create a seal limiting the amount of compressed natural gas that vents into the atmosphere.

- (61) "Reciprocating natural gas compressor seal" means any device or mechanism used to limit the amount of natural gas that vents from a compression cylinder into the atmosphere.
- (62) "Remote monitoring data" means, for the purposes of this subarticle, data obtained by CARB from a satellite-based measurement technology capable of detecting methane plumes.
- (63) "Sales gas system" means, for the purposes of this subarticle, any system that collects and transfers natural gas to be used off-site.
- (64) "Separator" means any tank or pressure separator used for the primary purpose of separating crude oil, produced water, and natural gas or for separating natural gas, condensate, and produced water. In crude oil production a separator may be referred to as a Wash Tank or as a three-phase separator.
- (65) "Separator and tank system" means the first separator in a crude oil or natural gas production system and any tank or sump connected directly to the first separator.
- (66) "Standard conditions" means a temperature of 60°F and a pressure of 14.696 psia for the purposes of calculating emissions in standard cubic feet.
- (67) "Successful repair" means tightening, adjusting, or replacing equipment or a component for the purpose of stopping or reducing fugitive leaks below the minimum leak threshold or emission flow rate standard specified in this subarticle. A repair shall be deemed "successful" once it is shown, via remeasurement using the applicable technique, as specified in this subarticle, for the equipment or component, that the leak in question has been stopped or reduced below the minimum leak threshold or emission flow rate as specified in this subarticle.
- (68) "Sump" means a lined or unlined surface impoundment or excavated depression in the ground which, during normal operations, is used to separate, store, or hold emulsion, crude oil, condensate, or produced water.
- (69) "Tank" means any container constructed primarily of non-earthen materials used for the purpose of storing, holding, or separating emulsion, crude oil, condensate, or produced water and that is designed to operate below 15 psig normal operating pressure.

- (70) "Unsafe to Monitor Components" means components installed at locations that would prevent the safe inspection or repair of components as defined by U.S. Occupational Safety and Health Administration (OSHA) standards or in provisions for worker safety found in 29 CFR Part 1910.
- (71) "Vapor collection system" means equipment and components installed on pressure vessels, separators, tanks, or sumps including piping, connections, and flow-inducing devices used to collect and route emission vapors to a processing, sales gas, or fuel gas system; to a gas disposal well; or to a vapor control device.
- (72) "Vapor control device" means destructive or non-destructive equipment used to control emissions.
- (73) "Vapor control efficiency" means the ability of a vapor control device to control emissions, expressed as a percentage, which can be determined by following the requirements in Appendix F.
- (74) "Vent or venting" means the intentional or automatic release of natural gas into the atmosphere from components, equipment, or activities described in this subarticle.
- (75) "Well" means a boring in the earth for the purpose of the following:
 - (A) Exploring for or producing oil or gas.
 - (B) Injecting fluids or gas for stimulating oil or gas recovery.
 - (C) Re-pressuring or pressure maintenance of oil or gas reservoirs.
 - (D) Disposing of oil field waste gas or liquids.
 - (E) Injection or withdraw of gas from an underground storage facility.

For the purpose of this subarticle, wells do not include active observation wells as defined in Public Resources Code Section 3008 subdivision (c), or wells that have been properly abandoned in accordance with Public Resources Code Section 3208.

- (76) "Wellhead" means the piping, casing, tubing and connected valves protruding above the earth's surface for an oil or natural gas well. The wellhead ends where the flow line connects to a wellhead valve. The wellhead does not include other equipment at the well site except for any conveyance through which gas is vented to the atmosphere.

- (77) "Well casing vent" means an opening on a well head that blocks or allows natural gas to flow to the atmosphere or to a vapor collection system.
- (78) "Well stimulation treatment" means the treatment of a well designed to enhance crude oil and natural gas production or recovery by increasing the permeability of the formation and as further defined by the Geologic Energy Management Division (CalGEM) SB 4 Well Stimulation Treatment Regulations, Title 14, Division 2, Chapter 4, Subchapter 2, Article 2, section 1761(a) (June 16, 2017), which is incorporated herein by reference.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95668. Standards.

The following standards apply at all times to facilities in sectors listed in section 95666. The availability of an exemption for any particular component or facility, or compliance with one of the standards, does not exempt the owner or operator of a facility from complying with other standards or requirements in other sections of this subarticle.

(a) *Separator and Tank Systems*

- (1) Except as provided in section 95668(a)(2), the following requirements apply to separator and tank systems located at facilities in sectors listed in section 95666.
- (2) The requirements of section 95668(a) do not apply to the following, provided that an owner or operator maintains, and makes available upon request by the CARB Executive Officer, records necessary to verify compliance with the following provisions:
 - (A) Separator and tank systems that receive an average of less than 50 barrels of crude oil and condensate per day. The average daily production shall be determined using the annual production certified reports submitted to the California Department of Conservation Geologic Energy Management Division (CalGEM) and dividing by 365 days per year.
 - (B) Separator and tank systems used in non-associated gas production that receive an average of less than 200 barrels of produced water per day. The average daily production shall be determined using the annual production certified reports submitted to CalGEM and dividing by 365 days per year.
 - (C) Separator and tank systems that are controlled with either the use of a floating roof that meets the requirements of 40 CFR 60.112b(a)(1) or (2) (October 8, 1997, which is incorporated herein by reference) or the use of a vapor collection system subject to a local air district rule. If the separator and tank system is controlled with the use of a floating roof or vapor collection system and is located in a region classified as non-attainment with any federal ambient air quality standard for ozone, the separator and tank system shall be subject to one of the following local air district rules for the exemption to apply:
 1. San Joaquin Valley Air Pollution Control District Rule 4623: Storage of Organic Liquids (Amended June 15, 2023).

2. South Coast Air Quality Management District Rule 463: Organic Liquid Storage (Amended May 5, 2023).
 3. South Coast Air Quality Management District Rule 1178: Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities (Amended September 1, 2023).
 4. Ventura County Air Pollution Control District Rule 71.1: Crude Oil Production and Separation (Amended July 11, 2023).
- (D) Separator and tank systems that are controlled using a gas blanket system to protect tanks from corrosion.
 - (E) Separators, tanks, and sumps that have contained crude oil, condensate, or produced water for 45 calendar days or fewer per calendar year provided that the owner or operator maintains, and can make available at the request of the CARB Executive Officer, a record of the number of days per year in which the separators, tanks, or sumps have contained liquid.
 - (F) Tanks used for temporarily separating, storing, or holding liquids from any newly constructed well for up to 90 calendar days following initial production from that well.
 - (G) Tanks used for temporarily separating, storing, or holding liquids from wells undergoing rework or inspection for up to 90 calendar days.
 - (H) Tanks that recover an average of less than 10 gallons per day of any petroleum waste product from equipment provided that the owner or operator maintains, and can make available at the request of the CARB Executive Officer, a record of the amount of liquid recovered. The average daily recovery shall be determined by using annual recovery and dividing by 365 days.
 - (I) Gauge tanks with a capacity of less than or equal to 100 barrels.
- (3) Owners or operators of separator and tank systems that are not controlled for emissions with either the use of a vapor collection system as specified in section 95671, or the use of a floating roof that meets the requirements of 40 CFR 60.112b(a)(1) or (2) (October 8, 1997), shall conduct annual flash analysis testing of the crude oil, condensate, or produced water processed, stored, or held in the system.

- (A) For new separator and tank systems, the first annual flash analysis testing shall occur within 90 days of initial system startup.
- (B) If the results of three consecutive years of test results show that the system has an annual emission rate of less than or equal to 10 metric tons per year of methane, the owner or operator may reduce the frequency of testing to once every five years.
 - 1. If the testing frequency is reduced to once every five years, and if the annual crude oil, condensate, or produced water throughput (based on the calendar year as defined in Appendix C) increases by more than 20 percent above the throughput used to calculate annual emissions for the previous flash test, then the annual methane emissions shall be recalculated using the laboratory reports from previous flash analysis testing; and
 - 2. The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a record of the revised flash emission calculation as specified in Appendix A, Table A1 and shall report the results to CARB as specified in section 95673 of this subarticle.
- (4) Flash analysis testing shall be conducted as follows:
 - (A) Testing shall be conducted in accordance with the CARB Test Procedure for Determining Annual Flash Emission Rate of Gaseous Compounds from Crude Oil, Condensate, and Produced Water as described in Appendix C.
 - (B) Testing shall be conducted so that no crude oil, condensate, or produced water is diverted through a gauge tank that is open to the atmosphere and located upstream of the separator and tank system while testing is conducted.
 - (C) Calculate the annual methane emissions for the crude oil, condensate, and produced water using the test results provided by the laboratory.
 - (D) Sum the annual methane emissions for the crude oil, condensate, and produced water.
 - (E) Maintain a record of flash analysis testing as specified in section 95672 and report the results to CARB as specified in section 95673.

- (F) The CARB Executive Officer may request additional flash analysis testing or information in the event that the test results reported do not reflect representative results of similar systems.
 - (G) An owner or operator may perform additional flash analysis testing within a single calendar year and use the average of all results within the calendar year to determine the annual emissions from the separator and tank system, provided that all test reports used in the averaging calculation are maintained and reported as specified in sections 95672 and 95673 of this subarticle.
- (5) Owners or operators of a separator and tank system with an annual emission rate greater than 10 metric tons per year of methane based on flash analysis testing, including emission rate recalculations pursuant to section 95668(a)(3)(B)1., shall control the emissions from the separator and tank system and uncontrolled gauge tanks located upstream of the separator and tank system with the use of a vapor collection system as specified in section 95671 within 180 days of conducting the flash analysis testing or completing the emission rate recalculation that first indicated an emission rate greater than 10 metric tons per year of methane.
- (6) On or after July 1, 2024, if a separator and tank system is required to use a vapor collection system as specified in section 95671 in order to control emissions, the owner or operator of that system shall comply with all applicable requirements in Appendix D. This requirement applies regardless of whether the system was controlled prior to or after July 1, 2024.
- (b) *Circulation Tanks for Well Stimulation Treatments*
- (1) Owners or operators of circulation tanks that conduct well stimulation treatments at facilities in sectors listed in section 95666 shall implement a best practices management plan that is designed to limit methane emissions from circulation tanks, and shall make that plan available upon request by the CARB Executive Officer. Each plan shall contain a list of best practices to address the following issue areas:
 - (A) Inspection practices to minimize emissions from circulation tanks.
 - (B) Practices to minimize venting of emissions from circulation tanks.
 - (C) Practices to minimize the duration of liquid circulation.
 - (D) Alternative practices to control vented and fugitive emissions.

(c) *Reciprocating Natural Gas Compressors*

- (1) Except as provided in section 95668(c)(2), the following requirements apply to reciprocating natural gas compressors located at natural gas gathering and boosting stations, natural gas processing plants, natural gas transmission compressor stations, and natural gas underground storage facilities in sectors listed in section 95666.
- (2) The requirements of section 95668(c) do not apply to the following:
 - (A) Reciprocating natural gas compressors that operate less than 200 hours per calendar year provided that the owner or operator maintains, and makes available upon request by the CARB Executive Officer, a record of the operating hours per calendar year.
- (3) Components on driver engines and compressors shall comply with the leak detection and repair requirements specified in section 95669, except for the rod packing component subject to section 95668(c)(4).
- (4) The compressor rod packing or seal emission flow rate through the rod packing or seal vent stack shall be measured annually by direct measurement while the compressor is running at normal operating temperature using one of the following methods, unless the compressor vent stacks used to vent rod packing or seal emissions are controlled with the use of a vapor collection system as specified in section 95671:
 - (A) Vent stacks shall be equipped with a meter or instrumentation to measure the rod packing or seal emissions flow rate; or
 - (B) Vent stacks shall be equipped with a clearly identified access port installed at a height of no more than six (6) feet above ground level or a permanent support surface for making individual or combined rod packing or seal emission flow rate measurements.
 - (C) If the measurement is not obtained because the compressor is not operating for the scheduled test date and the remainder of the calendar year, then testing shall be conducted within seven (7) calendar days of resumed operation. The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a copy of operating records that document the compressor hours of operation and run dates in order to demonstrate compliance with this requirement.

- (D) If the compressor is equipped with a continuous emission flow rate measurement instrument, the owner or operator shall submit the average emission flow rate from the period of time when the compressor was running at normal operating temperature during the calendar year.
- (5) A compressor with a rod packing or seal with a measured emission flow rate greater than two (2) standard cubic feet per minute (scfm), or a combined rod packing or seal emission flow rate greater than the number of compression cylinders multiplied by two (2) scfm, shall be successfully repaired within 30 calendar days from the date of the initial emission flow rate measurement.
- (A) A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.
 - (B) If the compressor is not able to be successfully repaired to below the allowed emission flow rate, the owner or operator shall take one of the following actions:
 - 1. Replace the rod packing or seal and measure the emission flow rate through the rod packing or seal vent stack by direct measurement while the compressor is running at normal operating temperature to verify that it is below the allowed emission rate. These actions shall occur within 60 days from the date of the initial emission flow rate measurement.
 - 2. Control emissions from the compressor vent stacks used to vent rod packing or seal emissions with the use of a vapor collection system as specified in section 95671. These actions shall occur within 180 days from the date of the initial emission flow rate measurement.
- (6) The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a record of the flow rate measurement as specified in Appendix A, Table A7 and shall report the result to CARB once per calendar year as specified in section 95673 of this subarticle.

(d) *Centrifugal Natural Gas Compressors*

- (1) Except as provided in section 95668(d)(2), the following requirements apply to centrifugal natural gas compressors located at onshore or offshore crude oil or natural gas production facilities, natural gas gathering and boosting stations, natural gas processing plants, natural gas transmission compressor stations, and natural gas underground storage facilities in sectors listed in section 95666.
- (2) The requirements of section 95668(d) do not apply to the following:
 - (A) Centrifugal natural gas compressors that operate less than 200 hours per calendar year provided that the owner or operator maintains, and can make available upon request by the CARB Executive Officer, a record of the operating hours per calendar year.
- (3) Components on driver engines and compressors that use a wet seal or a dry seal shall comply with the leak detection and repair requirements specified in section 95669.
- (4) The compressor wet seal shall be measured annually by direct measurement while the compressor is running at normal operating temperature in order to determine the wet seal emission flow rate using one of the following methods, unless the wet seal vent gas is controlled with the use of a vapor collection system as described in section 95671:
 - (A) All vent stacks that together capture all wet seal emissions, including all wet seal degassing emissions, shall be equipped with a meter or instrumentation to measure the wet seal emissions flow rate; or
 - (B) All vent stacks that together capture all wet seal emissions, including all wet seal degassing emissions, shall be equipped with a clearly identified access port installed at a height of no more than six (6) feet above ground level or a permanent support surface for making wet seal emission flow rate measurements.

- (C) If the measurement is not obtained because the compressor is not operating for the scheduled test date and the remainder of the calendar year, then testing shall be conducted within seven (7) calendar days of resumed operation. The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a copy of operating records that document the compressor hours of operation and run dates in order to demonstrate compliance with this requirement.
 - (D) If the compressor is equipped with a continuous emission flow rate measurement instrument, the owner or operator shall submit the average emission flow rate from the period of time when the compressor was running at normal operating temperature during the calendar year.
 - (5) A compressor with a wet seal emission flow rate greater than three (3) scfm, or a combined flow rate greater than the number of wet seals multiplied by three (3) scfm, shall be successfully repaired within 30 calendar days of the initial flow rate measurement.
 - (A) A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.
 - (B) If the compressor is not able to be successfully repaired to below the allowed emission flow rate, the owner or operator shall take one of the following actions within 180 days of the initial flow rate measurement:
 - 1. The wet seal shall be replaced with a dry seal; or
 - 2. Emissions from the compressor vent stacks used to vent all wet seal emissions, including all wet seal degassing emissions, shall be controlled with the use of a vapor collection system as specified in section 95671.
 - (6) The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a record of the flow rate measurement as specified in Appendix A, Table A7 and shall report the result to CARB once per calendar year as specified in section 95673 of this subarticle.
- (e) *Natural Gas Powered Pneumatic Controllers and Pumps*
- (1) The following requirements apply to natural gas powered pneumatic controllers and pumps located at facilities in sectors listed in section 95666:

- (2) Continuous bleed natural gas pneumatic controllers shall not vent natural gas to the atmosphere and shall comply with the leak detection and repair requirements specified in section 95669, except for the pneumatic controllers subject to section 95668(e)(2)(A).
- (A) Continuous bleed natural gas powered pneumatic controllers installed prior to January 1, 2016, may be used provided they meet all of the following requirements:
 1. No controller shall vent natural gas at a rate greater than six (6) standard cubic feet per hour (scfh) when the controller is idle and not actuating.
 2. All controllers are clearly marked with a permanent tag that meets the following requirements:
 - a. Identifies the natural gas flow rate as less than or equal to six (6) scfh;
 - b. Identifies the month and year of installation of the controller; and,
 - c. Includes identification information that allows traceability to the manufacturer's documentation.
 3. All controllers are tested annually using a direct measurement method; and,
 4. Any controller with a measured emissions flow rate greater than six (6) scfh shall be successfully repaired within 14 calendar days from the date of the initial emission flow rate measurement.
 5. The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a record of the flow rate measurement as specified in Appendix A, Table A7 and shall report the result to CARB once per calendar year as specified in section 95673 of this subarticle.
 6. The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, records of the location and manufacturer's specifications of each controller as specified in section 95672.

- (3) Intermittent bleed natural gas powered pneumatic controllers shall comply with the leak detection and repair requirements specified in section 95669 when the controller is idle and not controlling.
 - (4) Natural gas powered pneumatic pumps shall not vent natural gas to the atmosphere and shall comply with the leak detection and repair requirements specified in section 95669.
 - (A) The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, records of the location and manufacturer's specifications of each natural gas powered pneumatic pump as specified in section 95672.
 - (5) Continuous bleed natural gas powered pneumatic controllers and pumps which need to be replaced or retrofitted to comply with the requirements specified shall do so by one of the following methods:
 - (A) Collect all vented natural gas with the use of a vapor collection system as specified in section 95671; or
 - (B) Use compressed air or electricity to operate.
- (f) *Liquids Unloading of Natural Gas Wells*
- (1) Owners or operators of natural gas wells at facilities in sectors listed in section 95666 that are vented to the atmosphere for the purpose of liquids unloading shall perform one of the following:
 - (A) Collect the vented natural gas with the use of a vapor collection system as specified in section 95671;
 - (B) Measure the volume of natural gas vented by direct measurement; or
 - (C) Calculate the volume of natural gas vented using the Liquid Unloading Calculation listed in Appendix B or according to the California Air Resources Board Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, Title 17, Division 3, Chapter 1, Subchapter 10, Article 2, Subarticle 5, Section 95153(e) (December 31, 2014), which is incorporated herein by reference.
 - (2) Owners or operators shall record the volume of natural gas vented and specify the calculation method used or specify if the volume was measured by direct measurement as specified in Appendix A, Table A2.

- (3) Owners or operators shall maintain, and make available upon request by the CARB Executive Officer, a record of the volume of natural gas vented to perform liquids unloading as well as the manual method used (e.g., foaming agent) or equipment installed in the natural gas well(s) designed to automatically perform liquids unloading (e.g., velocity tubing, plunger lift, etc.) as specified in Appendix A, Table A2 and shall report the results to CARB once per calendar year as specified in section 95673 of this subarticle.

(g) *Well Casing Vents*

- (1) Owners or operators of wells located at facilities in sectors listed in section 95666 with a well casing vent that is open to the atmosphere shall measure the natural gas flow rate from the well casing vent annually by direct measurement.
 - (A) A well casing vent that is opened solely for conducting attended routine or periodic maintenance or attended testing would not constitute an open well casing vent.
 - (B) The owner or operator shall not measure the open well casing vent when it is being operated under negative pressure (e.g., when it is operated on a vacuum).
 - (C) The owner or operator shall estimate the percentage of the calendar year that the well casing vent is open to the atmosphere.
- (2) The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a record of each well casing vent flow rate measurement and percentage of the calendar year the well casing vent is open to the atmosphere as specified in Appendix A, Table A7 and shall report the results to CARB once per calendar year as specified in section 95673 of this subarticle.
 - (A) If the owner or operator measures the natural gas flow rate from the well casing vent more than once per calendar year, they shall report the average well casing vent flow rate for the calendar year to CARB.

(h) *Natural Gas Underground Storage Facility Monitoring Requirements*

- (1) Owners or operators of natural gas underground storage facilities listed in section 95666 shall have a monitoring plan approved by the CARB Executive Officer that contains equipment specifications and quality assurance procedures for each of the monitoring requirements specified in section 95668(h)(4) of this subarticle.

- (A) Owners or operators of new facilities shall submit monitoring plans to the CARB Executive Officer no later than 180 days after commencing injection/withdrawal operations at a new facility.
 - (B) By July 1, 2024, owners or operators of existing facilities with approved monitoring plans shall submit updated plans to the CARB Executive Officer reflecting the requirements of this subarticle.
 - (C) Monitoring plans shall be submitted using e-mail to oilandgas@arb.ca.gov with the subject line "Natural Gas Underground Storage Monitoring Plan."
- (2) Within 180 days of submission of a new or updated monitoring plan, the CARB Executive Officer will approve in full or in part, or disapprove in full or in part, a monitoring plan based on whether it is sufficient to meet the requirements specified in section 95668(h)(4).
- (A) Revisions to monitoring plans shall be submitted to the CARB Executive Officer within 14 calendar days of CARB notification; and
 - (B) The CARB Executive Officer will approve in full or in part, or disapprove in full or in part, the revisions to the monitoring plan within 14 calendar days of submittal to CARB.
 - 1. If the revised monitoring plan is not approved, the owner or operator shall submit additional revisions to the monitoring plan to the CARB Executive Officer within 14 calendar days of CARB notification.
 - 2. The CARB Executive Officer will approve in full or in part, or disapprove in full or in part, the additional revisions to the monitoring plan within 14 calendar days of submittal to CARB.
 - 3. If the CARB Executive Officer has not approved in full of the revised monitoring plan after six (6) submissions of revisions to the monitoring plan, the owner or operator shall be in violation of this subarticle until the monitoring plan is fully approved.

- (3) Within 180 days of CARB Executive Officer approval of a new or updated monitoring plan, the owner or operator of a natural gas underground storage facility shall begin monitoring the facility according to the most recently approved monitoring plan specified in section 95668(h)(4) of this subarticle.
 - (A) For updated monitoring plans, the previously approved plan shall remain in effect until the updated plan is put into effect.
- (4) Each natural gas underground storage facility monitoring plan shall at a minimum contain quality assurance procedures for validating data and alarms, procedures for documenting the event of a well blowout, and equipment specifications and procedures for performing the following types of monitoring at the facility:
 - (A) Continuous (with data resolution of one (1) minute or less) air monitoring to measure upwind and downwind ambient concentrations of methane at sufficient locations throughout the facility to identify methane emissions in the atmosphere.
 - 1. The monitoring system shall have at least one sensor located in a predominant upwind location and at least one sensor located in a predominant downwind location with the ability to continuously record measurements.
 - a. The upwind and downwind instruments shall have the capability to measure ambient concentrations of methane within minimum 250 ppb accuracy to determine upwind and downwind emissions baselines.
 - b. The upwind and downwind instruments shall be calibrated at least once annually unless more frequent calibrations are recommended by the equipment manufacturer. Any defective instrumentation shall be repaired or replaced within 14 calendar days from the date of calibration or the discovery of a malfunction. A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.
 - 2. The monitoring system shall have sufficient sensors to continuously measure meteorological conditions at the facility including ambient temperature, ambient pressure, relative humidity, wind speed, and wind direction with the ability to continuously record measurements.

3. The monitoring system shall have the ability to store at least 24 months of continuous instrument data and the ability to generate hourly, daily, weekly, monthly, and annual reports.
4. The monitoring system shall have an integrated alarm system that is audible and visible continuously in the control room at the facility and in remote control centers.
5. All data collected by the monitoring system shall be made available upon request of the CARB Executive Officer, and reported to CARB annually as specified in section 95673 for publication on a CARB maintained public internet web site.
6. After 12 months of continuous monitoring data has been collected, the owner or operator shall establish baseline monitoring conditions for the facility and submit baseline concentrations to the CARB Executive Officer.
7. The monitoring system shall be programmed to trigger the alarm system at any time the downwind sensor(s) detects a reading that is greater than or equal to four (4) times the downwind sensor(s) baseline or in the event of a sensor failure.
8. The facility owner or operator shall notify CARB, CalGEM, and the local air district within 24 hours of the downwind sensor(s) detecting a reading that is greater than or equal to four (4) times the downwind sensor(s) baseline.
9. The upwind and downwind baseline conditions may be re-evaluated every 12 months for changes in local conditions.
 - a. Modifications to baseline conditions must be approved by CARB.
 - b. Requests for modification to baseline conditions shall be approved in full or in part, or disapproved in full or in part, by CARB within three (3) months from the date of requested modifications.
10. The facility owner or operator shall keep records of any time the monitoring system is inactivated, including an explanation of the reason for the system being inactivated. The facility owner or operator shall also record when the system is reactivated.

- (B) Daily or continuous leak screening at each injection/withdrawal wellhead assembly and attached pipelines, for wellheads located on wells as defined by section 95667(a)(75)(E), according to one or both of the following methods:
1. Daily leak screening with the use of United States Environmental Protection Agency (US EPA) Reference Method 21 Determination of Volatile Organic Compound Leaks, (October 1, 2017) which is incorporated herein by reference, as specified in section 95669(b) of this subarticle or optical gas imaging.
 - a. If wildlife is found to be present on a component and work must be halted or postponed within a certain distance of the wildlife in order to comply with state and federal wildlife regulations, the owner or operator may delay inspection, so long as they report the delay to the CARB Executive Officer within 24 hours of discovering the wildlife, provide a description of the type of wildlife, identify the regulations requiring work to be halted, and resume inspections once the reason for the delay is resolved. The owner or operator shall notify the CARB Executive Officer within 24 hours after inspections have resumed. These notifications shall be issued as specified in section 95673 of this subarticle.
 2. Continuous leak screening with the use of automated instruments and a monitoring system with an alarm system that is both audible and visible in the control room and at remote control centers.
 - a. The alarm system shall be triggered at any time a leak is detected above 50,000 ppmv total hydrocarbons or above 10,000 ppmv total hydrocarbons if the 10,000 ppmv leak persists for more than five (5) continuous calendar days.
 - b. The alarm system shall be triggered in the event of a sensor failure.
 - c. The monitoring system shall use a data logging system with the ability to store at least two (2) years of continuous monitoring data.

- d. Quarterly, the alarm system shall be tested to ensure that the system and sensors are functioning properly. Any defective instrumentation shall be repaired or replaced within 14 calendar days from the date of the discovery of a malfunction. A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.
 - e. At least annually, all sensors shall be calibrated unless more frequent calibrations are required by the manufacturer. Any defective instrumentation shall be repaired or replaced within 14 calendar days from the date of the discovery of a malfunction. A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.
 - f. The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, records of monitoring system data, records of calibration, and records of alarm system testing.
 - g. The facility owner or operator shall keep records of any time the monitoring system is inactivated, including an explanation of the reason for the system being inactivated. The facility owner or operator shall also record when the system is reactivated.
3. All leaks identified during daily leak screening or identified by the continuous monitoring system, unless the continuous monitoring system can measure the concentration of the leak, shall be tested within 24 hours of initial leak detection in accordance with US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b).

- a. If wildlife is found to be present on a component and work must be halted or postponed within a certain distance of the wildlife in order to comply with state and federal wildlife regulations, the owner or operator may delay inspection, so long as they report the delay to the CARB Executive Officer within 24 hours of discovering the wildlife, provide a description of the type of wildlife, identify the regulations requiring work to be halted, and resume inspections once the reason for the delay is resolved. The owner or operator shall notify the CARB Executive Officer within 24 hours after inspections have resumed. These notifications shall be issued as specified in section 95673 of this subarticle.
 4. All leaks shall be successfully repaired within the repair timeframes specified for each leak threshold as specified in section 95669 of this subarticle.
 5. A well blowout at an injection/withdrawal well constitutes a violation of this subarticle.
 6. At any time a leak is detected above 50,000 ppmv total hydrocarbons or above 10,000 ppmv total hydrocarbons if the 10,000 ppmv leak persists for more than five (5) continuous calendar days, the owner or operator shall notify CARB, CalGEM, and the local air district within 24 hours of the alarm trigger.
 7. Owners or operators shall maintain, and make available upon request by the CARB Executive Officer, a record of the initial and final leak concentration measurements for leaks identified during daily leak screening or identified by a continuous leak monitoring system that are measured above the minimum allowable leak threshold as specified in Appendix A, Table A5.
 8. Owners or operators shall report the results of the initial and final leak concentration measurements for leaks identified during daily leak screening or identified by a continuous leak monitoring system as specified in section 95673 of this subarticle.
- (C) In the event of a well blowout, daily optical gas imaging (OGI) of the leak found at the injection/withdrawal head assembly shall be performed in accordance with the following provisions:

1. OGI shall be performed by a technician with a certification or training in basic thermal science, OGI camera operation and safety, and OGI inspections (e.g., OGI Certification or equivalent training);
2. OGI video footage of the leak shall be recorded for a minimum of 10 minutes every four (4) hours throughout the course of the blowout incident;
3. OGI video footage of the leak shall be made available upon by request by the CARB Executive Officer for publication on a CARB maintained public internet web site; and
4. OGI video footage of the leak shall be made publicly available by the facility by posting the video footage on a facility maintained public internet web site throughout the course of the blowout incident.

Note: Authority cited: Sections 38510, 38562, 39600, 39601, 41511 and 42710, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600, 41511 and 42710, Health and Safety Code.

§ 95669. Leak Detection and Repair.

- (a) Except as provided in section 95669(c), the following leak detection and repair requirements apply to facilities in sectors listed in section 95666.
- (b) All measurements made in accordance with US EPA Reference Method 21 (October 1, 2017) for the purposes of this subarticle shall be conducted as follows:
 - (1) Leak testing shall be for total hydrocarbons in units of parts per million volume (ppmv) calibrated as methane in accordance with US EPA Reference Method 21 (October 1, 2017).
 - (2) PID instruments shall not be used.
- (c) The requirements of this section do not apply to the following:
 - (1) Components, - including components found on tanks, separators, wells, and pressure vessels - that are subject to local air district leak detection and repair rules if the rules were in place prior to January 1, 2018, or are listed under section 95669(c)(1)(B).
 - (A) If a component is exempt from leak detection and repair requirements in a local air district rule, but does not qualify for any exemptions in sections 95669(c)(2)-(14), then it is subject to the requirements of section 95669.
 - (B) If the components are located in a region classified as non-attainment with any federal ambient air quality standard for ozone, the components shall be subject to one of the local air district rules listed below for the exemption to apply. For all components that are exempt due to the rules listed in subsections 3., 4., 7., or 8. below, owners or operators shall include those components (and associated equipment) in the lists described in section 95669(d)(1)(C)-(E) and shall identify the relied upon local air district rule for each entry in the lists.
 - 1. San Joaquin Valley Air Pollution Control District Rule 4401: Steam-Enhanced Crude Oil Production Wells (Amended June 15, 2023).
 - 2. San Joaquin Valley Air Pollution Control District Rule 4409: Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities (Amended June 15, 2023).

3. San Joaquin Valley Air Pollution Control District Rule 4623: Storage of Organic Liquids (Amended June 15, 2023).
 4. South Coast Air Quality Management District Rule 1148.1: Oil and Gas Production Wells (Amended March 5, 2004).
 5. South Coast Air Quality Management District Rule 1173: Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants (Amended February 6, 2009).
 6. South Coast Air Quality Management District Rule 1176: VOC Emissions from Wastewater Systems (Amended September 13, 1996).
 7. Ventura County Air Pollution Control District Rule 74.10: Components at Crude Oil and Natural Gas Production and Processing Facilities (Amended March 10, 1998).
 8. Yolo-Solano Air Quality Management District Rule 2.23: Fugitive Hydrocarbon Emissions (Amended March 23, 1994).
- (2) Components, - including components found on tanks, separators, wells, and pressure vessels - used exclusively for crude oil with an API gravity less than 20 averaged on an annual basis. The average annual API gravity shall be determined using certified reports submitted to CalGEM. This includes components used for crude oil and the associated produced water components.
- (3) Components incorporated into produced water lines located downstream of a separator and tank system that meets any of the following requirements:
- (A) Is controlled with the use of a vapor collection system as specified in section 95671.
 - (B) Is controlled with the use of a floating roof that meets the requirements of 40 CFR 60.112b(a)(1) or (2) (October 8, 1997).
 - (C) Meets any of the criteria in section 95668(a)(2).
 - (D) Has an annual emission rate less than or equal to 10 metric tons per year of methane as determined through flash analysis testing pursuant to section 95668(a).

- (4) Natural gas distribution pipelines located at a crude oil production facility used for the delivery of commercial quality natural gas and which are not owned or operated by the crude oil production facility.
 - (5) Components that are buried below ground. The portion of well casing that is visible above ground is not considered a buried component.
 - (6) Components used to supply compressed air to equipment or instrumentation.
 - (7) Components operating under a negative gauge pressure or below atmospheric pressure.
 - (8) Components at a crude oil or natural gas production facility which are not owned or operated by the production facility.
 - (9) Temporary components used for general maintenance and used less than 300 hours per calendar year if the owner or operator maintains, and can make available at the request of the CARB Executive Officer, a record of the date when the components were installed.
 - (10) Well casing vents that are open to the atmosphere which are subject to the requirements specified in section 95668(g) of this subarticle.
 - (11) Components found on steam injection wells or water flood wells.
 - (12) Pneumatic controllers or pumps that use compressed air or electricity to operate.
 - (13) A compressor rod packing which is subject to annual emission flow rate testing as specified in section 95668(c)(4) of this subarticle.
 - (14) Components on equipment or wells that are actively undergoing drilling, completion, or maintenance activities. If an inspection of these components pursuant to section 95669(g) was missed as a result of this exemption, the components shall be inspected before the end of the calendar quarter in which the drilling, completion, or maintenance activities are finished.
- (d) All components, including components found on tanks, separators, wells (including idle wells), and pressure vessels not identified in section 95669(c), shall be inspected and repaired within the timeframes specified in this section.

- (1) By July 1, 2024, owners or operators shall develop facility-specific leak detection and repair plans that encompass all components not identified in section 95669(c). The plans shall be updated annually if any changes are made to the facility or equipment that alter the plan. Leak detection and repair plans shall include the following:
 - (A) Procedures for conducting surveys that ensure the surveys comply with the relevant sections of US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b).
 - (B) Sitemap.
 - (C) List of equipment to be monitored, including an identification number or detailed description for each piece of equipment.
 - (D) List of components to be monitored and the method for determining location of components in the field (e.g., tagging, identification on a process and instrumentation diagram, etc.).
 - (E) List of equipment and components that are designated as inaccessible or unsafe to monitor along with an explanation/review of conditions for the designation.
 - (F) For each piece of equipment, list the frequency for conducting surveys that complies with the requirements specified in this section.
 - (G) For each piece of equipment, list the repair timeframes for leaks of different sizes that comply with the requirements specified in this section.
- (e) The CARB Executive Officer may perform inspections at facilities at any time to determine compliance with the requirements specified in this section.
- (f) Except for inaccessible or unsafe to monitor components, owners or operators shall audio-visually inspect (by hearing and by sight) all hatches, pressure-relief valves, well casings, stuffing boxes, and pump seals for leaks or indications of leaks at least once every 24 hours for facilities that are visited daily, or at least once per calendar week for facilities that are not visited at least once every 24 hours.
 - (1) Owners or operators shall audio-visually inspect all pipes and pipelines within the facility boundaries for leaks or indications of leaks at least once every 12 months.

- (2) Owners or operators shall maintain, and make available upon request by the CARB Executive Officer, a record of the dates of all audio-visual inspections conducted at the facility.
- (3) Any audio-visual inspection specified in 95669(f) that indicates a leak that cannot be repaired within 24 hours shall be tested using US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b) within 24 hours after initial leak detection.
 - (A) For leaks detected during normal business hours, the leak measurement shall be performed within 24 hours. For leaks detected after normal business hours or on a weekend or holiday, the deadline is shifted to the end of the next normal business day.
 - (B) Any leaks measured above the minimum leak threshold shall be successfully repaired within the timeframes specified in this section.
- (g) At least once each calendar quarter, all components shall be tested for leaks of total hydrocarbons in units of parts per million volume (ppmv) calibrated as methane in accordance with US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b).
 - (1) All inaccessible or unsafe to monitor components shall be inspected at least once annually using US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b).
- (h) Any component with a leak concentration measured above the following standards shall be repaired within the time period specified below and in Table 1:
 - (1) A first attempt at repair shall be made within five (5) calendar days for leaks with measured total hydrocarbon concentrations greater than or equal to 1,000 ppmv but not greater than 9,999 ppmv, which shall be successfully repaired or removed from service within 14 calendar days of the initial leak detection using US EPA Reference Method 21 (October 1, 2017).
 - (2) Leaks with measured total hydrocarbon concentrations greater than or equal to 10,000 ppmv but not greater than 49,999 ppmv shall be successfully repaired or removed from service within five (5) calendar days of the initial leak detection using US EPA Reference Method 21 (October 1, 2017).

- (3) Leaks with measured total hydrocarbon concentrations greater than or equal to 50,000 ppmv shall be successfully repaired or removed from service within two (2) calendar days of the initial leak detection using US EPA Reference Method 21 (October 1, 2017).
- (4) Critical components or critical process units shall be successfully repaired by the end of the next process shutdown or within 12 months from the date of initial leak detection, whichever is sooner.
- (5) A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.

Table 1 – Repair Time Periods

| Leak Threshold | Repair Time Period |
|--|--|
| 1,000-9,999 ppmv | First attempt at repair within 5 calendar days and successful repair within 14 calendar days |
| 10,000-49,999 ppmv | 5 calendar days |
| 50,000 ppmv or greater | 2 calendar days |
| Critical Components and Critical Process Units | Next scheduled shutdown or within 12 months, whichever is sooner |

- (i) Upon detection of a component with a leak concentration measured above the standards specified, the owner or operator shall affix to that component a weatherproof readily visible tag that identifies the date and time of leak detection measurement and the measured leak concentration. The tag shall remain affixed to the leaking component until it has been successfully repaired or replaced, after which the tag shall be removed.
 - (1) Successful repair shall be confirmed by re-measuring the component using US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b) to determine that the component is below the minimum leak threshold after repair or replacement.
- (j) Owners or operators shall maintain, and make available upon request by the CARB Executive Officer, a record of all leaks found at the facility as specified in Appendix A, Tables A4 and A5, and shall report the results to CARB once per calendar year as specified in section 95673 of this subarticle. If a leak is found on a component associated with a well, the owner or operator shall indicate whether the well is active or idle as specified in Appendix A, Table A5.
- (k) Hatches shall remain closed at all times except during sampling, adding process material, or attended maintenance operations.
- (l) Pressure-vacuum valves shall not vent or actuate except when the operating pressure of the tank exceeds the valve set pressure, which shall be set to within ten (10) percent of the maximum allowable working pressure of the tank.
- (m) Open-ended lines and valves located at the end of lines shall be sealed with a blind flange, plug, cap or a second closed valve, at all times except during operations requiring liquid or gaseous process fluid flow through the open-ended line. Open-ended lines do not include vent stacks used to vent natural gas from equipment that cannot be sealed for safety reasons. Open-ended lines shall be repaired as follows:
 - (1) Open-ended lines that are not capped or sealed shall be capped or sealed within seven (7) calendar days from the date of initial inspection.
 - (2) Open-ended lines that are capped or sealed and found leaking shall be repaired in accordance with the timeframes specified in section 95669(h).
- (n) Components or component parts which incur five (5) repair actions within a continuous 12-month period shall be replaced with a compliant component in working order and shall be re-measured using US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b) to determine that the component is below the minimum leak threshold.

- (1) The component shall be replaced and re-measured to be below the minimum leak threshold within 30 calendar days of the initial leak detection using US EPA Reference Method 21 (October 1, 2017) of the fifth (5th) leak.
 - (2) A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.
 - (3) A record of the replacement shall be maintained in a log at the facility, and shall be made available upon request by the CARB Executive Officer.
- (o) Compliance with Leak Detection and Repair Requirements:
- (1) The following provisions apply to inspections conducted by the CARB Executive Officer:
 - (A) No facility shall exceed the number of allowable leaks specified in Table 2 during a CARB Executive Officer inspection as determined in accordance with US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b).

Table 2 – Allowable Number of Leaks

| Leak Threshold | 200 or Fewer Components Inspected | More than 200 Components Inspected |
|------------------------|--|---|
| 1,000-9,999 ppmv | 5 | 2% of total inspected |
| 10,000-49,999 ppmv | 2 | 1% of total inspected |
| 50,000 ppmv or greater | 0 | 0 |

- (B) No component shall exceed a leak of total hydrocarbons greater than or equal to 50,000 ppmv during a CARB Executive Officer inspection as determined in accordance with US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b).
- (C) The failure of an owner or operator to repair leaks within the timeframes specified in this subarticle shall constitute a violation of this subarticle.

- (2) The following provisions apply to inspections conducted by the owner or operator:
 - (A) The failure of an owner or operator to repair leaks within the timeframes specified in this subarticle shall constitute a violation of this subarticle.
 - (B) Leaks discovered during an operator conducted inspection shall not constitute a violation if the leaking components are repaired within the timeframes specified in this subarticle.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95669.1. Remotely Detected Emission Plumes.

- (a) Beginning April 1, 2024, CARB may issue a notification to an owner or operator if remote monitoring data includes a methane emission plume at their facility.
- (1) The remote monitoring data shall be generated by a remote monitoring technology approved by the CARB Executive Officer if, in their best engineering judgment, the technology demonstrates a capability to detect methane emission plumes and meets all the following requirements:
 - (A) Spatial resolution of 30 meters by 30 meters or better.
 - (B) Data available to CARB within 72 hours of collection.
 - (C) Produces a visualization of the emission plume.
 - (2) The notification shall be sent electronically to the e-mail address supplied by the facility owner or operator pursuant to section 95674(b)(2) within seven (7) business days of CARB receiving the remote monitoring data. The notification shall contain all the following information:
 - (A) An emission ID number.
 - (B) An estimate of the latitude and longitude coordinates where the emission plume appears to be originating.
 - (C) A visualization of the emission plume.
 - (D) The date and time of the emission plume detection.
- (b) When an owner or operator receives a notification from CARB pursuant to section 95669.1(a), the owner or operator shall inspect the facility for leaking or venting components and equipment within five (5) calendar days of the notification using optical gas imaging instruments or US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b), unless section 95669.1(b)(1) applies.
- (1) If the owner or operator has records demonstrating that venting was occurring at the time of the remote emission plume detection due to an activity (e.g., maintenance), the owner or operator may report that activity in accordance with section 95673(a)(14) instead of performing an inspection. The records demonstrating that venting was occurring due to an activity shall be maintained as specified in section 95672(a)(23).

- (2) The inspection shall be performed until one of the following occurs:
 - (A) All components and equipment under the control of the owner or operator within at least a 100-meter radius of the location sent in the notification have been inspected; or
 - (B) The emission source is found.
- (c) Within 72 hours after conducting an inspection pursuant to section 95669.1(b), the owner or operator shall report to CARB the information specified in section 95673(a)(15).
- (d) The owner or operator shall perform the following actions depending on the results of the inspection required in section 95669.1(b):
 - (1) If the emission source is determined to be the result of venting, the owner or operator shall report to CARB the information specified in section 95673(a)(16) within five (5) calendar days after conducting the inspection.
 - (2) If the emission source is a component leak identified by US EPA Reference Method 21 (October 1, 2017), the owner or operator shall successfully repair the leak in accordance with the repair timeframes specified in section 95669 and shall report to CARB the information specified in section 95673(a)(17) within five (5) calendar days after the repair.
 - (3) If the emission source is identified by optical gas imaging and determined to be an unintentional emission source from a component, the owner or operator shall measure the leak concentration using US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b) within two (2) calendar days of conducting the inspection or within 14 calendar days of conducting the inspection if the component is inaccessible or unsafe to monitor.
 - (A) If the measured leak concentration is below the leak threshold specified in section 95669, the owner or operator shall report the information specified in section 95673(a)(18) within five (5) calendar days after performing the US EPA Reference Method 21 (October 1, 2017) measurement.

- (B) If the measured leak concentration is above the leak threshold specified in section 95669, the owner or operator shall successfully repair the leak in accordance with the repair timeframes specified in section 95669 and shall report to CARB the information specified in section 95673(a)(17) within five (5) calendar days after the repair.
- (4) If the emission source is an unintentional emission source that is not from a component, the owner or operator shall repair the emission source within two (2) calendar days of discovery and shall report to CARB the information specified in section 95673(a)(17) within five (5) calendar days after the repair.
- (e) The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a record of the information specified in Appendix A, Table A8 for each notification received and shall report this to CARB annually as specified in section 95673 of this subarticle.
- (f) The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, a record of all leaks found above the minimum leak threshold as specified in Appendix A, Table A5 and shall report the results to CARB annually as specified in section 95673 of this subarticle.
- (g) A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95670. Critical Components.

- (a) Critical components used in conjunction with a critical process unit at facilities in sectors listed in section 95666 shall be pre-approved by the CARB Executive Officer if owners or operators wish to claim any critical component exemptions available under this subarticle.
 - (1) Critical components that have been designated as critical under a local air district leak detection and repair rule that qualifies for an exemption to section 95669 under section 95669(c)(1) are not subject to the pre-approval requirements specified in section 95670. These critical components automatically qualify for the critical component exemptions available under this subarticle.
 - (2) If a process unit no longer meets the definition of a critical process unit in section 95667(a)(14), the critical component exemptions available under this subarticle no longer apply to pre-approved critical components used in conjunction with that process unit.
- (b) Owners or operators shall provide sufficient documentation identifying a critical component and demonstrating that the critical component is required as part of a critical process unit or that shutting down the critical component or process unit would impact safety or reliability of the natural gas system.
 - (1) Critical components shall be clearly identified in the documentation submitted to CARB both to confirm that the components are part of a critical process unit and to identify a component as critical during an inspection. The documentation shall clearly show how the components are part of a critical process unit or that shutting down the critical component or process unit would impact the safety or reliability of the natural gas system.
 - (2) Sufficient documentation shall include diagrams showing process flow or instrumentation, a table of uniquely identified components, photographs, written descriptions, or other clear means of identification.
- (c) A request for a critical component or process unit approval is made by submitting a record of the component or process unit as specified in Appendix A, Table A3 along with supporting documentation as specified in section 95670(b) of this subarticle. Requests shall be e-mailed to oilandgas@arb.ca.gov with the subject line "O&G Critical Components Request."
- (d) Owners or operators shall maintain, and make available upon request by the CARB Executive Officer the following:

- (1) A record of all critical components or process units located at the facility as specified in Appendix A, Table A3.
 - (2) Records of the approved critical component or process requests, including all supporting documentation that was submitted to CARB as specified in section 95670(c) of this subarticle.
- (e) Each critical component or critical process unit shall be identified according to one of the following methods:
- (1) Identify each component using a weatherproof, readily visible tag that indicates it as a CARB approved critical component and includes the date of CARB Executive Officer approval; or
 - (2) Provide a diagram or drawing of all critical components or the critical process unit upon request by the CARB Executive Officer.
- (f) Approval of a critical component may be granted only if owners or operators fully comply with this section. The CARB Executive Officer retains discretion to deny any request for critical component or process unit approval.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95670.1. Delay of Repair.

- (a) A delay of repair allows the owner or operator to exceed the specified repair timeframe in this subarticle if all of the applicable requirements in this section are met. To request a delay of repair, the owner or operator shall notify the CARB Executive Officer to report the delay before the repair timeframe is exceeded, provide the justification for the delay, substantiate that justification with documentation as specified in section 95670.1(a)(3), and provide an estimated date by which the repairs will be completed that shall be as soon as practicable. If the owner or operator is using the justification in section 95670.1(a)(3)(E), they shall not submit an estimated repair date. The CARB Executive Officer shall approve or deny the delay of repair request based on whether the information submitted substantiates one of the acceptable justifications in section 95670.1(a)(3) and whether the estimated date by which repairs will be completed is as soon as practicable based on the best engineering judgement of the CARB Executive Officer in consideration of dates contained within the documentation submitted.
- (1) The CARB Executive Officer shall approve or deny a delay of repair request within five (5) calendar days after receiving the request.
 - (A) If the CARB Executive Officer denies the delay of repair request, repairs shall be completed by the original allowable deadline, starting from the date of the denial. The total allowable days to repair from the date the concern was discovered would therefore include the original allowable deadline, plus the number of calendar days that the request was with the CARB Executive Officer, inclusive of the day the request was submitted and the day that the CARB Executive Officer issued the denial.
 - (2) If the delay of repair is approved, the owner or operator shall complete the successful repair by the estimated repair date submitted in their delay of repair request, unless the justification for delay of repair is that specified in section 95670.1(a)(3)(E), in which case the owner or operator shall complete the successful repair in the time period allowable for the provision for which the delay was granted following the date that the reason for the delay of repair is resolved.
 - (A) The owner or operator shall notify the CARB Executive Officer and provide the date of successful repair and the repaired leak concentration or emission flow rate within three (3) calendar days after the successful repair, as specified in section 95673(a)(20).
 - (3) Acceptable justifications for delaying repair include:

- (A) Parts or equipment required to make necessary repairs have been ordered but will not arrive in time to complete the repairs within the repair timeframes specified in this subarticle. The owner or operator shall submit to the CARB Executive Officer proof that parts or equipment required to make necessary repairs have been ordered and shipping information that shows the estimated date by which the parts or equipment will arrive. If shipping information is not available (e.g., for a custom part that needs to be manufactured), the owner or operator shall submit documentation that indicates an estimated date that the parts or equipment will be either be available to ship or delivered.
- (B) The necessary repairs require personnel with specialized knowledge, experience, or equipment, and the personnel have been scheduled but cannot arrive in time to complete the repairs within the repair timeframes specified in this subarticle. The owner or operator shall submit to the CARB Executive Officer documentation that shows which company has been scheduled and the date on which they are scheduled to arrive.
- (C) Emissions resulting from repair within the allowed timeframe would be greater than emissions resulting from delaying the repair (e.g., if a process unit must be shut down to complete the repairs and emissions would occur as a result of the shutdown). The owner or operator shall submit calculations to the CARB Executive Officer demonstrating the estimated emission reductions from delaying the repair. The emission flow rate used in the calculation shall be obtained by direct measurement or by using a correlation equation to convert from concentration to emission flow rate. If the delay of repair extends to the next measurement period, the leak concentration or direct emission flow rate shall be re-measured, and if the emission flow rate (either estimated using a correlation equation or by direct measurement) increases by greater than 20%, updated emission reduction calculations shall be submitted to the CARB Executive Officer.
- (D) A system owned or operated by a gas service utility has been temporarily classified as critical to reliable public gas system operation as ordered by the utility's gas control office. The owner or operator shall submit to the CARB Executive Officer documentation of such a classification.

- (E) Wildlife is found to be present on a component and work must be halted or postponed within a certain distance of the wildlife in order to comply with state and federal wildlife regulations. The owner or operator shall submit to the CARB Executive Officer what type of wildlife is found to be present and identify the state or federal wildlife regulations that require work to be halted or postponed.
 - (4) If, after approval of a delay of repair request, the owner or operator cannot make repairs by the estimated date submitted in the delay of repair request, the owner or operator shall submit a new delay of repair request prior to the estimated date of repair.
 - (5) The owner or operator shall maintain, and make available upon request by the CARB Executive Officer, records documenting the conditions justifying the delay of repair request as described in sections 95670.1(a)(3)(A) through (E).
- (b) All delay of repair requests and reporting of successful repairs following a delay of repair shall be e-mailed to oilandgas@arb.ca.gov with the subject line "Delay of Repair."

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95671. Vapor Collection Systems and Vapor Control Devices.

- (a) The following requirements apply to equipment at facilities in sectors listed in section 95666 that shall be controlled with the use of a vapor collection system and control device as a result of the requirements specified in section 95668 of this subarticle.
- (b) Unless section 95671(c) applies, the vapor collection system shall direct the collected vapors to one of the following:
 - (1) Sales gas system;
 - (2) Fuel gas system; or
 - (3) Gas disposal well not currently under review by CalGEM.
- (c) If no sales gas system, fuel gas system, or gas disposal well specified in section 95671(b) is available at the facility, the owner or operator shall control the collected vapors as follows:
 - (1) For facilities without an existing vapor control device installed at the facility, the owner or operator shall install a new vapor control device as specified in section 95671(d).
 - (2) For facilities currently operating a vapor control device and which are required to control vapors collected as a result of this subarticle, the owner or operator shall replace the existing vapor control device with a new vapor control device as specified in section 95671(d) to control all of the collected vapors, if the device does not already meet the requirements specified in section 95671(d).
- (d) Any vapor control device required in section 95671(c) shall meet the following requirements:
 - (1) If the vapor control device is to be installed in a region classified as non-attainment with any state or federal ambient air quality standard for ozone, respirable particulate matter (PM₁₀), fine particulate matter (PM_{2.5}), or nitrogen dioxide, the owner or operator shall install one of the following devices that follows all applicable performance test requirements in Appendix F (beginning July 1, 2024, including devices required in section 95671(c) prior to July 1, 2024), and meets all applicable federal, state, and local air district requirements:
 - (A) A non-destructive vapor control device that achieves at least 95 percent vapor control efficiency of total emissions and does not result in emissions of nitrogen oxides (NO_x); or

- (B) A vapor control device that achieves at least 95 percent vapor control efficiency of total emissions and does not generate more than 15 parts per million volume (ppmv) NO_x when measured at 3 percent oxygen and does not require the use of supplemental fuel gas, other than gas required for a pilot burner, to operate.
 - (2) If the vapor control device is to be installed in a region not covered under section 95671(d)(1), the vapor control device shall achieve at least 95 percent vapor control efficiency of total emissions, follow all applicable performance test procedures in Appendix F (beginning July 1, 2024, including devices required in section 95671(c) prior to July 1, 2024), and meet all applicable federal, state, and local air district requirements.
- (e) Beginning July 1, 2024, the owner or operator shall comply with all requirements for vapor collection systems and vapor control devices in Appendix E. Owners or operators who controlled emissions as a result of the requirements of this subarticle with the use of a vapor collection system or vapor control device as specified in section 95671 prior to July 1, 2024, shall also comply with all applicable requirements in Appendix E beginning July 1, 2024.
 - (f) If the collected vapors cannot be controlled as specified in sections 95671(b) through (e) of this subarticle, the equipment subject to the vapor collection and control requirements specified in this subarticle shall not be used or installed and shall be removed from service within 180 days of conducting testing indicating that vapors shall be controlled.
 - (g) Vapor collection systems and control devices are allowed to be taken out of service for up to 14 calendar days per calendar year for performing maintenance.
 - (1) A time extension to perform maintenance not to exceed 14 calendar days per calendar year may be requested by the owner or operator by submitting a request to the CARB Executive Officer before the initial 14 calendar-day limit is exceeded, which shall include the number of additional maintenance days requested for the calendar year and justification for necessity of the additional maintenance, including why the days requested are necessary to perform that maintenance.

- (A) The CARB Executive Officer shall approve or deny the request within five (5) calendar days based on their best engineering judgment of whether the owner or operator has demonstrated that the additional maintenance is necessary and that the additional days requested are necessary to perform that maintenance.
 - (B) Requests shall be submitted by e-mail to oilandgas@arb.ca.gov with the subject line "Vapor Collection System Maintenance Extension."
 - (C) The owner or operator shall notify the CARB Executive Officer within three (3) calendar days after the maintenance has been completed and the equipment is returned to service as described in section 95673(a)(21).
- (2) The owner or operator is responsible for maintaining a record of the number of calendar days per calendar year that the vapor collection system or vapor control device is out of service and shall provide a record of such activity at the request of the CARB Executive Officer.
 - (3) If an alternate vapor control device compliant with this section is installed prior to conducting maintenance and the vapor collection and control system continues to collect and control vapors during the maintenance operation consistent with the applicable standards specified in section 95671, the event does not count towards the 14 calendar day limit.
 - (4) Vapor collection system and control device shutdowns that result from utility power outages are not subject to enforcement action provided the equipment resumes normal operation as soon as normal utility power is restored. Vapor collection system and control device shutdowns that result from utility power outages do not count towards the 14 calendar-day limit for maintenance.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95672. Record Keeping Requirements.

- (a) Owners or operators of facilities in sectors listed in section 95666 subject to requirements specified in sections 95668, 95669, 95669.1, 95670, and 95671 shall maintain, and make available upon request by the CARB Executive Officer, a copy of records necessary to verify compliance with the provisions of this subarticle which include the following:

Flash Analysis Testing

- (1) Maintain, for at least five years from the date of each flash analysis test, a record of the flash analysis testing that shall include the following:
 - (A) A sketch or diagram of each separator and tank system tested that identifies the liquid sampling location and all pressure vessels, separators, tanks, sumps, and ponds within the system;
 - (B) A record of the flash analysis testing results, calculations, and a description of the separator and tank system as specified in Appendix A, Table A1;
 - (C) A field testing form for each flash analysis test conducted as specified in Appendix C, Form 1; and
 - (D) The laboratory report(s) for each flash analysis test conducted.

Separator and Tank Systems

- (2) Maintain at least five years of records submitted to CalGEM that document each separator and tank system crude oil, condensate, and produced water throughput.
- (3) Maintain at least five years of records that document the basis for an exemption from the separator and tank system requirements as specified in section 95668(a)(2).
- (4) Maintain records as specified in Appendix D(j).

Circulation Tanks for Well Stimulation Treatments

- (5) Maintain a copy of the best practices management plan as specified in section 95668(b)(1) designed to limit methane emissions from circulation tanks.

Reciprocating Natural Gas Compressors

- (6) Maintain, for at least five years from the date of each emissions flow rate measurement, a record of each initial and final, if applicable, rod packing or seal emission flow rate measurement as specified in Appendix A, Table A7.
- (7) Maintain, for at least one calendar year, a record that documents the date(s) and hours of operation a compressor is operated in order to demonstrate compliance with the rod packing emission flow rate measurement in the event that the compressor is not operating during a scheduled inspection.

Centrifugal Natural Gas Compressors

- (8) Maintain, for at least five years from the date of each emissions flow rate measurement, a record of each initial and final, if applicable, wet seal emission flow rate measurement as specified in Appendix A, Table A7.
- (9) Maintain, for at least one calendar year, a record that documents the date(s) and hours of operation a compressor is operated in order to demonstrate compliance with the wet seal emission flow rate measurement in the event that the compressor is not operating during a scheduled inspection.

Natural Gas Powered Pneumatic Controllers

- (10) Maintain, while in service and for at least five years after removal from service, records of the location and manufacturer's specifications of each continuous bleed natural gas powered pneumatic controller subject to section 95668(e)(2)(A). The location shall include latitude and longitude coordinates in decimal degrees to an accuracy and precision of five (5) decimals of a degree using the North American Datum of 1983.
- (11) Maintain, for at least five years from the date of each emissions flow rate measurement, a record of the initial and final, if applicable, emission flow rate measurement as specified in Appendix A, Table A7.

Natural Gas Powered Pneumatic Pumps

- (12) Maintain, while in service and for at least five years after removal from service, records of the location and manufacturer's specifications of each natural gas powered pneumatic pump. The location shall include latitude and longitude coordinates in decimal degrees to an accuracy and precision of five (5) decimals of a degree using the North American Datum of 1983.

Liquids Unloading of Natural Gas Wells

- (13) Maintain, for at least five years from the date of each liquids unloading measurement or calculation, a record of the measured or calculated volume of natural gas vented to perform liquids unloading and the manual method used (e.g., foaming agent) or equipment installed in the natural gas well(s) designed to automatically perform liquids unloading (e.g., velocity tubing, plunger lift, etc.) as specified in Appendix A, Table A2.

Well Casing Vents

- (14) Maintain, for at least five years from the date of each emissions flow rate measurement, a record of each well casing vent emission flow rate measurement and percentage of the calendar year the well casing vent is open to the atmosphere as specified in Appendix A, Table A7.

Natural Gas Underground Storage

- (15) Maintain, for at least five years from the date of each leak concentration measurement, a record of the initial and final leak concentration measurement for leaks identified during daily leak inspections or identified by a continuous leak monitoring system and measured above the minimum allowable leak threshold as specified in Appendix A, Table A5.
- (16) Maintain, for at least five years, records of both meteorological and upwind and downwind air monitoring data as specified in section 95668(h)(4)(A)5.
- (17) Maintain, for at least five years from the date of each entry, logs showing when each continuous air monitoring system is inactivated and reactivated, including an explanation of the reason for the system being inactivated, as required in section 95668(h)(4)(A)10.

- (18) Maintain, for at least five years from the date of each entry, logs showing when each continuous leak screening system is inactivated and reactivated, including an explanation of the reason for the system being inactivated, as required in section 95668(h)(4)(B)2.g.

Leak Detection and Repair

- (19) Maintain a current leak detection and repair plan as required in section 95669(d)(1).
- (20) Maintain, for at least five years from each inspection, a record of any deviations from the leak detection and repair plan or a statement that there were no deviations from the leak detection and repair plan.
- (21) Maintain, for at least five years from each inspection, a record of each leak detection and repair inspection as specified in Appendix A, Table A4.
- (22) Maintain, for at least five years from the date of each inspection, a component leak concentration and repair form for each inspection as specified in Appendix A, Table A5.

Remotely Detected Emission Plumes

- (23) Maintain, for at least five years from the date of each CARB notification of a methane emission plume identified using remote monitoring data, records demonstrating that venting was occurring due to an activity, if section 95669.1(b)(1) applies.
- (24) Maintain, for at least five years from the date of each CARB notification of a methane emission plume identified using remote monitoring data, records of follow-up activities as specified in Appendix A, Table A8.

Vapor Collection Systems and Vapor Control Devices

- (25) Maintain, for at least five years from the end of each calendar year, records showing the number of calendar days in each calendar year that the vapor collection system or vapor control device was out of service.
- (26) Maintain records as specified in Appendix E(f).

Delay of Repair

- (27) Maintain, for at least five years, records documenting the conditions justifying the delay of repair request as described in sections 95670.1(a)(3)(A) through (E).

Note: Authority cited: Sections 38510, 38562, 39600, 39601, 39607 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95673. Reporting Requirements.

- (a) Owners or operators of facilities in sectors listed in section 95666 subject to requirements specified in sections 95668, 95669, and 95669.1 shall report the following information to CARB by July 1st of each calendar year unless otherwise specified:

Flash Analysis Testing

- (1) Annually, for all flash analysis testing or recalculations of annual methane emissions, report the test results, calculations, and a description of the separator and tank system as specified in Appendix A, Table A1.

Reciprocating Natural Gas Compressors

- (2) Annually, report the initial and final, if applicable, emission flow rate measurement for each rod packing or seal and the number of compression cylinders as specified in Appendix A, Table A7.

Centrifugal Natural Gas Compressors

- (3) Annually, report the initial and final, if applicable, emission flow rate measurement for each wet seal and the number of wet seals as specified in Appendix A, Table A7.

Natural Gas Powered Pneumatic Controllers

- (4) Annually, report the initial and final, if applicable, emission flow rate measurement for each continuous bleed pneumatic controller with a designed emission flow rate of less than or equal to six (6) scfh as specified in Appendix A, Table A7.

Liquids Unloading of Natural Gas Wells

- (5) Annually, report the measured or calculated volume of natural gas vented to perform liquids unloading and the manual method used or equipment installed in the natural gas well(s) designed to automatically perform liquids unloading as specified in Appendix A, Table A2.

Well Casing Vents

- (6) Annually, report the emission flow rate measurement and percentage of the calendar year the well casing vent is open to the atmosphere for each well casing vent that is open to atmosphere as specified in Appendix A, Table A7.

Natural Gas Underground Storage

- (7) Within 24 hours of receiving an alarm or detecting a leak above 50,000 ppmv total hydrocarbons or above 10,000 ppmv total hydrocarbons if the 10,000 ppmv leak persists for more than 5 continuous calendar days at a natural gas injection/withdrawal wellhead assembly and attached pipelines, the owner or operator shall notify CARB, CalGEM, and the local air district to report the leak concentration measurement.
- (8) Within 24 hours of receiving an alarm signaled by a downwind air monitoring sensor(s) that detects a reading that is greater than four (4) times the downwind sensor(s) baseline, the owner or operator shall notify CARB, CalGEM, and the local air district to report the emissions measurement.
- (9) Quarterly, report the specified information in Appendix A, Table A5 for leaks identified during daily inspections or identified by a continuous leak monitoring system and measured above the minimum allowable leak threshold.
- (10) Within 24 hours of discovering wildlife, report any delays of inspection due to complying with wildlife regulations, including a description of the type of wildlife, identification of the regulations requiring work to be halted, and a follow-up notification within 24 hours of the inspections resuming, pursuant to sections 95668(h)(4)(B)1.a. and 95668(h)(4)(B)3.a.
- (11) Annually, report data gathered by the upwind and downwind monitoring sensors.

Leak Detection and Repair

- (12) Annually, report the results of each leak detection and repair inspection conducted during the calendar year as specified in Appendix A, Table A4.
- (13) Annually, report the specified information in Appendix A, Table A5 for components measured above the minimum allowable leak threshold.

Remotely Detected Emission Plumes

- (14) Within five (5) calendar days after receiving an emission plume detection notification pursuant to section 95669.1(a), if section 95669.1(b)(1) applies, report the date of the CARB notification, the emission ID provided in the notification, and a description of the venting, including a brief summary of the source of the venting and why the venting occurred.
- (15) Within 72 hours after conducting an inspection pursuant to section 95669.1(b), report all the following information:
 - (A) The date of the CARB notification.
 - (B) The emission ID number provided by CARB in the notification.
 - (C) The date of the inspection.
 - (D) The type of inspection performed (Method 21 or optical gas imaging).
 - (E) The type of emission source found, which shall be no emission source, a venting emission source, a leak detected using Method 21, or an unintentional emission source detected using optical gas imaging.
 - (F) The initial mitigation plan, unless the emission source is not found or is a venting emission source. The initial mitigation plan shall consist of a statement of whether the emission source has already been successfully repaired and, if not, a brief description of what actions the owner or operator anticipates taking to repair the emission source.
- (16) Within five (5) calendar days after conducting an inspection pursuant to section 95669.1(b), if section 95669.1(d)(1) applies, report the emission ID provided in the notification and a description of the venting, including a brief summary of the source of the venting and why the venting occurred.
- (17) Within five (5) calendar days after repairing a remotely detected emission source pursuant to sections 95669.1(d)(2), 95669.1(d)(3)(B), or 95669.1(d)(4), report the emission ID provided in the notification, the type of equipment associated with the emission source, and the date of repair. If the emission source was a leaking component, also report the type of component, the date of the US EPA Reference Method 21 (October 1, 2017) measurement, the initial leak concentration, and the post-repair leak concentration.

- (18) Within five (5) calendar days after performing a US EPA Reference Method 21 (October 1, 2017) measurement following an optical gas imaging inspection (in response to a remote emission detection) that does not result in finding a leak over the leak concentration threshold as described in section 95669.1(d)(3)(A), report the emission ID provided in the notification and a statement that the follow-up US EPA Reference Method 21 (October 1, 2017) measurement did not show a leak over the leak concentration threshold.
- (19) Annually, report the information specified in Appendix A, Table A8 for all remotely detected methane emission plume notifications received pursuant to section 95669.1(a).

Delay of Repair

- (20) Within three (3) calendar days after successful repair, report the date of successful repair and the repaired leak concentration or emission flow rate for all repairs delayed pursuant to section 95670.1.

Vapor Collection Systems and Vapor Control Devices

- (21) Within three (3) calendar days after completing maintenance and returning a vapor collection system or vapor control device to service following a time extension to perform maintenance pursuant to section 95671(g)(1), report the date(s) the equipment was taken out of service and the date(s) the equipment was returned to service during the calendar year.

Separator and Tank Systems Subject to Appendix D

- (22) Complete the reporting requirements specified in Appendix D sections (g)(1)(B), (g)(2), and (h)(6).

(b) Reports shall be submitted as follows:

- (1) Reports for sections 95673(a)(1)-(6), (12)-(13), and (19) shall be submitted through the California Electronic Greenhouse Gas Reporting Tool (Cal e-GGRT), which is accessed at the following website address: <https://caleggrt.arb.ca.gov/login.do>.
- (2) Reports for sections 95673(a)(7)-(11) shall be e-mailed to oilandgas@arb.ca.gov with the subject line "Natural Gas Underground Storage Reporting."
- (3) Reports for sections 95673(a)(14)-(18) shall be e-mailed to oilandgas@arb.ca.gov with the subject line "Remote Emission Detection Reporting."

- (4) Reports for section 95673(a)(20) shall be e-mailed to oilandgas@arb.ca.gov with the subject line "Delay of Repair."
- (5) Reports for section 95673(a)(21) shall be e-mailed to oilandgas@arb.ca.gov with the subject line "Vapor Collection System Maintenance Extension."
- (6) Reports for section 95673(a)(22) shall be submitted as specified in Appendix D.

Note: Authority cited: Sections 38510, 38562, 39600, 39601, 39607 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95674. Implementation.

(a) Implementation by CARB and by the Local Air Districts

- (1) The requirements of this subarticle are provisions of state law and are enforceable by both CARB and the local air districts where equipment covered by this subarticle is located. Local air districts may incorporate the terms of this subarticle into local air district rules. An owner or operator of equipment subject to this subarticle shall pay any fees assessed by a local air district for the purposes of recovering the district's cost of implementing and enforcing the requirements of this subarticle. Any penalties secured by a local air district as the result of an enforcement action that it undertakes to enforce the provisions of this subarticle may be retained by the local air district.
- (2) The CARB Executive Officer, at his or her discretion, may enter into an agreement or agreements with any local air district to further define funding, implementation, and enforcement processes, including arrangements further specifying approaches for implementation and enforcement of this subarticle, and for information sharing between CARB and local air districts relating to this subarticle.
- (3) Implementation and enforcement of the requirements of this subarticle by a local air district shall in no instance result in a standard, requirement, or prohibition less stringent than provided for by this subarticle, as determined by the CARB Executive Officer. The terms of any local air district permit or rule relating to this subarticle do not alter the terms of this subarticle, which remain as separate requirements for all sources subject to this subarticle.
- (4) Implementation and enforcement of the requirements of this subarticle by a local air district, including inclusion or exclusion of any of its terms within any local air district permit, or within a local air district rule, or registration of a facility with a local air district or CARB, does not in any way waive or limit CARB's authority to implement and enforce upon the requirements of this subarticle. A facility's permitting or registration status also in no way limits the ability of a local air district to enforce the requirements of this subarticle.

(b) Requirements for Regulated Facilities

- (1) Local Air District Permitting Application Requirements

- (A) Owners or operators of facilities or equipment regulated by this subarticle, and who are required by federal, state, or local law to hold local air district permits that cover those facilities or equipment shall apply for local air district permit terms ensuring compliance with this article. This requirement applies to facilities or equipment upon issuance of any new local air district permit covering these facilities or equipment, or upon the scheduled renewal of an existing permit covering these facilities or equipment.
 - (B) If, after the effective date of this subarticle, any local air district amends or adopts permitting rules that result in additional equipment or facilities regulated by this subarticle becoming subject to local air district permitting requirements, then owners or operators of that equipment or facility shall apply for terms in any applicable local air district permits for that equipment or facility that ensure compliance with this subarticle.
- (2) Facility and Equipment Reporting Requirements
- (A) Owners or operators of facilities or equipment that are regulated by this subarticle (meaning that section 95666 applies to the facility or equipment, regardless of any exemptions from specific requirements) shall report the following information to CARB as specified in Appendix A, Table A6 no later than January 1, 2018, or within 30 days of a new facility beginning operations, unless the local air district has established a registration or permitting program that collects at least the following information, and has entered into a Memorandum of Agreement with CARB specifying how information is to be shared with CARB. Reports to CARB shall be submitted through the California Electronic Greenhouse Gas Reporting Tool (Cal e-GGRT), which is accessed at the following website address: <https://caleggrrt.arb.ca.gov/login.do>.
 - 1. The owner or operator's name and contact information.
 - 2. The address or location of each facility with equipment regulated by this subarticle.
 - 3. A description of all equipment covered by this subarticle located at each facility including the following:
 - a. The number of crude oil or natural gas wells at the facility.

- b. A list identifying all pressure vessels, tanks, separators, sumps, and ponds at the facility, including the size of each tank and separator in units of barrels. The list shall also specify whether or not the equipment is controlled with a floating roof tank or a vapor collection system or is not controlled. Separator and tank systems that comply with the provisions in sections 95668(a)(2)(F), 95668(a)(2)(G), 95668(a)(2)(H), or 95668(a)(2)(I) do not need to be included in this list.
 - c. The annual crude oil, condensate, natural gas, and produced water throughput of the facility.
 - d. A list identifying all reciprocating and centrifugal natural gas compressors at the facility. The list shall include the size of the compressors in units of horsepower and shall specify whether or not the compressors are controlled with a vapor collection system. For centrifugal compressors, the list shall specify whether the compressor has a wet or dry seal.
 - e. A list identifying all natural gas powered pneumatic controllers and pumps at the facility. The list shall specify whether or not the pneumatic controllers and pumps are controlled with a vapor collection system.
 4. The permit numbers of all local air district permits issued for the facility or equipment, and an identification of permit terms that ensure compliance with the terms of this subarticle, or an explanation of why such terms are not included.
 5. An attestation that all information provided about the facility and equipment is provided by a party authorized by the owner or operator to do so, and that the information is true and correct.
- (B) Updates to these reports, recording any changes in this information, shall be filed with CARB, or, as relevant, with the local air district no later than July 1 of the calendar year after the year in which any information required by this subarticle has changed. Updates to CARB shall be submitted through the California Electronic Greenhouse Gas Reporting Tool (Cal e-GGRT).

1. Notification of changes in ownership of facilities that are regulated by this subarticle shall be e-mailed to oilandgas@arb.ca.gov within 30 days of the change with the subject line "O&G Change of Ownership" in addition to being submitted through the California Electronic Greenhouse Gas Reporting Tool (Cal e-GGRT). The notification shall include the date the change in ownership occurred.

(3) Owners or operators of equipment subject to this subarticle shall comply with all the requirements of sections 95666, 95667, 95668, 95669, 95669.1, 95670, 95670.1, 95671, 95672, 95673, and 95674 of this subarticle, regardless of whether or not they have complied with the permitting and facility and equipment reporting requirements of this section.

(c) *Rounding*

(1) For enforcement purposes, significant figures will not be used. For example, an API gravity of 19.9999 would be considered less than 20. Similarly, an emission rate of 10.0001 metric tons per year of methane would be considered greater than 10.

Note: Authority cited: Sections 38510, 38562, 39600, 39601, 39603, 39607 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600, 40701, 40702, 41511, 42300, 42301 and 42311, Health and Safety Code.

§ 95675. Enforcement.

- (a) Failure to comply with the requirements of this subarticle at any individual piece of equipment subject to this subarticle constitutes a single, separate violation of this subarticle.
- (b) Each day, or portion thereof, that an owner or operator is not in full compliance with the requirements of this subarticle is a single, separate violation of this subarticle.
- (c) Each metric ton of methane emitted in violation of this subarticle constitutes a single, separate violation of this subarticle.
- (d) Failure to submit any report required by this subarticle shall constitute a single, separate violation of this subarticle for each day or portion thereof that the report has not been received after the date the report is due.
- (e) Failure to retain and failure to produce any record that this subarticle requires to be retained or produced shall each constitute a single, separate violation of this subarticle for each day or portion thereof that the record has not been retained or produced.
- (f) Submitting or producing inaccurate information required by this subarticle shall be a violation of this subarticle.
- (g) Falsifying any information or record required to be submitted or retained by this subarticle shall be a violation of this subarticle.

Note: Authority cited: Sections 38510, 38562, 38580, 39600, 39601, 39607 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95676. No Preemption of More Stringent Air District or Federal Requirements.

This regulation does not preempt any more stringent requirements imposed by any air district. Compliance with this subarticle does not excuse noncompliance with any Federal regulation. The CARB Executive Officer retains authority to determine whether an air district requirement is more stringent than any requirement of this subarticle.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

§ 95677. Severability.

Each part of this subarticle is deemed severable, and in the event that any part of this subarticle is held to be invalid, the remainder of the subarticle shall continue in full force and effect.

Note: Authority cited: Sections 38510, 38562, 39600, 39601 and 41511, Health and Safety Code. Reference: Sections 38551, 38560, 38566, 39600 and 41511, Health and Safety Code.

Appendix A

Record Keeping and Reporting Forms

**Table A1
Flash Analysis Testing Record Keeping Form**

| | | | | | | | |
|--|---------------|--|---|----------------------------|---------------------------|--|--|
| Facility Name: | | | | Air District: | | | |
| Owner/Operator Name: | | | | | | | |
| Address: | | | | | | | |
| City: | | | | State: | | Zip: | |
| Contact Person: | | | | Phone Number: | | | |
| Tank System ID: | | | | | | | |
| Testing Date: | | | | | | | |
| Crude Oil or Condensate Samples | | | | | | | |
| API Gravity | GOR (scf/bbl) | MW (g/g-mole) | WT% CH ₄ (decimal <1; e.g., .43) | Sample Temperature (°F) | Sample Pressure (psia) | Throughput (bbl/day) | MTCH ₄ /Yr (metric tons) |
| | | | | | | | |
| Produced Water Samples | | | | | | | |
| GWR (scf/bbl) | MW (g/g-mole) | WT% CH ₄ (decimal <1; e.g., .43) | Sample Temperature (°F) | Sample Pressure (psia) | Throughput (bbl/day) | MTCH ₄ /Yr (metric tons) | |
| | | | | | | | |
| Days in Operation Per Year: | | | | | | | |
| Combined Emissions (metric tons): | | | | | | | |
| Separator and Tank System Description | | | | | | | |
| Production Type*: | | | | | | | |
| Number of Wells: | | | | | | | |
| Annual Crude Oil Throughput (bbls): | | | | | | | |
| Annual Condensate Throughput (bbls): | | | | | | | |
| Annual Natural Gas Throughput (MMcf): | | | | | | | |
| Annual Produced Water Throughput (bbls): | | | | | | | |

*Production type includes crude oil production, natural gas production, natural gas storage, natural gas transmission, natural gas processing plant, and natural gas gathering and boosting station.

Table A2
Liquids Unloading Record Keeping Form

| Facility Name: | | Air District: | | |
|----------------------|---------|------------------------------------|---------------------------------|-------------------------------------|
| Owner/Operator Name: | | | | |
| Address: | | | | |
| City: | | State: | | Zip: |
| Contact Person: | | Phone Number: | | |
| | | | | |
| Date | Well ID | Volume of Natural Gas Vented (Mcf) | Method (Calculated or Measured) | Manual Method/Automation Equipment* |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

*Manual method/automation equipment includes foaming agent, velocity tubing, plunger lift, etc.

**Table A3
 Designated Critical Component Record Keeping and Reporting Form**

| | | | |
|----------------------|----------------|---|------|
| Facility Name: | | Air District: | |
| Owner/Operator Name: | | Signature*: | |
| Address: | | | |
| City: | | State: | Zip: |
| Contact Person: | | Phone Number: | |
| | | | |
| Component Type: | Approval Date: | Description of Supporting Documentation** | |
| | | | |
| | | | |

*By signing this form, I am attesting that I am authorized to do so, and that the information provided is true and correct.

**Supporting documentation shall include diagrams showing process flow or instrumentation, a table of uniquely identified components, photographs, written descriptions, or other clear means of identification.

**Table A4
 Leak Detection and Repair Inspection
 Record Keeping Form**

| Facility Name: | | | Air District: | | |
|----------------------|--------------------|-------------------------------------|--|-----------------------|------------------------|
| Owner/Operator Name: | | | | | |
| Address: | | | | | |
| City: | | | State: | | Zip: |
| Contact Person: | | | Phone Number: | | |
| | | | | | |
| | | | Count of Leaking Components in each Category | | |
| Quarter | Date of Inspection | Total Count of Components Inspected | 1,000 to 9,999 ppmv | 10,000 to 49,999 ppmv | 50,000 ppmv or greater |
| Q1 | | | | | |
| Q2 | | | | | |
| Q3 | | | | | |
| Q4 | | | | | |

**Table A6
 Facility and Equipment Record Keeping Form**

| Date: | | | | | | | | | | | |
|--|------------------|--------------|---|----------------|-------------------|-------------------------------|---------------------------------------|---------------------------------------|--|----------|-----------|
| Facility Name: | | | | | | Air District: | | | | | |
| Facility Address or Location: | | | | | | | | | | | |
| Owner/Operator Name: | | | | | | | | | | | |
| Address: | | | | | | | | | | | |
| City: | | | | | | State: | | | Zip: | | |
| Contact Person: | | | | Phone Number: | | | | Email address: | | | |
| Production Type*: | | | | | | Number of Wells: | | | | | |
| Crude Oil Annual Throughput (bbls): | | | | | | | | | | | |
| Condensate Annual Throughput (bbls): | | | | | | | | | | | |
| Annual Natural Gas Throughput (MMcf): | | | | | | | | | | | |
| Produced Water Annual Throughput (bbls): | | | | | | | | | | | |
| Equipment | | | | | | | | | | | |
| ID | Equipment Type** | Seal Type*** | Permitted? (if yes, please provide permit ID) | Tank System ID | Tank Contents**** | Does tank have floating roof? | Is vapor collection system installed? | Size of Compressor (hp) or Tank (bbl) | Equipment subject to requirements of standards in section 95668? (Y/N) | Latitude | Longitude |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

*Production type includes crude oil production, natural gas production, natural gas storage, natural gas transmission, natural gas processing plant, and natural gas gathering and boosting station.

**Equipment type includes centrifugal natural gas compressor, continuous high bleed natural gas-actuated pneumatic controllers, continuous low bleed natural gas-actuated pneumatic controllers, intermittent bleed natural gas-actuated pneumatic controllers, natural gas-actuated pneumatic pumps, pond, pressure separator, reciprocating natural gas compressor, separator, sump, and tank.

***Seal type is for centrifugal natural gas compressors and includes wet seal and dry seal.

****Tank contents includes oil, water, and condensate.

**Table A7
 Emission Flow Rate Record Keeping Form**

| Facility Name: | | | | | | | Air District: | | | | | |
|-------------------------------|--------------|-----------------|---------|------------------------|-------------------------|----------------------------|---|--|---------------------|---------------------|--------------------------------------|--|
| Facility Address or Location: | | | | | | | | | | | | |
| Owner/Operator Name: | | | | | | | | | | | | |
| Address: | | | | | | | | | | | | |
| City: | | | | | | | State: | | | Zip: | | |
| Contact Person: | | | | | | | Phone Number: | | | | | |
| | | | | | | | | | | | | |
| Measurement Date | Equipment ID | Equipment Type* | Well ID | Flow Rate (scfm) ** | Flow Rate (scfh) *** | Repair Date, if applicable | Post-Repair Flow Rate (scfm), if applicable ** | Post-Repair Flow Rate (scfh), if applicable *** | Number of Cylinders | Number of Wet Seals | Amount of Time WCV Has Been Open (%) | Compressor Exemption Reason, if applicable **** |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

*Equipment type includes centrifugal natural gas compressor, reciprocating natural gas compressor, continuous high bleed natural gas-actuated pneumatic controller, continuous low bleed natural gas-actuated pneumatic controller, and open well casing vent.

**For compressors and open well casing vents.

***For pneumatic controllers.

****Exemption reason includes "operated less than 200 hours" and "has vapor recovery installed".

**Table A8
 Remote Emission Detection Follow-up Inspection Record Keeping Form**

| | | |
|----------------------|---------------|------|
| Facility Name: | Air District: | |
| Owner/Operator Name: | | |
| Address: | | |
| City: | State: | Zip: |
| Contact Person: | Phone Number: | |

| For all notifications, record the columns below | | | | | | For venting, also record | For unintentional emission sources requiring repair, also record | | | | | | | | |
|---|---|------------------|-------------------|--|--------------------------------|----------------------------|--|---|---|--|--|------------------------------------|--|-------------|--|
| Emission ID (provided by CARB) | Date of Emission Notification from CARB | Inspection Date* | Instrument Used** | Method 21 Instrument Calibration Date, if applicable | Type of Emission Identified*** | Description of Venting**** | Emitting Equipment Type | Emitting Equipment ID or detailed description for the equipment | Emitting Component Type, if component source***** | Emitting Comp. Type – Other (specify here) | Emitting Comp. ID, if component source | Active or idle well, if applicable | Initial Leak Conc. (ppmv), if comp. source | Repair Date | Conc. After Repair (ppmv), if comp. source |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

*If an inspection did not occur pursuant to section 95669.1(b)(1), enter "reported venting."
 **Instrument used shall be optical gas imaging (OGI) or Method 21 and include make and model.
 ***Type of emission identified includes unintentional-leak, unintentional-below leak threshold, unintentional-non-component, venting-routine, venting-construction/maintenance, or none.
 ****Description of venting shall include a brief summary of the source of the venting and why it occurred.
 *****Component type includes valve, connector, flange, fitting – pressure meter/gauge, fitting – not pressure meter/gauge, open-ended line, plug, pressure relief device, stuffing box, and other.

Appendix B

Calculation for Determining Vented Natural Gas Volume from Liquids Unloading of Natural Gas Wells

$$E_{scf} = \left(\frac{V * P_1 * T_2}{P_2 * T_1} \right) + (FR * HR)$$

Where:

E_{scf} is the natural gas emissions per event in scf

$V = \pi * r^2 * D$ (volume of the well)

$r = \frac{CD}{2}$ (radius of the well)

CD is the casing diameter in feet

D is the depth of the well in feet

P_1 is the shut-in pressure of the well in psia

P_2 is 14.7 psia (standard surface pressure)

T_1 is the temperature of the well at shut-in pressure in °F

T_2 is 60 °F (standard surface temperature)

FR is the metered flowrate of the well or the sales flowrate of the well in scf/hour

HR is the hours the well was left open to atmosphere during unloading

$$CH_4 \text{ emissions} = E_{scf} * MF_{CH_4} * MV * MW_{CH_4} * \left(\frac{\text{metric ton}}{2204.6 \text{ lb}} \right)$$

Where:

$CH_4 \text{ emissions}$ is in metric tons per event

$MF_{CH_4} = \frac{\text{lbmole } CH_4}{\text{lbmole gas}}$ (mole fraction of CH_4 in the natural gas)

$MV = \frac{1 \text{ lbmole gas}}{379.3 \text{ scf gas}}$ (molar volume)

$MW_{CH_4} = \frac{16 \text{ lb } CH_4}{\text{lbmole } CH_4}$ (molecular weight of CH_4)

Appendix C

Test Procedure for Determining Annual Flash Emission Rate of Gaseous Compounds from Crude Oil, Condensate, and Produced Water

1. PURPOSE AND APPLICABILITY

In crude oil and natural gas production, flash emissions may occur when gas dissolved in crude oil, condensate, or produced water is released from the liquids due to a decrease in pressure or increase in temperature, such as when the liquids are transferred from an underground reservoir to the earth's surface. This procedure is used for determining the annual flash emission rate from tanks used to separate, store, or hold crude oil, condensate, or produced water. The laboratory methods required to conduct this procedure are used to measure methane and other gaseous compounds.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

This procedure is conducted by collecting samples of crude oil or condensate and produced water upstream of a separator or tank where flashing may occur. Samples shall be collected under pressure and according to the methods specified in this procedure. If a pressure separator is not available for collecting samples, sampling shall be conducted using a portable pressurized separator.

Two sampling methods are specified for collecting liquid samples. The first method requires a double valve cylinder and the second requires a piston-type constant pressure cylinder. Both methods shall be conducted as specified in this procedure.

The laboratory methods specified for this procedure are based on American Standards and Testing Materials (ASTM), US Environmental Protection Agency (US EPA), and Gas Processor Association (GPA) methods. These laboratory methods measure the volume and composition of gases that flash from the liquids, including a Gas-Oil or Gas-Water Ratio, as well as the molecular weight and weight percent of the gaseous compounds. Included are procedures for measuring the bubble point pressure and conducting a laboratory flash analysis. The laboratory results are used with the crude oil or condensate or produced water throughput to calculate the mass of emissions that are flashed from the liquids per year.

3. DEFINITIONS

For the purposes of this procedure, the following definitions apply:

- 3.1 "Bubble point pressure" means the pressure, at the pressurized sample collection temperature, at which the first bubble of gas comes out of solution.
- 3.2 "CARB" means the California Air Resources Board.
- 3.3 "Condensate" means hydrocarbon and other liquid either produced or separated from crude oil or natural gas during production and which condenses due to changes in pressure or temperature.
- 3.4 "Crude oil" means a mixture of hydrocarbons that exists in liquid or semi-solid phase in natural underground reservoirs and remains liquid or semi-solid at atmospheric pressure after passing through surface separating facilities.
- 3.5 "Double valve cylinder" means a metal cylinder equipped with valves on either side for collecting crude oil, condensate, or produced water samples.
- 3.6 "Emissions" means the discharge of natural gas into the atmosphere.
- 3.7 "Emulsion" means any mixture of crude oil, condensate, or produced water with varying amounts of natural gas contained in the liquid.
- 3.8 "Flash or flashing" means a process during which gas dissolved in crude oil, condensate, or produced water under pressure is released when subject to a decrease in pressure, such as when liquids are transferred from an underground reservoir to a tank on the earth's surface or from a pressure vessel to an atmospheric tank.
- 3.9 "Floating Piston cylinder" means a metal cylinder containing an internal pressurized piston for collecting crude oil, condensate, or produced water samples.
- 3.10 "Gas-Oil Ratio (GOR)" means a measurement used to describe the volume of gas that is flashed from a barrel of crude oil or condensate in a separator and tank system.
- 3.11 "Gas-Water Ratio (GWR)" means a measurement used to describe the volume of gas that is flashed from a barrel of produced water in a separator and tank system.

- 3.12** "Natural gas" means a naturally occurring mixture or process derivative of hydrocarbon and non-hydrocarbon gases, of which its constituents include methane, carbon dioxide, and heavier hydrocarbons. Natural gas may be field quality (which varies widely) or pipeline quality.
- 3.13** "Operating pressure" means the pressure of the vessel from which a sample is collected. If no vessel pressure gauge is available or the difference between the sampling train pressure gauge and vessel pressure gauge readings is greater than +/- 5 psig, the sampling train pressure gauge reading shall be used to record the pressure on Form 1.
- 3.14** "Operating temperature" means the temperature of the vessel from which a sample is collected. If no vessel temperature gauge is available or the difference between the sampling train temperature gauge reading and the vessel temperature gauge reading is greater than +/- 4 °F, then the sampling train temperature gauge reading shall be used to record the temperature on Form 1.
- 3.15** "Portable pressurized separator" means a sealed vessel that can be moved from one location to another by attachment to a motor vehicle without having to be dismantled and is used for separating and sampling crude oil, condensate, or produced water at the temperature and pressure of the separator and tank system required for sampling.
- 3.16** "Pressure separator" means a pressure vessel used for the primary purpose of separating crude oil and produced water or for separating natural gas and produced water.
- 3.17** "Pressure vessel" means any vessel rated, as indicated by an ASME pressure rating stamp, and operated to contain normal working pressures of at least 15 psig without vapor loss to the atmosphere and may be used for the separation of crude oil, condensate, produced water, or natural gas.
- 3.18** "Produced water" means water recovered from an underground reservoir as a result of crude oil, condensate, or natural gas production and which may be recycled, disposed, or re-injected into an underground reservoir.
- 3.19** "Separator" means any tank or pressure separator used for the primary purpose of separating crude oil and produced water or for separating natural gas, condensate, and produced water. In crude oil production a separator may be referred to as a Wash Tank or as a three-phase separator.

- 3.20** "Separator and tank system" means the first separator in a crude oil or natural gas production system and any tank or sump connected directly to the first separator.
- 3.21** "Tank" means any container constructed primarily of non-earthen materials used for the purpose of storing, holding, or separating emulsion, crude oil, condensate, or produced water and that is designed to operate below 15 psig normal operating pressure.
- 3.22** "Target temperature" means the temperature at which a pressurized hydrocarbon liquid is flashed, and is therefore the temperature of the first atmospheric separator or tank.
- 3.23** "Throughput" means the average volume of crude oil, condensate, or produced water expressed in units of barrels per day. Throughput used for calculations shall be the annual average value for the calendar year prior to the year in which the flash test occurred, and shall be calculated using data from CalGEM certified reports.

4. BIASES AND INTERFERENCES

- 4.1** The sampling method used to collect a liquid sample will have an impact on the final results reported. Liquid samples shall be collected in accordance with the sampling procedures specified in this procedure.
- 4.2** The location from where a sample is collected will have an impact on the final results reported. Liquid samples shall be collected from a pressure separator or portable pressurized separator as specified in this procedure.
- 4.3** Collecting liquid samples from a pressure separator or portable pressurized separator that periodically drains liquids will have an impact on the final results reported. Samples shall not be collected from a pressure separator or portable pressurized separator while it periodically drains liquids and shall only be taken when a drain valve is closed.
- 4.4** Collecting liquid samples using an empty double valve cylinder will allow gases to flash from the cylinder and will have an impact on the final results reported. Samples collected using a double valve cylinder shall be collected as specified in this procedure.
- 4.5** Displacing liquids from a double valve cylinder that are reactive and not immiscible with the sample liquid collected will result in gas composition or volume errors and will affect the final results reported. Displacement

liquids shall be pre-tested by a laboratory to verify that the liquid is non-reactive and is immiscible with the sample liquid collected.

- 4.6 Non-calibrated equipment including pressure or temperature gauges will have an impact the final results reported. All pressure and temperature measurements shall be conducted with calibrated gauges as specified in this procedure and shall be calibrated at least twice per year.
- 4.7 Conducting laboratory procedures other than those specified in this procedure will have an impact on the final results reported. All laboratory methods and quality control and quality assurance procedures shall be conducted as specified in this procedure.
- 4.8 The collection of duplicate samples is recommended to verify reported results.
- 4.9 Failure to perform the bubble point pressure and sample integrity check may affect the reported results.
- 4.10 Performing a flash analysis by a means other than the method specified in this procedure may affect the reported results.

5. SAMPLING EQUIPMENT SPECIFICATIONS

- 5.1 An intrinsically safe pressure gauge capable of measuring liquid pressures of up to 2,000 pounds per square inch absolute within +/- 0.1 percent accuracy.
- 5.2 A temperature gauge capable of reading liquid temperature within +/- 2°F and within a range of 32°F to 250°F.
- 5.3 A graduated cylinder capable of measuring liquid in at least five (5) milliliter increments with at least the same capacity as the double valve cylinder used for liquid sampling.
- 5.4 A portable pressurized separator that is sealed from the atmosphere and is used for collecting crude oil, condensate, and produced water samples at the temperature and pressure of the separator and tank system being sampled.

6. SAMPLING EQUIPMENT

- 6.1 A double valve cylinder or a piston cylinder of at least 300 milliliters in volume for collecting crude oil or condensate samples or at least 800 milliliters in volume for collecting produced water samples.

- 6.2 A graduated cylinder for use with double valve cylinder.
- 6.3 A waste container suitable for capturing and disposing sample liquid.
- 6.4 High-pressure rated metal components and control valves that can withstand the temperature and pressure of the pressure separator from which sample liquid is gathered.
- 6.5 Pressure gauges with minimum specifications listed in Section 5.
- 6.6 Temperature gauge with minimum specifications listed in Section 5.
- 6.7 If required, a portable pressurized separator with minimum specifications listed in Section 5.

7. DATA REQUIREMENTS

- 7.1 The data required to conduct this procedure shall be provided by the facility owner or operator prior to conducting the sampling methods specified in this procedure. Field sampling shall not be performed until all data requirements are provided as listed in Section 7.2 and as specified on Form 1.
- 7.2 For each sample collected, the following data shall be recorded on the sample cylinder identification tag and on Form 1 prior to conducting a sample collection method:
 - (a) The separator identification number or description.
 - (b) The separator temperature and pressure if available.
 - (c) First downstream atmospheric tank or separator temperature.

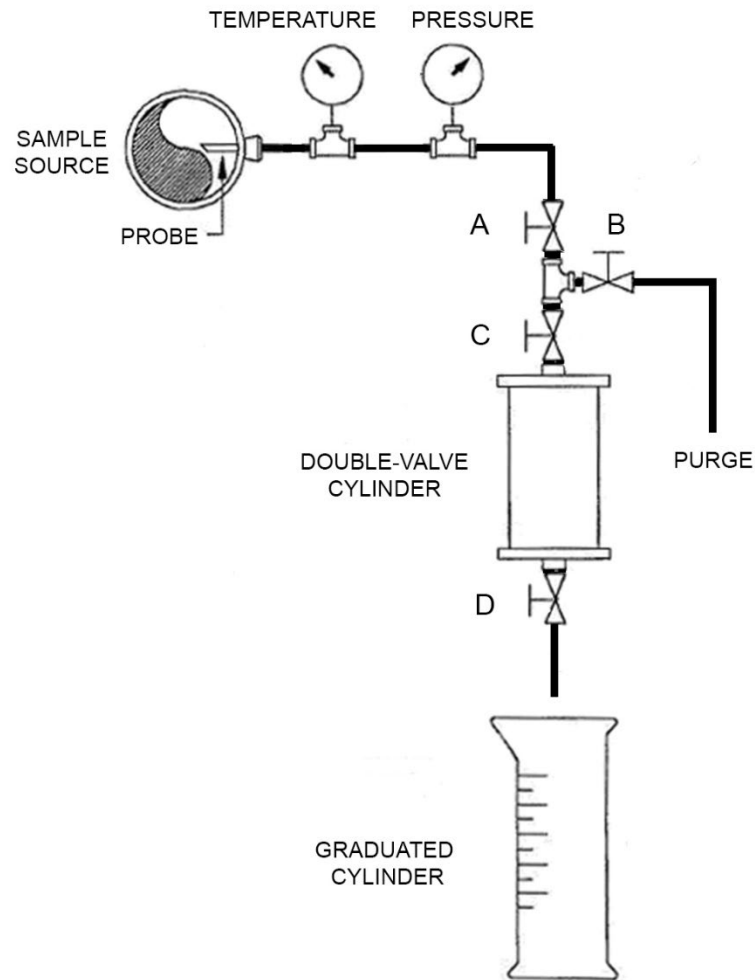
8. DOUBLE VALVE CYLINDER SAMPLING METHOD

- 8.1 Fill the double valve cylinder with non-reactive liquid that is immiscible with the liquid to be collected to prevent flashing within the cylinder and to prevent the displacement liquid from mixing or attaining homogeneity with the sample liquid.
 - (a) As an alternative for collecting produced water samples, the double valve cylinder may be filled with sample water under the same

pressure as the vessel to be sampled and then purged according to the procedure specified in section 8.6.

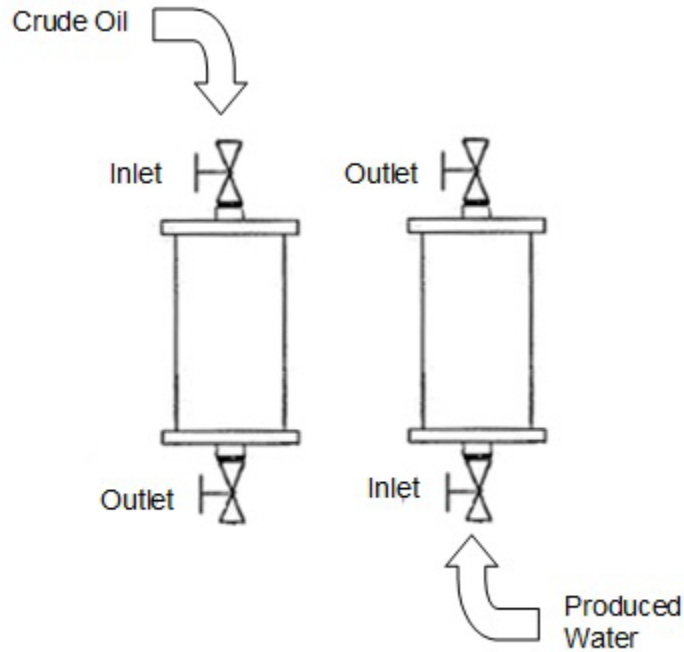
- 8.2** Identify a pressure separator immediately upstream of the separator or tank required for testing. If no pressure separator is available, install a portable pressurized separator immediately upstream of the separator or tank that can be used to collect crude oil, condensate, and produced water samples.
- 8.3** Record the sample collection data requirements specified in Section 7 on the cylinder identification tag and on Form 1.
- 8.4** Locate the sampling port(s) for collecting liquid samples.
- 8.5** Connect the sampling train as illustrated in Figure 1 to the sampling port on the pressure separator or portable pressurized separator while minimizing tubing between the purge valve and cylinder as shown. Bushings or reducers may be required.
- 8.6** Purge the sampling train: Place the outlet of valve B into the waste container. With valves B, C and D closed, slowly open valve A completely, and then slowly open valve B to purge the sample train until a steady stream of liquid without gas pockets is observed, and then close valve B.
- 8.7** Prepare for sampling: Orient the double-valve cylinder in the vertical position so that displacement liquid can readily be discharged from the cylinder. Note that the orientation of valves C and D depend on the type of sample being collected and the liquid used for displacement. Based on density differences in liquids, the heaviest liquid shall be introduced or expelled from the bottom of cylinder. See Figure 2.
 - (a) If the alternative method for collecting a produced water sample is chosen, the cylinder shall be purged at a rate not to exceed 60 milliliters per minute until at least 1600 milliliters (two cylinder volumes) are purged through the cylinder that has been previously filled with pressurized sample water prior to proceeding further.
- 8.8** Slowly open valve C to the full open position and place the outlet of valve D into the graduated cylinder.

Figure 1: Double Valve Cylinder Sampling Train



- 8.9** Collect liquid sample: Slowly open valve D to allow a slow displacement of the non-reactive displacement liquid at a rate not to exceed 60 milliliters per minute to prevent the sample liquid from flashing. Continue until approximately 70 percent of the displacement liquid is measured in the graduated cylinder. Then close valves D and C.
- 8.10** Record the pressure and temperature on Form 1.

Figure 2: Double Valve Cylinder Orientation

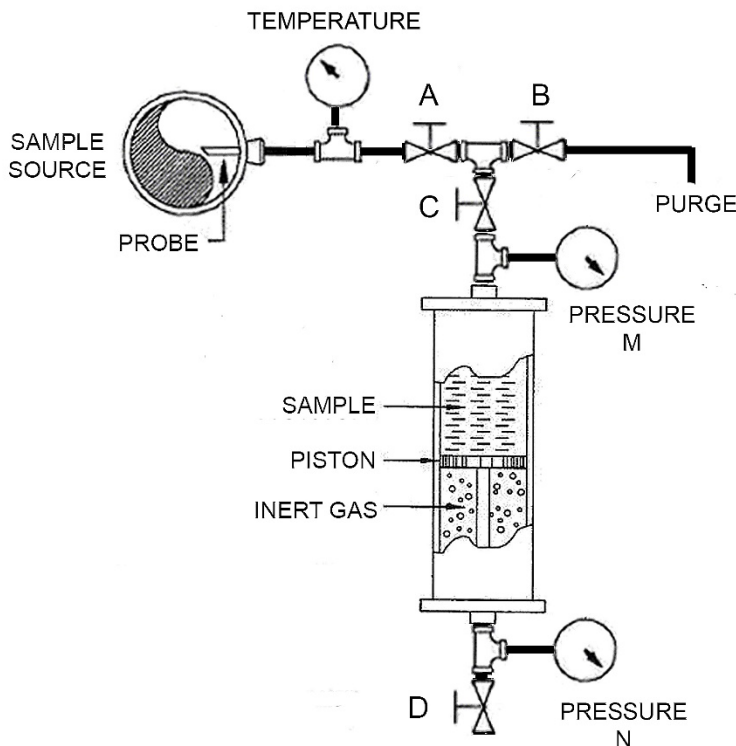


- 8.11 Record the double valve cylinder volume and the volume of liquid sampled on the cylinder identification tag and on Form 1.
- 8.12 Drain approximately 20 percent of the remaining displacement liquid into the graduated cylinder to take outage and record the actual volume of liquid drained on Form 1. This is required for safety and to prevent a pressurized cylinder from exploding during transport.
- 8.13 Disconnect the sample cylinder from the sampling train and verify that both valves are sealed.
- 8.14 Remove sampling train: With valves D and C closed, purge any remaining liquid in the sampling train through valve B. Then close valves A and B. Disconnect the sampling train from the pressure separator or portable pressurized separator.
- 8.15 Verify that all of the data requirements are recorded on the cylinder identification tag and on Form 1.
- 8.16 Transport the cylinder to the laboratory for conducting the laboratory methods specified in Section 12.

9. PISTON CYLINDER SAMPLING METHOD

- 9.1** Identify a pressure separator immediately upstream of the separator or tank required for testing. If no pressure separator is available, install a portable pressurized separator immediately upstream of the separator or tank that can be used to collect crude oil, condensate, and produced water samples.
- 9.2** Record the sample collection data requirements specified in Section 7 on the cylinder identification tag and on Form 1.
- 9.3** Locate the sampling port(s) for collecting liquid samples.
- 9.4** Connect the sampling train as illustrated in Figure 3 to the pressure separator or pressurized portable separator while minimizing tubing between the purge valve and cylinder as shown. Bushings or reducers may be required.
- 9.5** Purge the sampling train: Place the outlet of valve B into the waste container. With valves B, C and D closed, slowly open valve A completely, and then slowly open valve B to purge the sample train until a steady stream of liquid without gas pockets is observed, and then close valve B.

Figure 3: Piston Cylinder Sampling Train



- 9.6 Prepare for sampling: Verify that the gas pressure in the piston cylinder is greater than the pressure of sample liquid. If not, additional gas pressure shall be applied to the piston.
- 9.7 With valve B closed and valve A open, slowly open valve C to the full open position, then slowly open valve D until the pressure indicated on Gauge N is equal to Gauge M and then close valve D momentarily.
- 9.8 Collect liquid sample: Slowly open Valve D to allow liquid to enter the piston cylinder at a rate not to exceed 60 milliliters per minute by using the indicator and scale on the piston cylinder. Continue until a maximum of 80 percent of the cylinder is filled with liquid. Then close valves C and D.
- 9.9 Record the pressure and temperature on Form 1.
- 9.10 Record the cylinder volume and volume of liquid sampled on the cylinder identification tag and on Form 1.
- 9.11 Disconnect the sample cylinder from the sampling train and verify that both valves are sealed.

- 9.12 Remove sampling train: Place the outlet of valve B into the waste container and slowly open valve B to purge all liquid from the sampling train. Then close valves A and B. Disconnect the sampling train from the pressure separator or portable pressurized separator.
- 9.13 Verify that all of the data requirements are recorded on the cylinder identification tag and on Form 1.
- 9.14 Transport the cylinder to the laboratory for conducting the laboratory methods as specified in Section 12.

10. LABORATORY REQUIREMENTS AND METHODS

10.1 Quality Control, Quality Assurance, and Field Records

- (a) Quality control requirements shall be performed in accordance with the laboratory methods specified in this test procedure.
- (b) Each day of sampling, at least one field duplicate sample shall be collected per matrix type (crude oil, condensate, produced water). The field duplicate samples are collected to demonstrate acceptable method precision. Through this process the laboratory can evaluate the consistency of sample collection and analytical measurements as well as matrix variation. The laboratory should establish control limits based on relative percent difference to evaluate the validity of the measured results.
- (c) Laboratory procedures shall be in place for establishing acceptance criteria for field activities described in Sections 7, 8 and 9 of this procedure. All deviations from the acceptance criteria shall be documented. Deviations from the acceptance criteria may or may not affect data quality.
- (d) Laboratory procedures shall be in place to ensure that field staff have been trained on the sampling methods specified in this procedure and retrained on sampling methods if this procedure changes.
- (e) Field records shall provide direct evidence and support necessary for technical interpretations, judgments, and discussions concerning project activities and shall, at a minimum, include a completed copy of Form 1 as provided in this procedure for each sample collected.

10.2 Laboratory Equipment

- (a) All laboratory equipment used to conduct measurements shall be calibrated in accordance with the manufacturer specifications and in accordance with the laboratory methods specified in this procedure.

- (b) Any chromatograph system that allows for the collection, storage, interpretation, adjustment, or quantification of chromatograph detector output signals representing relative component concentrations may be used to conduct this procedure. All test methods and quality control requirements shall be conducted in accordance with each laboratory method specified.
- (c) The minimum reporting limit of the instruments used for reporting gaseous compounds shall be at least 100 parts per million (ppm) for both hydrocarbon and fixed gases.
- (d) The laboratory equipment, including sample lines, shall be temperature controlled and allow for the independent control of the sample cylinder and flash analysis equipment temperatures.
- (e) A gas volume meter with the capability of measuring volume in increments of one (1) milliliter minimum is required.
- (f) Laboratory vessels (e.g., glassware, cylinders, etc.) and equipment for collecting flash gas without sample degradation and without compromising the integrity of the sample are required.
- (g) A metering pump for introducing deionized water into a sample cylinder that can meter the water in precise increments (e.g., 0.01 milliliters) is required.

10.3 Bubble Point Pressure and Sample Integrity Check

This procedure is used to determine the bubble point pressure at sample collection temperature of a pressurized hydrocarbon liquid prior to conducting a flash or any compositional analysis. These results determine the integrity of the sample and provide a means of verifying the sampling conditions reported on Form 1. When heating is required, safety precautions shall be taken due to thermal expansion within a pressurized cylinder. This procedure is performed with the use of a Double Valve cylinder and is not applicable for Floating-Piston cylinders. Samples gathered with the use of a Floating-Piston cylinder shall be transferred to a Double Valve cylinder using a water displacement method prior to conducting this procedure.

- (a) Fix the cylinder in an upright vertical position using a ring stand or similar device. This ensures that headspace gas remains at the top of the cylinder.

- (b) Connect a pressure gauge and source of pressurized deionized water to the bottom of the sample cylinder using a metering pump for measuring the volume of water introduced into the sample cylinder.
- (c) Slowly condition the cylinder to the measured sample collection temperature reported on Form 1 while monitoring pressure for a minimum of two (2) hours or until a change of no more than one (1) psi in pressure over 15 minutes is observed.
- (d) Introduce deionized water while slowly mixing the sample by tilting the cylinder no more than 60 degrees from vertical in either direction to ensure that headspace gas remains at the top of the cylinder and liquid remains on the bottom. Continue adding deionized water to increase the pressure to above the pressure reported on Form 1, while mixing to ensure the sample returns to a single phase liquid.
- (e) Record the stabilized pressure reading on the laboratory report.
- (f) Remove a small increment of deionized water (approximately 0.5 milliliters) to reduce the pressure and allow it to stabilize. Document the sample pressure and the volume of deionized water (pump volume) on the laboratory report. Repeat until at least three (3) pressure readings above and three (3) pressure readings below the reported value on Form 1 are gathered.
- (g) Graph the results of sample pressure and volume of deionized water (pump volume). Draw a line between the points above the measured value on Form 1. Draw a second line between the points below the measured value on Form 1. The intercept of the two lines denotes the bubble point pressure.
- (h) Record the bubble point pressure on the laboratory report.
- (i) Any sample that fails to achieve the following Pass/Fail criteria, which is the percentage difference between the bubble point pressure and the sample collection pressure reported on Form 1, shall be discarded:

| Pass/Fail Criteria for Bubble Point Pressure Measurements |
|---|
| +/- 5% for > 500 psig +/- 7% for 250 - 499 psig +/- 10% for 100 - 249 psig +/- 15% for 50 - 99 psig +/- 20% for 20 - 49 psig +/- 30% for < 20 psig |

10.4 Laboratory Flash Analysis Procedure

This procedure is used to determine the volume and composition of gas flashed from a pressurized liquid. This procedure is conducted after performing the bubble point pressure measurement to verify sample integrity.

- (a) Condition the sample cylinder to the collection temperature recorded on Form 1 for a minimum of two (2) hours. This step may be expedited by performing in conjunction with the Bubble Point determination.
- (b) Connect a pressure gauge and source of pressurized deionized water to the bottom of the sample cylinder using a metering pump for measuring the volume of water introduced into the sample cylinder.
- (c) Connect the top of the sample cylinder to a temperature controlled flash chamber that can be heated or cooled independently from the sample cylinder. The chamber shall be of sufficient volume to allow for the flash process and the collection of the flashed liquid. Located at the top of the chamber will be an inlet for the liquid, and an outlet for the gas. The gas vent line will allow the flash gas to be routed through a constant volume gas cylinder and on to a gas meter (e.g., gasometer).
- (d) Throughout the flash process, maintain the transfer lines, flash chamber, and constant volume gas cylinder and gas meter at the target temperature.
- (e) Before introducing pressurized liquid into the flash chamber, evacuate the entire system and purge with helium. Vent the helium purge gas to atmosphere through the meter and then re-zero the gas meter.
- (f) Introduce deionized water into the bottom of the liquid sample cylinder to increase the pressure to a start pressure above the bubble point pressure. This step ensures that the sample remains single phase when introduced into the flash chamber.

- (g) Document the start pressure. The flash study will be performed at this pressure and not at the field recorded sample pressure.
- (h) Partially open (*crack-open*) the liquid sample inlet valve to allow for a slight drip of liquid into the flash chamber. It is critical to maintain the pressurized liquid as close as possible to the start pressure.
- (i) After liquid hydrocarbon and gas have been observed, terminate the flash procedure by closing the liquid inlet valve. Document the volume or weight of the residual liquid and the volume of gas collected. Document the volume of pressurized liquid sample introduced into the system.
- (j) Isolate the gas sample in the constant volume gas cylinder by closing both valves. Detach the cylinder and analyze via ASTM D1945-03. Before analyzing, condition the gas sample for a minimum of two hours at a temperature of at least 30°F above the target temperature. Assure that the GC inlet line is heat traced to maintain sample integrity upon injection.
- (k) Measure the pressurized liquid density at the start pressure and temperature. Also measure the density at a second pressure also above the bubble point pressure and the start pressure. Extrapolate the density of the pressurized liquid at the collection pressure recorded on Form 1.
- (l) Correct the pressurized liquid volume from the start pressure to the sample collection pressure recorded on Form 1 using the density measurements.
- (m) Document corrected liquid volume.
- (n) Perform all necessary calculations including that of the GOR or GWR.
- (o) A mass balance (analytical integrity check) may be performed by comparing the weight of pressurized liquid used for the flash (determined from the corrected volume used and the density at sample conditions) to the sum of the weight of the liquid and the weight of the gas.

10.5 Gas-Oil and Gas-Water Ratio Calculation Methodology

- (a) Convert the volume of gas vapor measured during the laboratory flash analysis procedure to standard atmospheric conditions as derived from the Ideal Gas Law as follows:

$$Vapor_{Std} = \frac{(Volume_{Lab})(459.67 + 60F)(P_{Lab})}{(459.67 + T_{Lab})(14.696)} \quad \text{Equation 1}$$

Where:

Vapor_{Std} = Standard cubic feet of vapor at 60°F and 14.696 psia.

Volume_{Lab} = Volume of vapor measured at laboratory conditions.

T_{Lab} = Temperature of vapor at laboratory conditions, °F.

P_{Lab} = Pressure of vapor at laboratory conditions, psia.

459.67 = Conversion from Fahrenheit to Rankine

60F = Standard temperature of 60°F.

14.696 = Standard atmospheric pressure, psia.

- (b) Convert the volume of crude oil, condensate, or produced water measured after conducting the laboratory flash analysis procedure to standard conditions as follows:

$$Liquid_{Std} = \left(\frac{Mass_{Liquid}}{Density_{60F}} \right) \left(\frac{1 \text{ gallon}}{3785.412 \text{ ml}} \right) \left(\frac{1 \text{ STB}}{42 \text{ gallons}} \right) \quad \text{Equation 2}$$

Where:

Liquid_{Std} = Standard volume of post-flash liquid at 60°F, barrels.

Mass_{Liquid} = Mass of liquid at laboratory conditions, grams.

Density_{60F} = Density of liquid at 60°F, grams/milliliter.

3785.412 = Conversion from milliliter to US gallons.

STB = Stock Tank Barrel.

42 gallons = Volume of a stock tank barrel at 60°F.

- (c) Calculate the Gas-Oil or Gas-Water Ratio as follows:

$$G = \frac{(Vapor_{Std})}{(Liquid_{Std})} \quad \text{Equation 3}$$

Where:

G = The Gas-Oil or Gas-Water Ratio.

Vapor_{Std} = Standard cubic feet of vapor at 60°F and 14.696 psia.

Liquid_{Std} = Standard volume of post-flash liquid at 60°F, barrels.

10.6 Analytical Laboratory Methods and Requirements

The following methods are required to evaluate and report flash emission rates from crude oil, condensate, and produced water.

- (a) Oxygen, Nitrogen, Carbon Dioxide, Methane, Ethane, Propane, i-Butane, n-Butane, i-Pentane, n-Pentane, Hexanes, Heptanes+: Evaluate per ASTM D1945-03 and ASTM D 3588-98.
- (b) BTEX: Evaluate per US EPA Method 8021B (GC/FID) or use US EPA Method

8260B, US EPA Method TO-14A, or US EPA Method TO-15 as alternate methods.

(c) Molecular Weight of gaseous phase by calculation per ASTM D 3588-98.

11. CALCULATING RESULTS

The following calculations are performed by the owner or operator in conjunction with the laboratory reports specified in Section 12. The same calculations are used for crude oil, condensate, and produced water.

11.1 Calculate the volume of gas flashed from the liquid per year using the Gas Oil or Gas Water Ratio obtained from the laboratory report as follows:

$$Ft^3 / Year = (G) \left(\frac{Barrels}{Day} \right) \left(\frac{Days}{Year} \right) \quad \text{Equation 4}$$

Where:

$Ft^3/Year$ = standard cubic feet of gas produced per year

G = Gas Oil or Gas Water Ratio (from laboratory report)

Barrels/Day = barrels per day of liquid (CalGEM certified reports)

Days/Year = days of operation per year (owner/operator)

11.2 Convert the gas volume to pounds as follows: **Equation 5**

$$Mass_{Gas} / Year = \left(\frac{Ft^3}{Year} \right) \left(\frac{gram}{gram - mole} \right) \left(\frac{gram - mole}{23.690 l} \right) \left(\frac{28.317 l}{Ft^3} \right) \left(\frac{lb}{454 grams} \right)$$

Where:

$Mass_{Gas} / Year$ = pounds of gas per year

$Ft^3/Year$ = cubic feet of gas produced per year (Equation 1)

Gram/Gram-Mole = Molecular weight (from laboratory report)

23.690 l/gr-mole = molar volume of ideal gas at 14.696 psi and 60°F

11.3 Calculate the annual mass of methane as follows:

$$Mass_{Methane} / Year = \left(\frac{WT\% Methane}{100} \right) \left(\frac{Mass_{Gas}}{Year} \right) \left(\frac{metric ton}{2205 lb} \right) \quad \text{Equation 6}$$

Where:

$Mass_{Methane} / Year$ = metric tons of methane

$Mass_{Gas} / Year$ = pounds of gas per year (Equation 5)

WT% Methane = Weight percent of methane (from laboratory report)

12. LABORATORY REPORTS

- 12.1** The results of this procedure are used by owners or operators of separator and tank systems to report annual methane flash emissions to CARB. The following information shall be compiled as a report by the laboratory conducting this procedure and provided to the owner or operator each time flash analysis testing is conducted:
- (a) A sketch or diagram of the separator and tank system depicting the sampling location;
 - (b) A copy of Form 1 as specified in this procedure for each liquid sample collected;
 - (c) The laboratory results for each liquid sample evaluated as specified in Section 12.4; and
 - (d) Other documentation or information necessary to support technical interpretations, judgments, and discussions.
- 12.2** Reports shall be made available to the owner or operator no later than 60 days from the date of liquid sampling.
- 12.3** Reports shall be maintained by the laboratory conducting this procedure for a minimum of five (5) years from the date of liquid sampling and additional copies shall be made available at the request of the owner or operator.
- 12.4** Laboratory reports shall include, at minimum, a listing of results obtained using the laboratory methods specified in this procedure and as specified in Table 1.

Table 1: Laboratory Data Requirements

| |
|--|
| WT% CO ₂ , CH ₄ |
| WT% C2-C6, C7+ |
| WT% BTEX |
| WT% O ₂ |
| WT% N ₂ |
| Molecular Weight of gas sample (gram/gram-mole) |
| Gas Oil or Gas Water Ratio (scf/stock tank barrel) |
| Post-Test Cylinder Water Volume |
| Post-Test Cylinder Oil Volume |

13. REFERENCES

- ASTM D1945-03 *Standard Test Method for Analysis of Natural Gas by Gas Chromatography, which is incorporated herein by reference. Reapproved 2010.*
- ASTM D 3588-98 *Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels, which is incorporated herein by reference. Reapproved 2003.*
- US EPA Method 8021B *Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, which is incorporated herein by reference. 2014.*
- US EPA Method 8260B *Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), which is incorporated herein by reference. 1996.*
- US EPA Method TO-14A *Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters with Subsequent Analysis By Gas Chromatography, which is incorporated herein by reference. 1999.*
- US EPA Method TO-15 *Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters and Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS), which is incorporated herein by reference. 1999.*

Appendix D

Additional Requirements for Separator and Tank Systems

This appendix applies to separator and tank systems that are required by section 95668(a) to have emissions controlled with a vapor collection system.

- (a) The owner or operator shall reduce emissions from each separator and tank system by 95.0 percent.
- (b) *Methods of controlling emissions.*
 - (1) Except as required in section (b)(2) of this appendix, if the owner or operator uses a vapor control device to reduce emissions, they shall equip each separator, tank, or sump of the separator and tank system with a cover that meets the requirements of section (c) of this appendix, that is connected through a vapor collection system that meets the requirements of Appendix E(a) and routed to a vapor control device that meets the conditions specified in Appendix E(b), as applicable. As an alternative to routing the vapor collection system to a vapor control device, the owner or operator may route the vapor collection system to a process, where process refers to one of the three options identified in section 95671(b) of this subarticle.
 - (2) If the owner or operator uses a floating roof to reduce emissions, they shall meet the requirements of 40 CFR 60.112b(a)(1) or (2) (October 8, 1997) and the relevant monitoring, inspection, recordkeeping, and reporting requirements in 40 CFR Part 60, Subpart Kb (January 19, 2021, which is incorporated herein by reference).
- (c) *Cover requirements for separator and tank systems.*
 - (1) The cover and all openings on the cover (e.g., access hatches, sampling ports, pressure relief valves, and gauge wells) shall form a continuous impermeable barrier over the entire surface area of the liquid in the separator, tank, or sump of the separator and tank system.
 - (2) Each cover opening shall be secured in a closed, sealed position (e.g., covered by a gasketed lid or cap) whenever material is in the unit on which the cover is installed except during those times when it is necessary to use an opening as follows:
 - (A) To add material to, or remove material from, the unit (this includes openings necessary to equalize or balance the internal pressure of the unit following changes in the level of the material in the unit);
 - (B) To inspect or sample the material in the unit;
 - (C) To inspect, maintain, repair, or replace equipment located inside the unit; or

- (D) To vent liquids, gases, or fumes from the unit through a vapor collection system, designed and operated in accordance with the requirements of Appendix E(a) to a vapor control device or to a process.
- (3) Each thief hatch shall be equipped, maintained, and operated with a weight, or other mechanism, to ensure that the lid remains properly seated and sealed under normal operating conditions, including such times when working, standing/breathing, and flash emissions may be generated. The owner or operator shall select gasket material for the hatch based on composition of the fluid in the separator and tank system and weather conditions.
- (d) Owners or operators shall demonstrate initial compliance with the emission reduction requirements that apply to each separator and tank system as required in section (h) of this appendix.
- (e) Owners or operators shall demonstrate continuous compliance with the emission control requirements that apply to each separator and tank system as required by section (i) of this appendix.
- (f) Owners or operators shall perform the required recordkeeping and reporting as required by section (j) of this appendix and sections 95672 and 95673 of this subarticle, as applicable.
- (g) *Requirements for separator and tank systems that are removed from service or returned to service.* Owners or operators of a separator and tank system subject to the emission control requirements that is removed from service shall comply with sections (g)(1) and (2) of this appendix. A separator and tank system is not subject to the requirements of this appendix for the period that it is removed from service.
 - (1) For a separator and tank system to be removed from service, the owner or operator shall comply with the requirements of sections (g)(1)(A) and (B) of this appendix.
 - (A) The owner or operator shall completely empty and degas each separator, tank, or sump of the separator and tank system such that the separator and tank system no longer contains crude oil, condensate, produced water, or intermediate hydrocarbon liquids. A separator and tank system where liquid is left on walls, as bottom clingage or in pools due to floor irregularity, is considered to be completely empty.

- (B) The owner or operator shall include a notification to CARB when they next report their facility and equipment information as specified in section 95674(b)(2) of this subarticle, identifying each separator and tank system removed from service during the reporting period and the date of its removal from service. This notification shall be e-mailed to oilandgas@arb.ca.gov with the subject line "Controlled Separator and Tank System Reporting."
 - (2) If a separator and tank system subject to emission control requirements identified in section (g)(1) of this appendix is returned to service during the reporting year, the owner or operator shall include a notification to CARB when they next report their facility and equipment information as specified in section 95674(b)(2) of this subarticle, identifying each separator and tank system that has been returned to service and the date of its return to service. This notification shall be e-mailed to oilandgas@arb.ca.gov with the subject line "Controlled Separator and Tank System Reporting."
- (h) *Initial Compliance Demonstration Requirements.* Owners or operators shall demonstrate initial compliance with the emission control requirements for each separator and tank system complying with this appendix by complying with the following:
 - (1) Owners or operators shall determine the annual emissions as specified in section 95668(a)(4), if applicable.
 - (2) If owners or operators use a vapor control device to reduce emissions, they shall equip each separator, tank, or sump of the separator and tank system with a cover that meets the requirements of section (c) of this appendix that is connected through a vapor collection system that meets the requirements of Appendix E(a) and is routed to a vapor control device that meets the requirements of Appendix E(b). As an alternative to routing the vapor collection system to a vapor control device, the owner or operator may route the vapor collection system to a process.
 - (3) Owners or operators shall conduct the initial cover and vapor collection system inspections according to the requirements in Appendix E(e) by July 1, 2024, for existing covers and vapor collection systems, or within 180 days of the installation of a new cover or vapor collection system.

- (4) Owners or operators shall comply with all reporting requirements specified in sections 95673 and 95674 of this subarticle, as applicable.
 - (5) Owners or operators shall maintain the records specified in section 95672 of this subarticle, as applicable.
 - (6) If owners or operators comply by using a floating roof, they shall submit a statement that they are complying with 40 CFR 60.112b(a)(1) or (2) (October 8, 1997) in accordance with section (b)(2) of this appendix when they report their initial or updated facility and equipment information as specified in section 95674(b)(2) of this subarticle. This notification shall be e-mailed to oilandgas@arb.ca.gov with the subject line "Controlled Separator and Tank System Reporting."
- (i) *Continuous Compliance Demonstration Requirements.* Owners or operators shall demonstrate continuous compliance for each separator and tank system subject to the emission control requirements in this appendix by complying with the following:
- (1) Owners or operators shall reduce emissions from the separator and tank system by 95.0 percent or greater.
 - (2) Owners or operators shall comply with all applicable continuous compliance demonstration requirements for vapor collection systems in Appendix E(d).
- (j) *Record Keeping Requirements.* For each separator and tank system, owners or operators shall maintain the records identified in sections (j)(1) through (3) of this appendix, as applicable.
- (1) Maintain, for at least five years from the date of the deviation, records of deviations in cases where the separator and tank system was not operated in compliance with the requirements specified in this appendix, Appendix E, and Appendix F.

- (2) For separator and tank systems that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), records indicating the number of consecutive days that the separator and tank system is located at a site in the oil and natural gas production segment, natural gas processing segment, or natural gas transmission and storage segment. If a separator and tank system is removed from a site and, within 30 days, is either returned to or replaced by another separator and tank system at the site to serve the same or similar function, then the entire period since the original separator and tank system was first located at the site, including the days when the separator and tank system was removed, shall be added to the count towards the number of consecutive days. These records shall be maintained for at least five years from the calendar year to which the records refer.
- (3) Records of the identification and location of each separator and tank system subject to emission control requirements.

Appendix E

Additional Requirements for Vapor Collection Systems and Vapor Control Devices

- (a) *Vapor Collection System Requirements.* For vapor collection systems using a vapor control device or routing emissions to a process, the owner or operator shall comply with the following:
- (1) Owners or operators shall design the vapor collection system to route all gases, vapors, and fumes emitted from the emission source to a vapor control device that meets the requirements specified in section (b) of this appendix, or to a process.
 - (2) Owners or operators shall design and operate a vapor collection system in a leak-free condition, as determined using leak detection and repair inspections as required in section 95669 of this subarticle.
 - (3) Owners or operators shall meet the requirements specified in sections (a)(3)(A) and (B) of this appendix if the vapor collection system contains one or more bypass devices that could be used to divert all or a portion of the gases, vapors, or fumes from entering the vapor control device or to a process.
 - (A) Except as provided in section (a)(3)(B) of this appendix, owners or operators shall comply with either section (a)(3)(A)1. or 2. of this appendix for each bypass device.
 1. Owners or operators shall properly install, calibrate, maintain, and operate a flow indicator at the inlet to the bypass device that could divert the stream away from the vapor control device or process to the atmosphere that sounds an alarm, or initiates notification via remote alarm to the nearest field office, when the bypass device is open such that the stream is being, or could be, diverted away from the vapor control device or process to the atmosphere. Owners or operators shall maintain records of each time the alarm is activated according to section (f)(4) of this appendix.
 2. Owners or operators shall secure the bypass device valve installed at the inlet to the bypass device in the non-diverting position using a car-seal or a lock-and-key type configuration. Car-seals are devices used to lock or “seal” a valve in the open, closed, or mid position to prevent unauthorized operation of the valve.

- (B) Low leg drains, high point bleeds, analyzer vents, open-ended valves or lines, and safety devices are not subject to the requirements of section (a)(3)(A) of this appendix.

- (4) Owners or operators shall conduct an assessment that the vapor collection system is of sufficient design and capacity to ensure that all emissions from the emission source are routed to the vapor control device or to a process and that the vapor control device is of sufficient design and capacity to accommodate all emissions from the emission source and have it certified by a qualified professional engineer in accordance with sections (a)(4)(A) and (B) of this appendix. Qualified professional engineer means an individual who is licensed by a state as a Professional Engineer to practice one or more disciplines of engineering and who is qualified by education, technical knowledge, and experience to make the specific technical certifications required under this subarticle. Professional engineers making these certifications shall be currently licensed in at least one state in which the certifying official is located.
 - (A) Owners or operators shall maintain records of the assessment and the following certification, signed and dated by the qualified professional engineer: "I certify that the vapor collection system design and capacity assessment was prepared under my direction or supervision. I further certify that the vapor collection system design and capacity assessment was conducted and this report was prepared pursuant to the requirements of Title 17, Division 3, Chapter 1, Subchapter 10, Article 4, Subarticle 13, of the California Code of Regulations. Based on my professional knowledge and experience, and inquiry of personnel involved in the assessment, the certification submitted herein is true, accurate, and complete. I am aware that there are penalties for knowingly submitting false information."

 - (B) The assessment shall be prepared under the direction or supervision of the qualified professional engineer who signs the certification in section (a)(4)(A) of this appendix.

(b) *Vapor Control Device Requirements.*

- (1) Each vapor control device used to meet the emission reduction standards in section 95671 shall be installed according to sections (b)(1)(A) through (D) of this appendix, as applicable. As an alternative to section (b)(1)(A) of this appendix, owners or operators may install a vapor control device model tested under Appendix F(d), which meets the criteria in Appendix F(d)(11) and meets the continuous compliance requirements in Appendix F(e).
- (A) For each enclosed combustion device (e.g., thermal vapor incinerator, catalytic vapor incinerator, boiler, or process heater) owners or operators shall follow the requirements in sections (b)(1)(A)1. through (b)(1)(A)4. of this appendix.
 1. Maintain each enclosed combustion device in a leak-free condition.
 2. Install and operate a continuous burning pilot flame.
 3. Operate the enclosed combustion device with no visible emissions, except for periods not to exceed a total of one minute during any 15-minute period. A visible emissions test using section 11 of US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020, which is incorporated herein by reference) shall be performed at least once every calendar month, separated by at least 15 days between each test. The observation period shall be 15 minutes. Devices failing the visible emissions test shall follow manufacturer's repair instructions, if available, or best combustion engineering practice as outlined in the unit inspection and maintenance plan, to return the unit to compliant operation. All inspection, repair, and maintenance activities for each unit shall be recorded in a maintenance and repair log and shall be available for inspection. Following return to operation from maintenance or repair activity, each device shall pass a US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020) visual observation as described in this section.

4. Each enclosed combustion vapor control device (e.g., thermal vapor incinerator, catalytic vapor incinerator, boiler, or process heater) shall be designed and operated in accordance with one of the performance requirements specified in sections (b)(1)(A)4.a. through d. of this appendix.
 - a. Owners or operators shall reduce the mass content of total hydrocarbons (THC) in the gases vented to the device by 95.0 percent by weight or greater as determined in accordance with the requirements of Appendix F(b).
 - b. Owners or operators shall reduce the concentration of THC in the exhaust gases at the outlet to the device to a level equal to or less than 275 parts per million by volume as propane on a wet basis corrected to three (3) percent oxygen as determined in accordance with the applicable requirements of Appendix F(b).
 - c. Owners or operators shall operate the device at a minimum temperature of 760°Celsius, provided the vapor control device has demonstrated, during the performance test conducted under Appendix F(b), that combustion zone temperature is an indicator of destruction efficiency.
 - d. If a boiler or process heater is used as the vapor control device, then the owner or operator shall introduce the vent stream with the primary fuel or use the vent stream as the primary fuel in a boiler or process heater.

- (B) Each vapor recovery device (e.g., carbon adsorption system or condenser) or other non-destructive vapor control device shall be designed and operated to reduce the mass content of THC in the gases vented to the device by 95.0 percent by weight or greater as determined in accordance with the requirements of Appendix F(b). A carbon replacement schedule shall be included in the design of the carbon adsorption system. As an alternative to the performance testing requirements, owners or operators may demonstrate compliance by conducting a design analysis for vapor recovery devices according to the requirements in Appendix F(c).
 - (C) Owners or operators shall design and operate a flare in accordance with the requirements of 40 CFR 60.18(b) (December 22, 2008, which is incorporated herein by reference), and they shall conduct the compliance determination using US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020) to determine visible emissions.
 - (D) Owners or operators shall operate each vapor control device used to comply with the requirements of section 95671 of this subarticle at all times when gases, vapors, and fumes are vented through the vapor collection system to the vapor control device. Owners or operators may vent more than one piece of equipment to a vapor control device used to comply with this subarticle.
- (2) For each carbon adsorption system used as a vapor control device to meet the requirements of section 95671 of this subarticle, owners or operators shall manage the carbon in accordance with the requirements specified in sections (b)(2)(A) and (B) of this appendix.
- (A) Following the initial startup of the vapor control device, owners or operators shall replace all carbon in the vapor control device with fresh carbon on a regular, predetermined time interval that is no longer than the carbon service life established according to Appendix F(c)(2) or (3), or according to the design required in section (b)(1)(B) of this appendix, for the carbon adsorption system. Owners or operators shall maintain records identifying the schedule for replacement and records of each carbon replacement as required in section (f)(5) of this appendix.

- (B) Owners or operators shall regenerate, reactivate, or burn the spent carbon removed from the carbon adsorption system in one of the units specified in sections (b)(2)(B)1. through 6. of this appendix.
1. Regenerate or reactivate the spent carbon in a thermal treatment unit for which the owner or operator has been issued a final permit under 40 CFR Part 270 (December 9, 2019), which is incorporated herein by reference, that implements the requirements of 40 CFR Part 264, Subpart X (February 7, 2020), which is incorporated herein by reference.
 2. Regenerate or reactivate the spent carbon in a unit equipped with operating organic air emission controls in accordance with an emissions standard for volatile organic compounds under a subpart in 40 CFR Part 60 or Part 63.
 3. Burn the spent carbon in a hazardous waste incinerator for which the owner or operator complies with the requirements of 40 CFR Part 63, Subpart EEE (October 28, 2008, which is incorporated herein by reference) and has submitted a Notification of Compliance under 40 CFR 63.1207(j) (October 28, 2008), which is incorporated herein by reference.
 4. Burn the spent carbon in a hazardous waste boiler or industrial furnace for which the owner or operator complies with the requirements of 40 CFR Part 63, Subpart EEE (October 28, 2008) and has submitted a Notification of Compliance under 40 CFR 63.1207(j) (October 28, 2008).
 5. Burn the spent carbon in an industrial furnace for which the owner or operator has been issued a final permit under 40 CFR Part 270 (December 9, 2019) that implements the requirements of 40 CFR Part 266, Subpart H (March 18, 2010), which is incorporated herein by reference.
 6. Burn the spent carbon in an industrial furnace that is designed and operated in accordance with the interim status requirements of 40 CFR Part 266, Subpart H (March 18, 2010).

- (c) *Initial Compliance Demonstration Requirements.* Owners or operators shall demonstrate initial compliance with the emission control requirements for each vapor collection system by complying with the following:
- (1) Each vapor collection system shall reduce emissions by 95.0 percent or greater as required in section 95671 of this subarticle and as demonstrated by Appendix F.
 - (2) Owners or operators shall conduct an initial performance test as required in Appendix F by July 1, 2024, for existing vapor collection systems or within 180 days of the installation of a new vapor collection system.
 - (3) Owners or operators shall conduct the vapor collection system inspection according to the requirements in section (d) of this appendix by July 1, 2024, for existing vapor collection systems or within 180 days of the installation of a new vapor collection system.
- (d) *Continuous Compliance Demonstration Requirements.* Owners or operators shall demonstrate continuous compliance with the emission control requirements for each vapor collection system by complying with the following:
- (1) Vapor collection systems shall reduce emissions by 95.0 percent or greater as required in section 95671 of this subarticle and as demonstrated by Appendix F.
 - (2) For each vapor control device used to reduce emissions, owners or operators shall demonstrate continuous compliance with the performance requirements of section (b) of this appendix according to sections (d)(2)(A) through (D) of this appendix. Owners or operators are exempt from the requirements of this section if they install a vapor control device model tested in accordance with Appendix F(d)(2) through (10), which meets the criteria in Appendix F(d)(11), the reporting requirements in Appendix F(d)(12), and the continuous compliance requirements in Appendix F(e).
 - (A) For each combustion device owners or operators shall conduct inspections at least once every calendar month according to sections (d)(2)(A)1. through (d)(2)(A)4. of this appendix. Monthly inspections shall be separated by at least 14 calendar days.

1. Conduct visual inspections to confirm that the pilot flame is lit when vapors are being routed to the combustion device and that the continuous burning pilot flame is operating properly.
 2. Conduct inspections to monitor for visible emissions from the combustion device using section 11 of US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020). The observation period shall be 15 minutes. Devices shall be operated with no visible emissions, except for periods not to exceed a total of one (1) minute during any 15-minute period.
 3. Conduct olfactory, visual, and auditory inspections of all equipment associated with the combustion device to ensure system integrity.
 4. For any absence of pilot flame, or other indication of smoking or improper equipment operation (e.g., visual, auditory, or olfactory), owners or operators shall ensure the equipment is returned to proper operation as soon as practicable after the event occurs. At a minimum, owners or operators shall perform the procedures specified in sections (d)(2)(A)4.a. and (d)(2)(A)4.b. of this appendix.
 - a. Owners or operators shall check the air vent for obstruction. If an obstruction is observed, the owner or operator shall clear the obstruction as soon as practicable.
 - b. Owners or operators shall check for liquid reaching the combustor.
- (B) For each vapor control device, owners or operators shall conduct inspections at least once every calendar month to ensure physical integrity of the vapor control device according to the manufacturer's instructions. Monthly inspections shall be separated by at least 14 calendar days.

- (C) Each vapor control device shall be operated following the manufacturer's written operating instructions, procedures, and maintenance schedule to ensure good air pollution control practices for minimizing emissions. Records of the manufacturer's written operating instructions, procedures, and maintenance schedule shall be available for inspection.
 - (D) Conduct a periodic performance test no later than 60 months after the initial performance test as specified in Appendix F(b)(5)(A) and conduct subsequent periodic performance tests at intervals no longer than 60 months following the previous periodic performance test.
- (e) If owners or operators install a vapor control device or route emissions to a process, they shall inspect each vapor collection system according to the procedures and schedule specified in section (e)(1) of this appendix, inspect each cover according to the procedures and schedule specified in section (e)(2) of this appendix, and inspect each bypass device according to the procedures of section (e)(3) of this appendix. Owners or operators shall also comply with the requirements of sections (e)(4) through (6) of this appendix.
- (1) For each vapor collection system, owners or operators shall conduct an inspection at least once every calendar month as specified in sections (e)(1)(A) through (C) of this appendix.
 - (A) Owners or operators shall maintain records of the inspection results as specified in section (f)(2) of this appendix.
 - (B) Conduct olfactory, visual, and auditory inspections for defects that could result in air emissions. Examples of defects include visible cracks, holes, or gaps in piping; loose connections; liquid leaks; or broken or missing caps or other closure devices.
 - (C) Monthly inspections shall be separated by at least 14 calendar days.
 - (2) For each cover, owners or operators shall conduct inspections at least once every calendar month as specified in sections (e)(2)(A) through (C) of this appendix.
 - (A) Owners or operators shall maintain records of the inspection results as specified in section (f)(3) of this appendix.

- (B) Conduct olfactory, visual, and auditory inspections for defects that could result in air emissions. Examples of defects include visible cracks, holes, or gaps in the cover, or between the cover and the separator wall; broken, cracked, or otherwise damaged seals or gaskets on closure devices; and broken or missing hatches, access covers, caps, or other closure devices. In the case where the separator and tank system is buried partially or entirely underground, owners or operators shall inspect only those portions of the cover that extend to or above the ground surface, and those connections that are on such portions of the cover (e.g., fill ports, access hatches, gauge wells, etc.) and can be opened to the atmosphere.
 - (C) Monthly inspections shall be separated by at least 14 calendar days.
- (3) For each bypass device, except as provided for in section (a)(3)(B) of this appendix, owners or operators shall meet the requirements of section (e)(3)(A) or (B) of this appendix.
- (A) Owners or operators shall properly install, calibrate, and maintain a flow indicator at the inlet to the bypass device that could divert the stream away from the vapor control device or process to the atmosphere. The flow indicator shall be set to trigger an audible alarm, or initiate notification via remote alarm to the nearest field office, when the bypass device is open such that the stream is being, or could be, diverted away from the vapor control device or process to the atmosphere. Owners or operators shall maintain records of each time the alarm is sounded according to section (f)(4) of this appendix.
 - (B) If the bypass device valve installed at the inlet to the bypass device is secured in the non-diverting position using a car-seal or a lock-and-key type configuration, the owner or operator shall visually inspect the seal or closure mechanism at least once every month to verify that the valve is maintained in the non-diverting position and the vent stream is not diverted through the bypass device. Owners or operators shall maintain records of the inspections and records of each time the key is checked out, if applicable, according to section (f)(4) of this appendix.

- (4) *Repairs.* In the event that a leak or defect is detected, owners or operators shall repair the leak or defect according to the requirements of sections (e)(4)(A) through (C) of this appendix, except as provided in section (e)(5) of this appendix.
 - (A) Any inspection that indicates a leak that cannot be repaired within 24 hours shall be tested using US EPA Reference Method 21 (October 1, 2017) as specified in section 95669(b) within 24 hours after initial leak detection.
 - 1. For leaks detected during normal business hours, the leak measurement shall be performed within 24 hours. For leaks detected after normal business hours or on a weekend or holiday, the deadline is shifted to the end of the next normal business day.
 - 2. Any leak measured above the minimum leak threshold in section 95669(h) of this subarticle shall be repaired within the timeframes specified in that section.
 - (B) Any defect shall be repaired within five (5) calendar days after the defect is detected.
 - (C) Grease or another applicable substance shall be applied to deteriorating or cracked gaskets to improve the seal while awaiting repair.
- (5) *Delay of repair.* A delay of repair may be granted by the CARB Executive Officer as specified in section 95670.1 of this subarticle.
- (6) *Inaccessible or unsafe to monitor requirements.* Any components that are designated as inaccessible or unsafe to monitor are exempt from the inspection requirements of sections (e)(1) and (2) of this appendix. Owners or operators shall have a written plan that requires inspection of the inaccessible or unsafe to monitor components at least once per calendar year.
- (f) *Record Keeping Requirements.* Owners or operators shall maintain the records identified in sections (f)(1) through (11) of this appendix, as applicable.

- (1) Except as specified in section (f)(1)(H) of this appendix, owners or operators shall maintain the records specified in sections (f)(1)(A) through (G) of this appendix for each vapor control device tested under Appendix F(d) which meets the criteria in Appendix F(d)(11) and meets the continuous compliance requirements in Appendix F(e).
 - (A) Make, model, and serial number of purchased device.
 - (B) Date of purchase.
 - (C) Copy of purchase order.
 - (D) Location of the vapor control device in latitude and longitude coordinates in decimal degrees to an accuracy and precision of five (5) decimals of a degree using the North American Datum of 1983.
 - (E) Inlet gas flow rate.
 - (F) An electronic copy of the performance test result as specified in Appendix F(e)(6).
 - (G) Maintain, for at least five years from the calendar year in which the records refer to, records of continuous compliance requirements in Appendix F(e) as specified in sections (f)(1)(G)1. through 5. of this appendix.
 1. Records that the pilot flame is present at all times of operation.
 2. Records that the device was operated with no visible emissions except for periods not to exceed a total of one (1) minute during any 15-minute period.
 3. Records of the maintenance and repair log.
 4. Records of the visible emissions test following return to operation from a maintenance or repair activity.
 5. Records of the manufacturer's written operating instructions, procedures, and maintenance schedule to ensure good air pollution control practices for minimizing emissions.

- (H) As an alternative to the requirements of section (f)(1)(D) of this appendix, owners or operators may maintain records of one or more digital photographs with the date the photograph was taken and the latitude and longitude of the vapor control device embedded within or stored with the digital file. As an alternative to embedded latitude and longitude within the digital photograph, the digital photograph may consist of a photograph of the vapor control device with a photograph of a separately operating GPS device within the same digital picture, provided the latitude and longitude output of the GPS unit can be clearly read in the digital photograph.
- (2) A record of each vapor collection system inspection required under section (e)(1)(A) of this appendix. These records shall be maintained for at least five years from the date of each inspection.
- (3) A record of each cover inspection required under section (e)(2)(A) of this appendix. These records shall be maintained for at least five years from the date of each inspection.
- (4) If owners or operators are subject to the bypass requirements of section (a)(3) of this appendix, a record of each inspection, a record of each time the key is checked out, and a record of each time the alarm is sounded. These records shall be maintained for at least five years from the date of each inspection, key being checked out, or alarm being sounded.
- (5) For each carbon adsorber, records of the schedule for carbon replacement (as determined by the design analysis requirements of Appendix F(c)) and records of each carbon replacement completed at a time interval that is no longer than the carbon service life established according to Appendix F(c)(2) or (3) for the carbon absorption system. These records shall be maintained for at least five years from the calendar year to which the records refer.
- (6) For each piece of equipment subject to vapor control device requirements of this appendix and Appendix F:
 - (A) Records of the inspections, including any corrective actions taken, and the manufacturers' operating instructions, procedures, and maintenance schedule.

1. For records of section 11, US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020) results, include: company, location, company representative (name of the person performing the observation), sky conditions, process unit (type of vapor control device), clock start time, observation period duration (in minutes and seconds), accumulated emission time (in minutes and seconds), and clock end time. Owners or operators shall create their own form including the above information or use Figure 22-1 in US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020).
 - (B) Vapor control device manufacturer operating instructions, procedures, and maintenance schedule shall be available for inspection.
 - (C) These records shall be maintained for at least five years from the date of each inspection.
- (7) A log of records, as specified in section (b)(1)(A)3. of this appendix and Appendix F(e)(4), for all inspection, repair, and maintenance activities for each vapor control device failing the visible emissions test. These records shall be maintained for at least five years from the calendar year to which the records refer.
- (8) Records of each vapor collection system design and capacity assessment required under section (a)(4) of this appendix. These records shall be maintained for as long as the vapor collection system is in service and for at least five years after being removed from service.
- (9) Records of any repairs performed pursuant to sections (e)(4)(A) and (B) of this appendix including the date that the leak or defect was discovered, the date of the repair, and the type of the component that was leaking or had a defect. These records shall be maintained for at least five years from the date of each repair.

- (10) Records of each initial and periodic performance test performed pursuant to sections (c)(2) and (d)(2)(D) of this appendix. These records shall include an equipment ID or description of the vapor control device, the type of vapor control device, the date of the performance test, the gas volumetric flow rate (as determined in Appendix F(b)(2)), the percent reduction efficiency (as determined in Appendix F(b)(3), if complying with Appendix E(b)(1)(A)4.a. or the percent reduction efficiency requirement in Appendix E(b)(1)(B)), and the exhaust gas THC concentration (as determined in Appendix F(b)(4), if complying with Appendix E(b)(1)(A)4.b.). These records shall be maintained while the vapor control device is in service and for at least five years after being removed from service.
- (11) Records of each design analysis performed pursuant to section (b)(1)(B) of this appendix, including all elements identified in Appendix F(c) for the type of vapor control device for which the design analysis was performed. These records shall be maintained while the vapor control device is in service and for at least five years after being removed from service.

Appendix F

Performance Test Procedures for Vapor Control Devices

This appendix applies to the performance testing of vapor control devices used to demonstrate compliance with emission control requirements. Owners or operators shall demonstrate that a vapor control device achieves the applicable performance requirements using the performance test methods and procedures specified in this appendix. For condensers and carbon adsorbers, owners or operators may use a design analysis as specified in section (c) of this appendix in lieu of complying with section (b) of this appendix. In addition, this appendix contains the requirements for enclosed combustion device performance tests conducted by the manufacturer, as relevant and allowed for compliance demonstration purposes.

- (a) *Performance test exemptions.* Owners or operators are exempt from the requirements to conduct performance tests and design analyses if they use any of the vapor control devices described in sections (a)(1) through (6) of this appendix.
- (1) A flare that is designed and operated in accordance with 40 CFR 60.18(b) (December 22, 2008). Owners or operators shall conduct the compliance determination using US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020) to determine visible emissions.
 - (2) A boiler or process heater with a design heat input capacity of 44 megawatts or greater.
 - (3) A boiler or process heater into which the vent stream is introduced with the primary fuel or is used as the primary fuel.
 - (4) A boiler or process heater burning hazardous waste for which the owner or operator has been issued a final permit under 40 CFR Part 270 (December 9, 2019) and complies with the requirements of 40 CFR Part 266, Subpart H (March 18, 2010); the owner or operator has certified compliance with the interim status requirements of 40 CFR Part 266, Subpart H (March 18, 2010); the owner or operator has submitted a Notification of Compliance under 40 CFR 63.1207(j) (October 28, 2008) and complies with the requirements of 40 CFR Part 63, Subpart EEE (October 28, 2008); or the owner or operator complies with 40 CFR Part 63, Subpart EEE (October 28, 2008) and will submit a Notification of Compliance under 40 CFR 63.1207(j) (October 28, 2008) by July 1, 2024, for existing vapor control devices or within 180 days of the installation of a new vapor control device.
 - (5) A hazardous waste incinerator for which the owner or operator has submitted a Notification of Compliance under 40 CFR 63.1207(j) (October 28, 2008), or for which the owner or operator will submit a Notification of Compliance under 40 CFR 63.1207(j) (October 28, 2008) by July 1, 2024, for existing vapor control devices or within 180 days of the installation of a new vapor control device, and the owner or operator complies with the requirements of 40 CFR Part 63, Subpart EEE (October 28, 2008).
 - (6) A vapor control device whose model can be demonstrated to meet the performance requirements of Appendix E(b) through a performance test conducted by the manufacturer, as specified in section (d) of this appendix.

- (b) *Test methods and procedures.* Owners or operators shall use the test methods and procedures specified in sections (b)(1) through (5) of this appendix, as applicable, for each performance test conducted to demonstrate that a vapor control device meets the requirements of Appendix E(b). Owners or operators shall conduct the initial and periodic performance tests according to the schedule specified in section (b)(5) of this appendix. Each performance test shall consist of a minimum of three (3) test runs. Each run shall be at least one (1) hour long.
- (1) Owners or operators shall use US EPA Method 1 or 1A (40 CFR Part 60, Appendix A-1, January 14, 2019), as appropriate, to select the sampling sites specified in sections (b)(1)(A) and (B) of this appendix. Any references to particulate mentioned in US EPA Methods 1 and 1A do not apply to this section.
 - (A) Sampling sites shall be located at the inlet of the first vapor control device and at the outlet of the final vapor control device, to determine compliance with the vapor control device percent reduction requirement.
 - (B) The sampling site shall be located at the outlet of the combustion device to determine compliance with the enclosed combustion device THC exhaust gas concentration limit.
 - (2) Owners or operators shall determine the gas volumetric flowrate using US EPA Method 2, 2A, 2C, or 2D (40 CFR Part 60, Appendix A-2, October 31, 2016, which is incorporated herein by reference).
 - (3) To determine compliance with the vapor control device percent reduction performance requirement in Appendix E(b)(1)(A)4.a. or Appendix E(b)(1)(B), owners or operators shall use US EPA Method 25A (40 CFR Part 60, Appendix A-7, December 7, 2020). Owners or operators shall use US EPA Method 4 (40 CFR Part 60, Appendix A-3, March 23, 2021, which is incorporated herein by reference) to convert the US EPA Method 25A results to a dry basis. Owners or operators shall use the procedures in sections (b)(3)(A) through (C) of this appendix to calculate percent reduction efficiency.
 - (A) Owners or operators shall compute the mass rate of THC using the following equations:

$$E_i = K_2 C_i M_p Q_i$$

$$E_o = K_2 C_o M_p Q_o$$

Where:

E_i, E_o = Mass rate of THC at the inlet and outlet of the vapor control device, respectively, dry basis, kilograms per hour.

K_2 = Constant, 2.494×10^{-6} (parts per million) (gram-mole per standard cubic meter) (kilogram/gram) (minute/hour), where standard temperature (gram-mole per standard cubic meter) is 20°Celsius.

C_i, C_o = Concentration of THC, as propane, of the gas stream as measured by US EPA Method 25A at the inlet and outlet of the vapor control device, respectively, dry basis, parts per million by volume.

M_p = Molecular weight of propane, 44.1 gram/gram-mole.

Q_i, Q_o = Flowrate of gas stream at the inlet and outlet of the vapor control device, respectively, dry standard cubic meter per minute.

- (B) Owners or operators shall calculate the percent reduction in THC as follows:

$$R_{cd} = \frac{E_i - E_o}{E_i} * 100\%$$

Where:

R_{cd} = Control efficiency of vapor control device, percent.

E_i = Mass rate of THC at the inlet to the vapor control device as calculated under section (b)(3)(A) of this appendix, kilograms per hour.

E_o = Mass rate of THC at the outlet of the vapor control device, as calculated under section (b)(3)(A) of this appendix, kilograms per hour.

- (C) If the vent stream entering a boiler or process heater with a design capacity less than 44 megawatts is introduced with the combustion air or as a secondary fuel, the owner or operator shall determine the weight-percent reduction of total THC across the device by comparing the THC in all combusted vent streams and primary and secondary fuels with the THC exiting the device, respectively.
- (4) Owners or operators shall use US EPA Method 25A (40 CFR Part 60, Appendix A-7, December 7, 2020) to measure THC, as propane, to determine compliance with the THC exhaust gas concentration limit specified in Appendix E(b)(1)(A)4.b. Owners or operators shall determine the concentration in parts per million by volume on a wet basis and correct it to three (3) percent oxygen, using the procedure in section (b)(4)(A) of this appendix.
 - (A) Owners or operators shall correct the THC concentration to three (3) percent oxygen as specified in sections (b)(4)(A)1. and (b)(4)(A)2. of this appendix.
 - 1. Owners or operators shall use the emission rate correction factor for excess air, integrated sampling, and analysis procedures of US EPA Method 3A or 3B (40 CFR Part 60, Appendix A-2, October 31, 2016), ASTM D6522-00 (February 10, 2000), or ANSI/ASME PTC 19.10-1981, Part 10 (manual portion only) to determine the oxygen concentration. The samples shall be taken during the same time that the samples are taken for determining THC concentration.
 - 2. Owners or operators shall correct the THC concentration for percent oxygen using the following equation:

$$C_c = C_m \left(\frac{17.9}{20.9 - \%O_{2m}} \right)$$

Where:

C_c = THC concentration, as propane, corrected to three (3) percent oxygen, parts per million by volume on a wet basis.

C_m = THC concentration, as propane, parts per million by volume on a wet basis.

$\%O_{2m}$ = Concentration of oxygen, percent by volume as measured, wet.

- (5) Owners or operators shall conduct performance tests according to the schedule specified in sections (b)(5)(A) and (B) of this appendix.
 - (A) Owners or operators shall conduct an initial performance test by July 1, 2024, for existing vapor control devices or within 180 days of the installation of a new vapor control device.
 - (B) Owners or operators shall conduct periodic performance tests for all vapor control devices required to conduct initial performance tests except as specified in sections (b)(5)(B)1. and (b)(5)(B)2. of this appendix. Owners or operators shall conduct the first periodic performance test no later than 60 months after the initial performance test required in section (b)(5)(A) of this appendix. Owners or operators shall conduct subsequent periodic performance tests at intervals no longer than 60 months following the previous periodic performance test.
 1. A vapor control device whose model is tested under, and meets the criteria of section (d) of this appendix. For centrifugal compressors, if the gas flow rate is not continuously monitored at the inlet to the control device to ensure the flow rate does not exceed the minimum or maximum flow rate determined by the manufacturer (with a monitoring instrument accuracy of ± 2 percent or better at the maximum expected flow rate) and the monitoring device does not continuously indicate the presence of the pilot flame when emissions are routed to the vapor control device, then owners or operators shall comply with the periodic performance testing requirements of section (b)(5)(B).

2. A combustion vapor control device tested under section (b) of this appendix that meets the outlet THC performance level specified in Appendix E(b)(1)(A)4.b. and that establishes a correlation between firebox or combustion chamber temperature and the THC performance level. For centrifugal compressors, owners or operators shall establish a limit on temperature in accordance with section (b)(5)(B)2.a. of this appendix and continuously monitor the temperature as required by section (b)(5)(B)2.b. of this appendix.
 - a. Owners or operators shall establish a minimum and maximum operating temperature, as appropriate for the control device, to continuously achieve the applicable performance requirements, based on the performance test, design analysis, and control device manufacturer recommendations, as applicable. If a condenser is used, the owner or operator shall establish a condenser performance curve showing the relationship between condenser outlet temperature and condenser control efficiency. The performance curve shall be based on the performance test, design analysis, and control device manufacturer's recommendations, as applicable.
 - b. Owners or operators shall install, calibrate, operate, and maintain a device equipped with a continuous recorder to measure the temperature as appropriate for the control device. The monitoring device shall have a minimum accuracy of ± 1 percent of the temperature being monitored in $^{\circ}\text{Celsius}$, or $\pm 2.5^{\circ}\text{Celsius}$, whichever value is greater.
- (c) *Vapor control device design analysis to meet the requirements of Appendix E(b).*
 - (1) For a condenser, the design analysis shall include an analysis of the vent stream composition, constituent concentrations, flowrate, relative humidity, and temperature, and shall establish the design outlet organic compound concentration level, design average temperature of the condenser exhaust vent stream, and the design average temperatures of the coolant fluid at the condenser inlet and outlet.

- (2) For a regenerable carbon adsorption system, the design analysis shall include the vent stream composition, constituent concentrations, flowrate, relative humidity, and temperature, and shall establish the design exhaust vent stream organic compound concentration level, adsorption cycle time, number and capacity of carbon beds, type and working capacity of activated carbon used for the carbon beds, design total regeneration stream flow over the period of each complete carbon bed regeneration cycle, design carbon bed temperature after regeneration, design carbon bed regeneration time, and design service life of the carbon.
 - (3) For a nonregenerable carbon adsorption system, such as a carbon canister, the design analysis shall include the vent stream composition, constituent concentrations, flowrate, relative humidity, and temperature, and shall establish the design exhaust vent stream organic compound concentration level, capacity of the carbon bed, type and working capacity of activated carbon used for the carbon bed, and design carbon replacement interval based on the total carbon working capacity of the vapor control device and source operating schedule. In addition, these systems will incorporate dual carbon canisters in case of emission breakthrough occurring in one canister.
- (d) *Performance testing for combustion vapor control devices—manufacturers' performance test.* This section applies to the performance testing of a combustion vapor control device conducted by the device manufacturer.
- (1) The manufacturer shall demonstrate that a specific model of vapor control device achieves the performance requirements in section (d)(11) of this appendix by conducting a performance test as specified in sections (d)(2) through (10) of this appendix. The owner or operator shall maintain records of a test report for each combustion vapor control device in accordance with the requirements in section (d)(12) of this appendix.
 - (2) Performance testing shall consist of three one-hour (or longer) test runs for each of the four firing rate settings specified in sections (d)(2)(A) through (D) of this appendix, making a total of 12 test runs per test. Propene (propylene) gas shall be used for the testing fuel. All fuel analyses shall be performed by an independent third-party laboratory (not affiliated with the vapor control device manufacturer or fuel supplier).

- (A) 90-100 percent of maximum design rate (fixed rate).
 - (B) 70-100-70 percent (ramp up, ramp down). Begin the test at 70 percent of the maximum design rate. During the first five (5) minutes, incrementally ramp the firing rate to 100 percent of the maximum design rate. Hold at 100 percent for five (5) minutes. In the 10-15-minute time range, incrementally ramp back down to 70 percent of the maximum design rate. Repeat three more times for a total of 60 minutes of sampling.
 - (C) 30-70-30 percent (ramp up, ramp down). Begin the test at 30 percent of the maximum design rate. During the first five (5) minutes, incrementally ramp the firing rate to 70 percent of the maximum design rate. Hold at 70 percent for five (5) minutes. In the 10-15-minute time range, incrementally ramp back down to 30 percent of the maximum design rate. Repeat three more times for a total of 60 minutes of sampling.
 - (D) 0-30-0 percent (ramp up, ramp down). Begin the test at the minimum firing rate. During the first five (5) minutes, incrementally ramp the firing rate to 30 percent of the maximum design rate. Hold at 30 percent for five (5) minutes. In the 10-15-minute time range, incrementally ramp back down to the minimum firing rate. Repeat three more times for a total of 60 minutes of sampling.
- (3) All models employing multiple enclosures shall be tested simultaneously and with all burners operational. Results shall be reported for each enclosure individually and for the average of the emissions from all interconnected combustion enclosures/chambers. Vapor control device operating data shall be collected continuously throughout the performance test using an electronic data acquisition system. A graphic presentation or strip chart of the vapor control device operating data and emissions test data shall be included in the test report in accordance with section (d)(12) of this appendix. Inlet fuel meter data may be manually recorded provided that all inlet fuel data readings are included in the test report.
- (4) Inlet testing shall be conducted as specified in sections (d)(4)(A) and (B) of this appendix.

- (A) The inlet gas flow metering system shall be located in accordance with US EPA Method 2A (40 CFR Part 60, Appendix A-1, January 14, 2019) to measure inlet gas flow rate at the vapor control device inlet location. Position the fitting for filling fuel sample containers a minimum of eight pipe diameters upstream of any inlet gas flow monitoring meter.
 - (B) Inlet flow rate shall be determined using US EPA Method 2A (40 CFR Part 60, Appendix A-1, January 14, 2019). Record the start and stop reading for each 60-minute THC test. Record the gas pressure and temperature at five-minute intervals throughout each 60-minute test.
- (5) Inlet gas sampling shall be conducted as specified in sections (d)(5)(A) and (B) of this appendix.
- (A) At the inlet gas sampling location, securely connect a Silonite-coated stainless steel evacuated canister fitted with a flow controller sufficient to fill the canister over a three-hour period. Filling shall be conducted as specified in sections (d)(5)(A)1. through (d)(5)(A)3. of this appendix.
 - 1. Open the canister sampling valve at the beginning of each test run, and close the canister at the end of each test run.
 - 2. Fill one canister across the three test runs such that one composite fuel sample exists for each test condition.
 - 3. Label the canisters individually and record sample information on a chain of custody form.
 - (B) Analyze each inlet gas sample using the methods in sections (d)(5)(B)1. through (d)(5)(B)3. of this appendix. The owner or operator shall include the results in the test report required by section (d)(12) of this appendix.
 - 1. Hydrocarbon compounds containing between one and five atoms of carbon plus benzene using ASTM D1945-03.
 - 2. Hydrogen (H₂), carbon monoxide (CO), carbon dioxide (CO₂), nitrogen (N₂), oxygen (O₂) using ASTM D1945-03.
 - 3. Higher heating value using ASTM D3588-98 or ASTM D4891-89.

- (6) Outlet testing shall be conducted in accordance with the criteria in sections (d)(6)(A) through (E) of this appendix.
 - (A) Sample and flow rate shall be measured in accordance with sections (d)(6)(A)1. and (d)(6)(A)2. of this appendix.
 - 1. The outlet sampling location shall be a minimum of four equivalent stack diameters downstream from the highest peak flame or any other flow disturbance, and a minimum of one equivalent stack diameter upstream of the exit or any other flow disturbance. A minimum of two sample ports shall be used.
 - 2. Flow rate shall be measured using US EPA Method 1 (40 CFR Part 60, Appendix A-1, January 14, 2019) for determining flow measurement traverse point location, and US EPA Method 2 (40 CFR Part 60, Appendix A-1, January 14, 2019) for measuring duct velocity. If low flow conditions are encountered (i.e., velocity pressure differentials less than 0.05 inches of water) during the performance test, a more sensitive manometer shall be used to obtain an accurate flow profile.
 - (B) Molecular weight and excess air shall be determined as specified in section (d)(7) of this appendix.
 - (C) Carbon monoxide shall be determined as specified in section (d)(8) of this appendix.
 - (D) THC shall be determined as specified in section (d)(9) of this appendix.
 - (E) Visible emissions shall be determined as specified in section (d)(10) of this appendix.
- (7) Molecular weight and excess air determination shall be performed as specified in sections (d)(7)(A) through (C) of this appendix.

- (A) An integrated bag sample shall be collected during the moisture test required by US EPA Method 4 (40 CFR Part 60, Appendix A-3, March 23, 2021) following the procedure specified in sections (d)(7)(A)1. and (d)(7)(A)2. of this appendix. Analyze the bag sample using a gas chromatograph-thermal conductivity detector (GC-TCD) analysis meeting the criteria in sections (d)(7)(A)3. and (d)(7)(A)4. of this appendix.
1. Collect the integrated sample throughout the entire test, and collect representative volumes from each traverse location.
 2. Purge the sampling line with stack gas before opening the valve and beginning to fill the bag. Clearly label each bag and record sample information on a chain of custody form.
 3. The bag contents shall be vigorously mixed prior to the gas chromatograph analysis.
 4. The GC-TCD calibration procedure in US EPA Method 3C (40 CFR Part 60, Appendix A-2, October 31, 2016) shall be modified by using US EPA Alt-045 as follows: For the initial calibration, triplicate injections of any single concentration shall agree within five (5) percent of their mean to be valid. The calibration response factor for a single concentration re-check shall be within 10 percent of the original calibration response factor for that concentration. If this criterion is not met, repeat the initial calibration using at least three concentration levels.
- (B) Calculate and report the molecular weight of oxygen, carbon dioxide, methane, and nitrogen in the integrated bag sample and include in the test report specified in section (d)(12) of this appendix. Moisture shall be determined using US EPA Method 4 (40 CFR Part 60, Appendix A-3, March 23, 2021). Traverse both ports with the US EPA Method 4 (40 CFR Part 60, Appendix A-3, March 23, 2021) sampling train during each test run. Ambient air shall not be introduced into the integrated bag sample required by US EPA Method 3C (40 CFR Part 60, Appendix A-2, October 31, 2016) during the port change.

- (C) Excess air shall be determined using resultant data from the US EPA Method 3C tests and US EPA Method 3B, Equation 3B-1 (40 CFR Part 60, Appendix A-2, October 31, 2016), or ANSI/ASME PTC 19.10-1981, Part 10 (manual portion only).
- (8) Carbon monoxide shall be determined using US EPA Method 10 (40 CFR Part 60, Appendix A-4, December 7, 2020, which is incorporated herein by reference). Run the test simultaneously with US EPA Method 25A (40 CFR Part 60, Appendix A-7, December 7, 2020) using the same sampling points. An instrument range of 0-10 parts per million by volume-dry (ppmvd) is recommended.
- (9) THC determination shall be performed as specified in sections (d)(9)(A) through (G) of this appendix.
 - (A) Conduct THC sampling using US EPA Method 25A (40 CFR Part 60, Appendix A-7, December 7, 2020), except that the option for locating the probe in the center 10 percent of the stack is not allowed. The THC probe shall be traversed to 16.7 percent, 50 percent, and 83.3 percent of the stack diameter during each test run.
 - (B) A valid test shall consist of three US EPA Method 25A (40 CFR Part 60, Appendix A-7, December 7, 2020) tests, each no less than 60 minutes in duration.
 - (C) A 0-10 parts per million by volume-wet (ppmvw) (as propane) measurement range is preferred; as an alternative, a 0-30 ppmvw (as carbon) measurement range may be used.
 - (D) Calibration gases shall be propane in air and be certified through US EPA Protocol 1— "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards".
 - (E) THC measurements shall be reported in terms of ppmvw as propane.
 - (F) THC results shall be corrected to three (3) percent CO₂, as measured by US EPA Method 3C (40 CFR Part 60, Appendix A-2, October 31, 2016). The following equation shall be used for this diluent concentration correction:

$$C_{corr} = C_{meas} \left(\frac{3}{CO_{2meas}} \right)$$

Where:

C_{meas} = The measured concentration of the pollutant.

$\text{CO}_{2\text{meas}}$ = The measured concentration of the CO_2 diluent.

3 = The corrected reference concentration of CO_2 diluent.

C_{corr} = The corrected concentration of the pollutant.

- (G) Subtraction of methane or ethane from the THC data is not allowed in determining results.
- (10) Visible emissions shall be determined using US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020). The test shall be performed continuously during each test run. A digital color photograph of the exhaust point, taken from the position of the observer and annotated with date and time, shall be taken once per test run and the 12 photographs shall be included in the test report specified in section (d)(12) of this appendix.
- (11) *Performance test criteria.*
- (A) The vapor control device model tested shall meet the criteria in sections (d)(11)(A)1. through (d)(11)(A)4. of this appendix. These criteria shall be reported in the test report required by section (d)(12) of this appendix.
1. US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020) results under section (d)(10) of this appendix showing no indication of visible emissions.
 2. Average US EPA Method 25A (40 CFR Part 60, Appendix A-7, December 7, 2020) results under section (d)(9) of this appendix equal to or less than 10.0 ppmvw THC as propane corrected to 3.0 percent CO_2 .
 3. Average CO emissions determined under section (d)(8) of this appendix equal to or less than 10 parts ppmvd, corrected to 3.0 percent CO_2 .
 4. Excess combustion air determined under section (d)(7) of this appendix equal to or greater than 150 percent.

- (B) The manufacturer shall determine a maximum inlet gas flow rate which shall not be exceeded for each vapor control device model to achieve the criteria in section (d)(11)(C) of this appendix. The maximum inlet gas flow rate shall be included in the test report required by section (d)(12) of this appendix.
 - (C) A manufacturer shall demonstrate a destruction efficiency of at least 95.0 percent for THC, as propane. A vapor control device model that demonstrates a destruction efficiency of 95.0 percent for THC, as propane, will meet the control requirement for this regulation of 95.0 percent reduction in emissions.
- (12) The owner or operator of a combustion vapor control device model tested under this section shall maintain records of the information listed in sections (d)(12)(A) through (F) of this appendix.
- (A) A full schematic of the vapor control device and dimensions of the device components.
 - (B) The maximum net heating value of the device.
 - (C) The test fuel gas flow range (in both mass and volume). Include the maximum allowable inlet gas flow rate.
 - (D) The air/stream injection/assist ranges, if used.
 - (E) The test conditions listed in sections (d)(12)(E)1. through (d)(12)(E)15. of this appendix, as applicable for the tested model.
 - 1. Fuel gas delivery pressure and temperature.
 - 2. Fuel gas moisture range.
 - 3. Purge gas usage range.
 - 4. Condensate (liquid fuel) separation range.
 - 5. Combustion zone temperature range. This is required for all devices that measure this parameter.
 - 6. Excess air range.
 - 7. Flame arrestor(s).
 - 8. Burner manifold.

9. Pilot flame indicator.
10. Pilot flame design fuel and calculated or measured fuel usage.
11. Tip velocity range.
12. Momentum flux ratio.
13. Exit temperature range.
14. Exit flow rate.
15. Wind velocity and direction.

(F) All test calibration quality assurance/quality control data, calibration gas values, gas cylinder certification, strip charts, or other graphic presentations of the data annotated with test times and calibration values.

(e) *Continuous compliance for combustion vapor control devices tested by the manufacturer in accordance with section (d) of this appendix.* This section applies to the demonstration of compliance for a combustion vapor control device tested under the provisions in section (d) of this appendix. Owners or operators shall demonstrate that a vapor control device achieves the performance requirements in section (d)(11) of this appendix by installing a device tested under section (d) of this appendix, complying with the criteria specified in sections (e)(1) through (8) of this appendix and maintaining the records specified in Appendix E(f)(1).

- (1) The inlet gas flow rate shall be equal to or less than the maximum specified by the manufacturer.
- (2) A pilot flame shall be present at all times of operation.
- (3) Devices shall be operated with no visible emissions, except for periods not to exceed a total of one (1) minute during any 15-minute period. A visible emissions test conducted according to section 11 of US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020) shall be performed at least once every calendar month, separated by at least 15 days between each test. The observation period shall be 15 minutes.

- (4) Devices failing the visible emissions test shall follow manufacturer's repair instructions, if available, or best combustion engineering practice as outlined in the unit inspection and maintenance plan, to return the unit to compliant operation. All inspection, repair and maintenance activities for each unit shall be recorded in a maintenance and repair log and shall be available for inspection.
- (5) Following return to operation from maintenance or repair activity, each device shall pass a US EPA Method 22 (40 CFR Part 60, Appendix A-7, December 7, 2020) visual observation as described in section (e)(3) of this appendix.
- (6) If the owner or operator operates a combustion vapor control device model tested under this appendix, an electronic copy of the performance test results required by Appendix F(d) shall be maintained by the owner or operator.
- (7) Each enclosed combustion vapor control device shall be maintained in a leak-free condition.
- (8) Operate each vapor control device following the manufacturer's written operating instructions, procedures, and maintenance schedule to ensure good air pollution control practices for minimizing emissions.

(f) References.

- ANSI/ASME PTC 19.10-1981 *Flue and Exhaust Gas Analyses [Part 10, Instruments and Apparatus], which is incorporated herein by reference. 1981.*
- ASTM D1945-03 *Standard Test Method for Analysis of Natural Gas by Gas Chromatography, which is incorporated herein by reference. Reapproved 2010.*
- ASTM D3588-98 *Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels, which is incorporated herein by reference. Reapproved 2003.*
- ASTM D4891-89 *Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion, which is incorporated herein by reference. Reapproved 2006.*

- ASTM D6522-00 *Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers, which is incorporated herein by reference. 2000.*
- US EPA Protocol 1 *EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards, which is incorporated herein by reference. 2012.*

Appendix G

Procedure for Direct Flow Rate Measurement using High-Volume Sampling

- (a) Owners or operators using a high-volume sampler to measure emissions shall do so in accordance with sections (a)(1) through (5) of this appendix.
- (1) The high-volume sampler shall be designed to capture the entirety of the emissions from the applicable vent and measure the entire range of methane concentrations being emitted as well as the total volumetric flow at standard conditions. Owners or operators shall develop a standard operating procedure for this device and document these procedures.
 - (2) The high-volume sampler shall include one or more methane gas sensors meeting the requirements in sections (a)(2)(A) through (C) of this appendix.
 - (A) The methane sensor shall be selective to methane with minimal interference, less than 2.5 percent for the sum of responses to other compounds in the gas matrix. Owners or operators shall document the minimal interference through empirical testing or through data provided by the manufacturer of the sensor.
 - (B) The methane sensor shall have a measurement range over the entire expected range of concentrations. If the gas concentration exceeds the range of the methane sensor, a gas divider can be incorporated into the system to extend the range.
 - (C) The methane sensor shall be capable of taking a measurement once every second, and the data system shall be capable of recording these results for each sensor at all times during operation of the sampler.
 - (3) The high-volume sampler shall be designed such that it is capable of sampling sufficient volume in order to capture all emissions from the applicable vent. The high-volume sampler shall include one or more flow measurement sensors meeting the requirements of sections (a)(3)(A) and (B) of this appendix.
 - (A) The flow measurement sensor shall have a measurement range over the entire expected range of flow rates sampled. If needed, multiple sensors may be used to capture the entire range of expected flow rates.
 - (B) The flow measurement sensor shall be capable of taking a measurement once every second, and the data system shall be capable of recording these results for each sensor at all times during operation of the sampler.

- (4) Owners or operators shall calibrate the methane sensor according to the procedures in sections (a)(4)(A)1. and (a)(4)(A)2. of this appendix, and the flow measurement sensor shall be calibrated according to the procedures in section (a)(4)(B) of this appendix.
 - (A) Methane Sensor Calibration.
 - 1. Initially and on a semi-annual basis, determine the linearity at four points through the measurement range for each methane sensor using methane gaseous calibration cylinder standards. At each point, the difference between the cylinder value and the sensor reading shall be less than five (5) percent of the respective calibration gas value. If the sensor does not meet this requirement, perform corrective action on the sensor, and do not use the sampler until these criteria can be met.
 - 2. Prior to each testing day, challenge each sensor at two points, a low point, and a mid-point, using methane gaseous calibration cylinder standards. At each point, the difference between the cylinder value and the sensor reading shall be less than five (5) percent of the respective calibration gas value. If the sensor does not meet this requirement, perform corrective action on the sensor and do not use the sampler again until these criteria can be met.
 - (B) Flow measurement sensors shall meet the requirements in US EPA Method 2D (40 CFR Part 60, Appendix A-1, January 14, 2019). Rate meters shall be calibrated on an annual basis according to the requirements in US EPA Method 2D (40 CFR Part 60, Appendix A-1, January 14, 2019). If the flow sensor relies on ancillary temperature and pressure measurements to correct the flow rate to standard conditions, the temperature and pressure sensors shall also be calibrated on an annual basis.
- (5) Owners or operators shall conduct sampling in accordance with the procedures in sections (a)(5)(A) through (E) of this appendix.
 - (A) The instrument shall be operated consistent with manufacturer recommendations.
 - (B) Identify the vent to be measured. Collect a background methane sample in parts per million by volume (ppmv) for a minimum of one minute and record the result along with the date and time.

- (C) Approach the vent with the sample hose and adjust the sampler to be measuring at the full flow rate. Then, adjust the flow rate to ensure the measured methane concentration is within the calibrated range of the methane sensor and minimum methane concentration is at least two (2) ppmv higher than the background concentration. Sample for a period of at least one minute and record the average flowrate in standard cubic feet per minute and the methane sample concentration in ppmv, along with the date and time.
- (D) Calculate the leak rate according to the following equation:

$$Q = V \frac{(S_{CH_4} - B_{CH_4})}{1000000}$$

Where:

S_{CH_4} = methane sample concentration, ppmv

B_{CH_4} = background methane concentration, ppmv

V = Average flow rate of the sampler, scfm

Q = Methane emission rate, scfm

- (E) Collect at least three separate one-minute measurements and determine the average leak rate.