

Compendium of Leading North American Regulations and Emission Standards for Air and Climate Pollutants from Oil and Gas Operations

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Clean Air Task Force
114 State Street, 6th Floor
Boston, MA 02109

P: 617.624.0234
F: 617.624.0230

Introduction

This document provides:

- A. A brief overview of the most important recent oil and gas air and climate pollutant regulations promulgated by North American national and state/provincial governments.
- B. A list of recommended “best in class” regulations for each major specific emissions sources / equipment types, chosen from among the regulations in place in North American jurisdictions.

This document is not intended to serve in any way as legal analysis.

This document is only intended to introduce readers to the most effective regulatory approaches and document those approaches. While we periodically update this document to the best of our abilities in response to regulatory changes, given the large number of jurisdictions included in this overview and the relatively rapid pace of development and evolution of these regulations, readers should understand that portions of the document may no longer be current.

This document was originally prepared by Elizabeth Paranhos (Delone Law Inc.), Environmental Defense Fund, and Clean Air Task Force, and it has been updated by Clean Air Task Force.

Overview of O&G Regulations

Companies and countries representing over 40% of global oil and gas production have agreed to limit emissions associated with natural gas leaks, venting and flaring in some capacity. National and sub-national jurisdictions across the US, Canada, and Mexico have issued regulations, or committed to do so in order to meet methane reduction goals. Several additional US states are in the process of developing or strengthening regulations, and several other countries have started to look at policies that can reduce methane emissions, including the European Union and Argentina. The strength of regulations varies from one jurisdiction to the next. Some regulate methane emissions directly, while others address VOCs, which reduce methane as a co-benefit, since the two pollutants are both present in natural gas. In the US and Canada, some rules only apply to new

facilities or equipment, while other rules are applied to existing equipment.

Several studies have identified methane mitigation measures from the O&G sector as some of the easiest available to achieve significant reductions in greenhouse gas emissions.¹ For most companies, even small investments in efficiency and mitigation projects compete for capital with exploration and production projects; due to higher returns the latter tend to get funded at the expense of the former. This is the main reason why voluntary programs have only achieved modest results and regulation can play a big part in reducing emissions at minimal cost to companies.

National Regulations

United States

In June 2016, the U.S. Environmental Protection Agency (USEPA) issued a set of New Source Performance Standards (referred to by the English acronym “NSPS OOOOa”) to reduce emissions of methane and smog-forming volatile organic compounds (VOCs) from new, reconstructed and modified oil and gas sources.² This rule is built from a rule issued in August 2012 (NSPS OOOO) that focused on emissions of VOCs from new and modified natural gas production and processing facilities.³

In October 2016, the USEPA issued Control Techniques Guidelines (CTGs) for reducing smog-forming volatile organic compound (VOC) emissions from existing oil and natural gas equipment and processes in certain states and areas with ground-level ozone problems.⁴

In November 2016, the U.S. Department of Interior Bureau of Land Management issued a rule to reduce the waste of natural gas from venting, flaring, and leaks during oil and natural gas production activities on onshore

¹ *Summary of Methane Emission Reduction Opportunities Across North American Oil and Natural Gas Industries*. ICF International. May, 2016. https://www.edf.org/sites/default/files/north-american-executive-summary_english.pdf

² Environmental Protection Agency, Final Rule, Oil and Natural Gas Sector: Emission Standards for New and Modified Sources, (“EPA NSPS OOOOa”), 40 C.F.R. Part 60 (June 3, 2016), available at: <https://www.gpo.gov/fdsys/pkg/FR-2016-06-03/pdf/2016-11971.pdf>

³ Environmental Protection Agency, Final Rule, Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, (“EPA NSPS OOOO”), 40 C.F.R. Part 60 and 63, (August 16, 2016), available at: <https://www.gpo.gov/fdsys/pkg/FR-2012-08-16/pdf/2012-16806.pdf>.

⁴ EPA Control Techniques Guidelines for the Oil and Natural Gas Industry (“EPA CTGs”), (October 2018), available at <https://www.epa.gov/sites/production/files/2016-10/documents/2016-ctg-oil-and-gas.pdf>.



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Boston, MA 02109

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F: 617.624.0230

Federal and Indian lands.⁵ This rule was vacated by a US Federal Court in October 2020.

Canada

On April 25th 2018, the Canadian Environment and Climate Change Ministry finalized robust, nationwide standards designed to cut methane pollution from the oil and gas industry by roughly 40-45 percent.⁶ These standards are the culmination of two years of Canadian federal efforts that began with Canada's commitment to reduce methane emissions from both new and existing sources of pollution in the oil and gas sector, and Canada's signing of the North American Leaders Summit pledge with Mexico and the US to reduce emissions by 40-45% by 2025.

Canada was the first country to put in place regulations to reduce methane from the oil and gas sector, covering both new and existing sources. Importantly, these rules cover sites across the industry, including oil and gas well sites, plants that process natural gas, and gas pipeline compressor stations.

The new Canadian standards will reduce emissions by requiring oil and gas companies to find and fix leaks in their equipment, reduce pollution during completion of new wells that have been hydraulically fractured, and repair and/or upgrade equipment such as compressors, oil tanks, and natural gas-driven automatic valves. With these regulations, Environment and Climate Change Canada (ECCC) estimates that between 2018 and 2035, methane emissions will be reduced by roughly 10 million metric tons. The total climate benefits of those reductions are around 845 million metric tons of CO₂-equivalent over the next few decades, so this rule has climate benefits similar to closing twelve coal-fired power plants or taking ten million cars off the road. ECCC estimates the regulations would result in net benefits of CAN\$8.9 billion.

Under Canadian law, provinces with significant oil and gas production (specifically British Columbia, Alberta, Manitoba and Saskatchewan) will need to either adopt the federal standards or develop their own regulations to achieve a similar level of emissions reduction. This is a process known as "equivalency". The major oil and gas provinces are currently proposing regulations to meet the federal standards, a process expected to go through early 2020.

Mexico

⁵ Bureau of Land Management, Waste Prevention, Production Subject to Royalties, and Resource Conservation ("BLM Waste Rule"), 81 FR 83008, 43 C.F.R. Parts 3100, 3160 and 3170, (Nov. 18, 2016), available at <https://www.gpo.gov/fdsys/pkg/FR-2016-11-18/pdf/2016-27637.pdf>.

⁶ ECCC. Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector), available at: <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2018-66/FullText.html>.



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In November 2018, the Mexican Agency for Security, Energy, and Environment (ASEA) finalized Guidelines for the Prevention and Comprehensive Control of Methane Emissions from the Hydrocarbon Sector.⁷ The regulation covers the whole hydrocarbons value chain (from exploration to distribution) and includes both existing and new sources.

The regulation sets a period of 12 months after its publication for the development of a “Program for Prevention and Integrated Control of Methane Emissions” (PPCIEM for its Spanish acronym), which includes a diagnosis of the baseline emissions. ASEA provides some flexibility for regulated companies by allowing them to choose one of the last 5 years as the base year for all targets.

The PPCIEM aims to lay out the schedule for the implementation of all measures included in Title III (or measures that are similar or superior-including a technical justification), which should all be implemented within 6 years of the publication of the regulation. These measures include improvements in technology and/or practices in vapor recovery systems, pneumatic pumps, compressors, pneumatic controllers, glycol dehydrators, transport/distribution pipelines, (flash) tanks, well completions and stimulation, liquids unloading, and flaring. If the implementation of a measure is deemed not technically feasible, a detailed justification must be included in an annex to the PPCIEM and should be validated by a third-party verifier (see section on Compliance Evaluation). The PPCIEM also requires the inclusion of a Leak Detection and Repair (LDAR) program, which should start when the PPCIEM is submitted; inspections are to be performed quarterly.

Existing facilities will include an emission target in their PPCIEM and maintain that level of emissions once it is reached, while new ones will be required to maintain the level of emissions of the base year, which will be defined in the PPCIEM.

Reporting on both LDAR and the measures included in the PPCIEM will be done annually and will have to be verified by certified third parties.

State/Provincial Regulations

In 2008, the state of Colorado issued its first regulations to reduce VOC emissions from oil and gas operations in areas of the state with poor air quality. These were the first modern regulations to address emissions in the oil and gas sector and served as a launching point for other states and the US federal government's efforts to address methane leakage. In 2014, Colorado strengthened these rules, including requiring operators to perform regular, comprehensive leak detection and repair inspections. The 2014 rulemaking

⁷ La Agencia de Seguridad, Energía y Ambiente (ASEA), Guidelines for the Prevention and Comprehensive Control of Methane Emissions from the Hydrocarbon Sector. (“ASEA”), (November 13, 2018), available at: https://www.dof.gob.mx/nota_detalle.php?codigo=5543033&fecha=06/11/2018



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114 State Street, 6th Floor
Boston, MA 02109

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also expanded the regulation of oil and gas air emissions to the entire state and targeted methane emissions, in addition to VOC. In 2017 and 2019, Colorado further strengthened its standards, particularly in the part of the state with air quality problems. And in 2020-2021, Colorado further strengthened its rules by prohibiting routine venting or flaring of associated gas, significantly tightening rules for pneumatic controllers, increasing stringency for capturing emissions from well completions and workovers, and tightening other aspects of the regulations.⁸

In 2013, the Pennsylvania Department of Environmental Protection (PA DEP) updated a General Operating Permit for new and modified natural gas compressor stations and processing plants (GP-5). In June 2018, the PA DEP strengthened GP-5 and issued a new General Operating permit for new and modified unconventional natural gas well (i.e., shale gas wells) site operations (GP-5A).⁹

In June 2014, the Utah Department of Environmental Quality issued a General Approval Order for new and modified oil and gas well sites and tank batteries.¹⁰

The Wyoming Department of Environmental Quality (WYDEQ) initially issued permitting guidance for new and modified oil and gas wells in 1997, and this guidance was most recently updated in 2016. This guidance includes standards of varying stringency, and covering different sets of equipment types, in different parts of the state; the strongest and broadest rules apply in a core area with dense natural gas production sites and significant ground-level

⁸ Colorado Air Quality Control Commission Regulation Number 7, 5 C.C.R. 1001-9, (“Colorado regulation”), available at <https://www.sos.state.co.us/CCR/GenerateRulePdf.do?ruleVersionId=9417>. (See chronology here: <https://www.colorado.gov/pacific/cdphe/ozone-planning-chronology>)

Colorado Oil and Gas Conservation Commission Regulation Number 2. C.C.R. 401-1: 903, (“Colorado Flaring Rule”), available at <https://www.sos.state.co.us/CCR/GenerateRulePdf.do?ruleVersionId=9245>.

⁹ Pennsylvania Department of Environmental Protection (PA DEP), General Permit for Natural Gas Compression and/or Processing Facilities (“Pennsylvania GP-5”) available at <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=19614&DocName=03%20GP-5%20NATURAL%20GAS%20COMPRESSION%20STATIONS%2C%20PROCESSING%20PLANT%20AND%20TRANSMISSION%20STATIONS%20GENERAL%20PLAN%20APPROVAL%20AND%20FOR%20GENERAL%20OPERATING%20PERMIT.PDF%20%20%3Cspan%20style%3D%22color%3Agreen%3B%22%3E%3C%2Fspan%3E%20%3Cspan%20style%3D%22color%3Ablue%3B%22%3E%3C%2Fspan%3E>, and General Permit for Unconventional Natural Gas Well Site Operations and Remote Pigging Stations (“Pennsylvania GP-5A”), available at <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=19615&DocName=03%20GP-5A%20UNCONVENTIONAL%20NATURAL%20GAS%20WELL%20SITE%20OPERATIONS%20AND%20REMOTE%20PIGGING%20STATIONS%20GENERAL%20PLAN%20APPROVAL%20AND%20FOR%20GENERAL%20OPERATING%20PERMIT.PDF%20%20%3Cspan%20style%3D%22color%3Agreen%3B%22%3E%3C%2Fspan%3E%20%3Cspan%20style%3D%22color%3Ablue%3B%22%3E%3C%2Fspan%3E>.

¹⁰ Utah Department of Environmental Quality, Division of Air Quality, Approval Order: General Approval Order for a Crude Oil and Natural Gas Well Site and/or Tank Battery, (June 5, 2014), (“Utah General Approval Order”), available at <https://deq.utah.gov/legacy/permits/general-approval-orders/docs/2014/6June/DAQE-AN149250001-14.pdf>.

ozone air quality problems.¹¹ In 2015 WYDEQ developed a regulation for new and existing sources specific to the core area, the Upper Green River Non-Attainment Area.¹²

In March 2017, the California Air Resources Board (CARB) issued regulations establishing greenhouse gas emission standards for crude oil and natural gas facilities in the state.¹³

In 2017 the Ohio Environmental Protection Agency issued General Operating Permits for new and modified natural gas compressor stations.¹⁴

In December 2018 the Alberta Energy Regulator (AER) published an Update to Directive 060, covering Flaring, Incinerating, and Venting in the Upstream Petroleum Industry.¹⁵

In December 2018 the British Columbia Oil and Gas Commission (BC OGC) finalized amendments to the Drilling and Production regulation to reduce methane emissions from upstream oil and gas operations.¹⁶

In May 2021, the New Mexico Energy, Minerals and Natural Resources Department (EMNRD) Oil Conservation Division (OCD) issued rules prohibiting the routine venting or flaring of associated gas and further requiring oil and gas operators to limit venting and flaring for any cause to two percent of natural gas production by the end of 2026.¹⁷

¹¹ Wyoming DEQ, Air Quality Division, Chapter 6, Section 2 Permitting Guidance (“Wyoming Permitting Guidance”) available at http://deq.wyoming.gov/media/attachments/Air%20Quality/New%20Source%20Review/Guidance%20Documents/FINAL_2018_Oil%20and%20Gas%20Guidance.pdf.

¹² Wyoming DEQ, Air Quality Division, Chapter 8, Nonattainment Area Regulations, Section 6 (pages 8-85 – 8-94) (“Wyoming Nonattainment Area Regulations”) available at https://rules.wyo.gov/DownloadFile.aspx?source_id=12729&source_type_id=81&doc_type_id=110&include_meta_data=Y&file_type=pdf&filename=12729.pdf&token=208221116231104014026080189136236175092003165132.

¹³ California Air Resources Board, California Final Regulation Order, 17 C.C.R. (“CARB rule”), (March 10, 2017), available at <https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasfro.pdf>.

¹⁴ Ohio Environmental Protection Agency, General Permits, (“Ohio General Permits”), available at <http://epa.ohio.gov/dapc/genpermit/ngcs.aspx>.

¹⁵ Alberta Energy Regulator. Directive 060 Upstream Petroleum Industry Flaring, Incinerating, and Venting. (“Alberta regulation”), (December 13, 2018), available at <https://static.aer.ca/prd/documents/directives/Directive060.pdf>.

¹⁶ British Columbia Oil and Gas Commission (BC OGC). Amendment to Drilling and Production Regulation, B.C. Reg. 282/2010. (“BC regulation”), (December 17, 2018), available at: http://www.bclaws.ca/civix/document/id/regulationbulletin/regulationbulletin/Reg286_2018.

¹⁷ New Mexico Energy, Minerals and Natural Resources Department (EMNRD) Oil Conservation Division (NM OCD), Title 19, Chapter 15, Park 27 Venting and Flaring of Natural Gas (“NM OCD Flaring Rule”), (May, 25, 2021), available at: <http://164.64.110.134/nmac/nmregister/xxxii/19.15.27.html>.



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Recommended Policies by Source

This memo highlights best practices and technological solutions for a number of upstream and midstream sources in the oil and gas value chain, focusing on sources that historically have been the subject of air pollution regulation at the federal or state/provincial levels. Many of the best practice regulatory examples derive from regulations developed in the U.S., Mexico or Canada. Sources not addressed abandoned and orphaned wells, the integrity of underground natural gas storage facilities, and pipelines, among others. Footnotes provide citations to the relevant regulatory language.

The requirements apply to:

- new and existing activities or sources, unless otherwise noted
- activities and equipment in the onshore crude oil and natural gas production and natural gas processing, storage and transmission segments.

“New” activities or sources are those which begin or are constructed after the effective date of the regulation or requirement.

Italicized terms which are underlined are listed in the definitions section at the end of the document.

Combustion devices

- Operational requirements
 - If a flare or other *combustion device*¹⁸ is used to control emissions of hydrocarbons, it must have a design destruction efficiency of at least 98% for hydrocarbons. It shall be enclosed, be equipped with and operate an auto-igniter, have no visible emissions during normal operations, and be designed so than that an observer can, by means of visual observation from the outside of the enclosed flare or combustion device, determine whether it is operating properly.¹⁹
- Monitoring requirements
 - Operation of a *combustion device* used to control emissions shall be continually monitored using any device that senses and records a parameter that indicates whether the combustion device is functioning to achieve the 98% control requirement.²⁰

Pneumatic Controllers

- Control requirement

¹⁸ [Colorado Regulation](#) § 9.I.D.3.a.; § 9.II.C.1.b-c; § 9.II.D.3; § 9.II.F; § 9.VI.D.1.a

¹⁹ [Colorado Regulation](#) §§ 9.I.C.1.e. A.

²⁰ [EPA NSPS OOOOa](#) § 60.5417a.



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- New controllers. New controllers shall be not vent natural gas to the atmosphere.²¹ Operators can meet this requirement by either using no-bleed devices (air-driven or electric controllers/actuators) or by routing emissions to a vapor collection system²² that captures the emissions.²³ If it is not feasible to capture the emissions, operators may use a flare.²⁴
- Existing controllers at Well Production Facilities and Compressor Stations
 - Operators of these facilities must convert a portion (~50%+) of their existing fleet of venting controllers (across all sites operated by the firm in a jurisdiction) to non-emitting units (electric, air driven, or utilizing capture or control of emissions) over a period of two years.²⁵
 - In the interim period before conversion, operators must
 - Ensure that all emitting controllers emit less than 6 standard cubic feet per hour (0.17 standard cubic meters per hour).²⁶
 - For any level controller for an oil/gas/water separator at a wellsite that actuates more than once per 15 minute interval, use a relay designed to minimize venting per actuation.²⁷
 - For intermittent-vent controllers, inspect each controller on a regular basis (i.e., during each leak inspection required for the site) and ensure that the device does not emit natural gas between actuations; any device that does emit between actuations must be inspected within 5 days and, if determined to be operating improperly, must be repaired within 30 days after the inspection.²⁸
 - For continuous-vent controllers, measure emissions from the controller yearly. If emissions from the controller exceed 6 standard cubic feet per hour (0.17 standard

²¹ [Alberta regulation](#) § 8.6.1 (1) (applies to any new controller installed at any site after 1 January 2022); [Colorado Regulation](#) § D.III.C.4.a.; [BC regulation](#) § 52.05 (2) (both of these rules apply to all controllers at new sites; Colorado's rule also applies to expanded sites (e.g., sites with new wells)).

²² [CARB](#) § 95667(a)(62).

²³ [Wyoming Permitting Guidance](#), p. 11; [CARB](#) § 95668(e)(5).

²⁴ [Wyoming Permitting Guidance](#), p.11.

²⁵ [Colorado Regulation](#) § D.III.C.4.c and d.

²⁶ [Wyoming Nonattainment Area Regulations](#), § 6(f); [BC regulation](#) § 52.05(4); [Alberta regulation](#) § 8.6.1 (4).

²⁷ [Alberta regulation](#) § 8.6.1 (3).

²⁸ [Colorado Regulation](#) §§ D.III.F.2.g and D.III.F.3.a; [CARB](#) § 95668(e)(3).



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cubic meters per hour), the controller must be repaired within 14 days.²⁹

- Existing controllers at Large Compressor Stations or Processing Plants shall be zero bleed.³⁰
- Recordkeeping
 - Maintain, for at least five years from the date of each inspection, a record of each component leak concentration and repair.³¹
 - Documentation of the natural gas bleed rate.³²
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.³³

Pneumatic Pumps

- Control requirement
 - New and existing: Use zero bleed, electric (solar) pump, or route emissions to vapor collection system.³⁴
 - Monitor any natural gas-driven pump, vapor collection system and combustor as part of instrumental LDAR.³⁵
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.³⁶

Liquids Unloading

- Control requirement
 - New wells: Prohibit blowing accumulated liquids out of the wellbore by gas pressure where the gas is vented to the atmosphere.³⁷
 - Existing wells: Require existing wells to use any means of creating differential pressure to unload the liquids from a well

²⁹ [CARB](#) § 95668(e)(2)(A)(1)-(4).

³⁰ [BC regulation](#) § 52.05 (3); [Colorado Regulation](#) § D.III.C.2.

³¹ [CARB](#) § 95672 (18).

³² [EPA NSPS OOOO](#) §§ 60.5390(c)(1), 5420(b)(5)(i).

³³ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#), § 60.5420a(c)(1) (EPA requirements for gas well completions).

³⁴ [BLM Waste Rule](#) 3179.202(c); [CARB](#) § 95668(e)(4); [Wyoming Nonattainment Area Regulation](#) §6(e); [ECCC](#) § 39(1), [ASEA](#) § Chapter II, Articles 41-42; [BC regulation](#) § 52.06 (1) (applies to pumps operated more than 750 hours in the year).

³⁵ [CARB](#) § 95668(e)(4).

³⁶ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for gas well completions).

³⁷ [BLM Waste Rule](#) § 3179.204(a); *See also* South Coast Air Quality Management District R. 1148.1 (prohibiting venting from oil or gas facility).



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P: 617.624.0234
F: 617.624.0230

without venting.³⁸ If these methods are not successful in unloading the liquids from the well, the well may be vented to the atmosphere. Operators must remain on-site during any liquids unloading events to ensure that any venting to the atmosphere is limited to no more than what is practically necessary.³⁹

- Recordkeeping
 - Operators must retain records of the cause, date, time, duration and estimated volume of each venting event.⁴⁰
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁴¹

Equipment leaks

- Applicable to well sites, compressor stations, tank batteries and gas processing plants, and any oil or gas facility with a hydrocarbon liquids storage tank.
- Control requirement
 - Inspection within 30 days after startup.⁴²
 - Instrumental LDAR: Conduct quarterly inspections⁴³ of components in accordance with US EPA Reference Method 21,⁴⁴ using an optical gas imaging device, or using an alternative approved device that is equally or more effective at detecting leaks.⁴⁵
 - Components means any component that has the potential to emit fugitive emissions of methane or VOC including but not limited to⁴⁶ a valve, fitting, flange, threaded-connection, process drain, stuffing box, pressure-vacuum, valve, pipe, seal fluid system, diaphragm, hatch, sight-glass, meter, open-ended line, continuous bleed and intermittent-vent natural gas powered pneumatic device, natural gas powered pneumatic pump, centrifugal compressor wet seal, or reciprocating compressor rod packing

³⁸ [Colorado regulation](#), § D.II.G.1.a.; [ASEA](#) § Chapter IX, Article 66.

³⁹ [Colorado regulation](#), § D.II.G.1.b.; [BLM Waste Rule](#) § 3179.204(d)(1).

⁴⁰ [Colorado regulation](#), § D.II.G.2.a.; 43 C.F.R. § 3179.204(d)(2).

⁴¹ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for gas well completions); [Colorado regulation](#), § D.II.G.3.a.

⁴² [Colorado Regulation](#), § D.I.L.2.d.

⁴³ [Colorado Regulation](#), § D.I.L.1.a.; [CARB](#) § 95669(g); [Pennsylvania GP-5](#) § G.1(a)(ii); [Pennsylvania GP-5A](#) § G.1(b); [Ohio General Permits](#) 12.1(C)(5)(c)(2), 12.2(C)(5)(c)(2); [Wyoming Permitting Guidance](#) at 22; [Wyoming Nonattainment Area Regulations](#) § (6)(g)(1)(a); [Utah General Approval Order](#), II.B.10, [ASEA](#) § Chapter XI, Article 71.

⁴⁴ [CARB](#) § 95669(g).

⁴⁵ [BLM Waste Rule](#) § 3179.302(a); [EPA NSPS OOOOa](#) § 50.5397a(a), [ASEA](#) § Chapter XI, Article 73.

⁴⁶ [EPA NSPS OOOOa](#) § 60.5430a.



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- or seal, combustion devices and vapor recovery systems.⁴⁷
- Conduct audio, visual, or olfactory inspections monthly,⁴⁸ OR daily for facilities that are visited daily and weekly for facilities that are not visited daily.⁴⁹
 - Repair or replace all “fugitive emissions” within 5 working days of discovery, unless the component is a *critical component* that cannot be repaired without shutdown.⁵⁰ If the component is a critical component that cannot be repaired without shutdown, operators shall minimize the leak within one day of detection and repair the leak by the end of the next process shutdown or within one year, whichever is sooner.⁵¹
 - Fugitive emissions means
 - For optical gas imaging inspections, any visible emission from a fugitive emissions component observed using optical gas imaging.⁵²
 - For Method 21 inspections, any concentration of hydrocarbon above 500 ppm for any monitoring using approved quantitative instrument-based monitoring.⁵³
 - Re-monitoring
 - Each repaired or replaced component must be resurveyed as soon as practicable to ensure there is no leak, but no later than 15 days of the leak discovery.⁵⁴
 - Recordkeeping
 - Must retain records documenting results of inspections, including identification of number of leaks by component, date of inspection and date of repairs, date of re-monitoring to verify repair, list of unsafe to monitor and *critical components* on delayed repair list, and plan for monitoring such components.⁵⁵
 - Reporting
 - Must submit annual report including total number of facilities inspected, total number of inspections, total number of leaks identified, by component and type of facility, total number of leaks repaired, and total number of leaks on delayed repair

⁴⁷ [CARB](#) § 95667(a)(9); [EPA NSPS OOOOa](#) § 60.5430a.

⁴⁸ [Colorado Regulation](#), § D.II.E.4.d.

⁴⁹ [CARB](#) §§ 95669(e)

⁵⁰ [Colorado Regulation](#), § D.I.L.5.a.; [CARB](#) §§ 95669(h)(2).

⁵¹ [CARB](#) § 95669(h)(3); [Colorado Regulation](#), § D.I.L.5.a.(ii) (establishing when it is unsafe to monitor components).

⁵² [EPA NSPS OOOOa](#) § 60.5397a(a); [Colorado Regulation](#), § D.I.L.4.b.

⁵³ [Colorado Regulation](#), § D.I.L.4.a.

⁵⁴ [EPA NSPS OOOOa](#) § 60.5397a(j)(2).

⁵⁵ [Colorado Regulation](#), § D.I.L.6.; [ECCC](#) § 53.

list,⁵⁶ accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁵⁷

Glycol Dehydrators

- Control requirement
 - Operators shall control emissions of methane and VOC from new and existing glycol dehydrators by 98%.⁵⁸
- Monitoring
 - Inspect glycol dehydrator and vapor recovery system or control device as part of instrumental LDAR.⁵⁹
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁶⁰

Centrifugal compressor seals

- Control requirement
 - New and Existing centrifugal compressors with wet seals: Require operators to route oil degassing unit emissions either to a *vapor collection system* (including routing the emissions to the inlet of the compressor) or a *combustion device*. Alternatively, operators can design/retrofit the compressor using dry seals.⁶¹
- Monitoring
 - Inspect compressor, wet seals, isolation valves, vapor recovery system or control device as part of instrumental LDAR.⁶²
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁶³

Reciprocating compressor rod-packing

- Control requirement

⁵⁶ [Colorado Regulation](#), § § D.I.L.7.a-e.

⁵⁷ [Colorado Regulation](#), § D.I.L.7.g; [ASEA](#) § Chapter XI, Article 84.

⁵⁸ [Wyoming Permitting Guidance](#) at 25 (requiring all new dehydrators to control emissions by 98%); [Wyoming Nonattainment Area Regulations](#) § 6(d)(1)(A); [Colorado Regulation](#), § D.II.D.3. Some states set a control threshold below which operators are not required to install controls. This threshold varies, and is dependent on a number of factors including whether or not a control device is already present at the site, the cost of installing a new device, and the emissions potential from the dehydrators.

⁵⁹ [CARB](#) § 95668(d)(3)(A) (components on driver engines and compressors are subject to LDAR).

⁶⁰ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420(c)(1) (EPA requirements for gas well completions).

⁶¹ [CARB](#) § 95668(d)(5),(7); [EPA NSPS OOOOa](#) §§ 5380(a)(1)-(2); 5380a(a)(1)-(2); [ASEA](#) § Chapter III, Articles 43-44.

⁶² [CARB](#) § 95668(d)(3).

⁶³ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for gas well completions).



Clean Air Task Force
114 State Street, 6th Floor
Boston, MA 02109

P: 617.624.0234
F: 617.624.0230



Clean Air Task Force
114 State Street, 6th Floor
Boston, MA 02109

P: 617.624.0234
F: 617.624.0230

- New and Existing: Route emissions from compressor vents used to vent rod packing or seal emissions to a vapor recovery system (including systems that deliver emissions to compressor engine fuel or air intakes), or if not feasible, to a *combustion device*.⁶⁴
- Monitoring
 - Inspect compressor, compressor seals, rod-packing and vapor recovery system or control device as part of instrumental LDAR.⁶⁵
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁶⁶

Liquid Storage Tanks: Flash Gas, Working & Breathing Losses

- Control requirements
 - Require operators of any tank or set of tanks at a site with potential emissions of two short tons per year or more of VOC to route emissions, including all emissions of *flash gas*, and emissions due to *working losses* and *breathing losses*, either to a *vapor collection system* or, in some cases, to a *combustion device*.⁶⁷
 - Prohibit venting of hydrocarbon emissions from hatches and other access points on tanks during normal operation.⁶⁸
 - Require operators of controlled tanks to evaluate their systems for controlling tank emissions and certify that each system is designed and is adequate to capture all *flash gas*, *working losses* and *breathing losses* from the tank.⁶⁹
 - Any controlled tank at a new site or an expanded site must have a *storage tank measurement system* and operators must keep thief hatches and other access points on such tanks closed while determining the quality and quantity of fluids in the tank.⁷⁰
 - Operators of facilities loading 5,000 barrels or more of hydrocarbon liquids per year into transport vehicles must

⁶⁴ [CARB § 95668\(c\)\(3\)\(C\)](#); [Ohio General Permits](#) 17.1 Template C.1.(b)(1); [Pennsylvania GP-5A](#) § D.1.; [CARB § 95668\(c\)](#); [EPA NSPS OOOOa](#) § 60.5420a(c).

⁶⁵ [CARB § 95668\(c\)\(3\)\(A\)](#), (4)(A).

⁶⁶ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for gas well completions).

⁶⁷ [Colorado regulation](#), § D.I.D.1.a. (setting control threshold at two short tons per year); [Wyoming Permitting Guidance](#) at p. 7 (specifying that the sum of all flash emissions, from all vessels, must be considered when evaluating whether emissions exceed control threshold).

⁶⁸ Other potential language could include “hatches shall be closed at all times except during sampling, adding of process material through the hatch, or attended maintenance operations.” [Ventura County R. 74.10.C.1](#), [ASEA](#) § Chapter VII, Article 61.

⁶⁹ [Colorado regulation](#), § D.I.C.1.a.

⁷⁰ [Colorado regulation](#), § D.II.C.4.a(ii), D.II.C.4.b.



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114 State Street, 6th Floor
Boston, MA 02109

P: 617.624.0234
F: 617.624.0230

control emissions from transferring liquids from tanks to transport vehicles using a) submerged fill and b) vapor collection and return systems and/or pollution control equipment.⁷¹

- Monitoring
 - Require at least monthly visual and AVO inspections of tanks and control devices to ensure emissions are being routed to control units and flares are operating as designed.⁷²
 - Monitor storage vessels, access points and vapor collection systems and combustors as part of instrumental LDAR.⁷³
 - If any tanks are exempted from the requirement to install emission controls, conduct annual flash analysis testing for these tanks to estimate annual methane emissions from the tanks and evaluate whether the exemption remains warranted.⁷⁴
- Recordkeeping
 - Retain records of monthly visual and AVO inspections.⁷⁵
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁷⁶

Open ended lines and valves and sampling connection system

- Control requirements
 - Require each valve or line to be equipped with a cap, blind flange, plug or second valve. Alternatively, operators can treat these valves and lines as fugitive components and include them in instrumental LDAR program.⁷⁷
 - Require each sampling connection system to be equipped with a closed-loop, vent or purge system.⁷⁸

Compressor blowdown venting

- Control requirements
 - New: The compressor shall be designed so that no gas from compressor blowdown vents is emitted into the atmosphere. This requirement can be met by a design that captures 100% of the gasses from these sources, and routes them to a vapor

⁷¹ [Colorado regulation](#), § D.II.C.5.a.

⁷² [Colorado regulation](#), § D.II.E.4.a., D.I.E.2.b.; [ASEA](#) § Chapter VII, Article 62.

⁷³ [Colorado regulation](#), § D.II.C.2.b.(ii)(I).

⁷⁴ [CARB](#) § 95668(a)(3)-(5).

⁷⁵ [Colorado regulation](#), § D.II.E.4.d.

⁷⁶ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for gas well completions); [Colorado regulation](#) § D.I.F.3.c.(vii), D.I.F.1.g.(xiv).

⁷⁷ [Colorado regulation](#) § D.II.B.3.a.

⁷⁸ [Ohio General Permits](#) 12.1.C.5.d.3.b.



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114 State Street, 6th Floor
Boston, MA 02109

P: 617.624.0234
F: 617.624.0230

recovery system, or if not feasible, to a *combustion device*. The above design requirements shall be met at all times that pressure is present at the inlet or discharge isolation valve, including periods of either intermittent or prolonged shutdown of the compressor.⁷⁹

- Monitoring
 - Monitor compressor, *vapor collection system* and combustor as part of instrumental LDAR.
- Recordkeeping
 - Maintain records of the number of blowdown events, volume of gas emitted from all compressor blowdown events for each month, in scf; mole fraction of each CH₄ component in the gas stream using a representative analysis; and the rolling, 12-month summation of the volume of gas emitted from all compressor blowdown events, in scf.⁸⁰
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁸¹

Pigging

- Control requirements
 - During pigging activities operator must limit methane emissions by using a vapor recovery system, or if not feasible, a *combustion device*.⁸²
- Recordkeeping
 - Date and time of venting,⁸³ and amounts of venting.⁸⁴
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁸⁵

Oil and Gas well completions and recompletions

- Control requirements
 - During the initial flowback stage, the owner or operator of an oil or gas well shall route the flowback into one or more well

⁷⁹ [Ohio General Permits](#) 17.1.C.3.

⁸⁰ [Ohio General Permits](#) 17.1.C.1.d.2.

⁸¹ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420(c)(1) (EPA requirements for oil or gas well completions following hydraulic fracturing).

⁸² [Ohio General Permits](#) 21.1.C.1.b. (sets a VOC threshold for this requirement, however if an existing control system is onsite, no such threshold is necessary).

⁸³ [Ohio General Permits](#) 21.1.C.1.b.

⁸⁴ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements)

⁸⁵ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for oil or gas well completions).



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Boston, MA 02109

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F: 617.624.0230

completion vessels or storage tanks and commence operation of a separator;

- During the separation flowback stage, the owner or operator of an oil or gas well shall route all recovered liquids from the separator to one or more well completion vessels or storage tanks, re-inject the liquids into the well or another well or route the recovered liquids to a collection system. The owner or operator of an oil or gas well shall route the recovered gas from the separator into a gas flow line or collection system, use the recovered gas as an on-site fuel source, or use the recovered gas for another purpose that a purchased fuel or raw material would serve;
- The owner or operator of an oil or gas well shall route all recovered gas to the gas flow line as soon as practicable or the well shall be shut in to conserve the gas. In cases where recovered gas cannot be directed to the flow line, the owner or operator of an oil or gas well shall capture and direct recovered gas to a *combustion device*, except in conditions that may result in a fire hazard or explosion, or where high heat emissions from a combustion device may negatively impact waterways;
- The air pollution control equipment must achieve a hydrocarbon control efficiency of at least 95%, or if a combustion device is used, it must have a design destruction efficiency of at least 98% for hydrocarbons.⁸⁶
- The owner or operator of an oil or gas well has a general duty to safely maximize resource recovery and minimize releases to the atmosphere during flowback and subsequent recovery.⁸⁷
- Notify the appropriate regulator no later than two (2) days prior to the commencement of each well completion operation and provide location of the well and planned date of completion activity.⁸⁸ Operator must employ reduced emission completion practices on all completed and re-completed wells, regardless of whether the well was hydraulically fractured.⁸⁹
- Operator may flare during completion or re-completion only if such flaring is included in an approved gas capture plan or for separate approved reason to minimize adverse impacts to public health, safety, welfare, the environment, and wildlife resources.⁹⁰

- Notification

⁸⁶ [Colorado Regulation](#) § D.VI.D.1.a.

⁸⁷ [EPA NSPS OOOOa](#) § 60.5375a(a)(1)-(4).

⁸⁸ [EPA NSPS OOOOa](#) at § 60.5410a

⁸⁹ [Colorado Flaring Rule](#) at 903.c.(1)

⁹⁰ [Colorado Flaring Rule](#) at 903.c.(3)



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114 State Street, 6th Floor
Boston, MA 02109

P: 617.624.0234
F: 617.624.0230

- The owner or operator of an affected oil or gas well subject to this section shall submit a notification to the [regulator] no later than two (2) days prior to the commencement of each well completion operation that provides the anticipated date of the well completion, well number and location, owner or operator contact number, and planned date of the beginning of flowback.⁹¹
- The owner or operator must monitor air quality for at least ten (10) days prior to beginning pre-production operations, during all pre-production operations, and for at least six months after the well is capable of consistently producing either separable gas or salable liquid hydrocarbons. And the owner or operator must submit an air quality monitoring plan.⁹²
- Recordkeeping
 - A log for each well completion operation at each affected oil or gas well with hydraulic fracturing operations specifying the following: location, date, time and duration of completion, duration of combustion and venting, if any, and specific reasons for venting in lieu of capture or combustion.⁹³
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official⁹⁴

Gas Venting and Flaring

- Control requirements
 - Operators shall not vent or flare gas as a means of handling gas when oil wells do not have sufficient takeaway capacity to handle gas.⁹⁵
 - Operator shall not vent or flare natural gas except:
 - During an emergency or malfunction
 - During wellbore liquids unloading
 - During first 12 months of production for an exploratory well
 - During well tests, tank sampling, and normal operation of pneumatic controllers, pump, storage

⁹¹ [EPA NSPS OOOOa](#) at § 60.5420a(a)(2);

⁹² [Colorado Regulation](#) § D.VI.C.1.

⁹³ [Colorado Regulation](#) § D.VI.D.3; [EPA NSPS OOOOa](#) at § 60.5375a(b).

⁹⁴ [EPA NSPS OOOOa](#) at § 60.5420a(c)(1),

⁹⁵ [Colorado Flaring Rule](#) at 903(d)(1) (prohibiting operators from venting or flaring gas during production, with several exceptions, such as emergencies, testing, liquids unloading and maintenance activities, but not including disposal of gas during production due to lack of transport capacity away from the facility) and NM OCD Flaring Rule at 19.15.27.8.D (similarly, prohibiting operators from venting or flaring gas during production, with enumerated exceptions that do not include disposal of gas during production due to lack of transport capacity away from the facility).



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114 State Street, 6th Floor
Boston, MA 02109

P: 617.624.0234
F: 617.624.0230

- tank, dehydration units, amine treatment units, and compressors.⁹⁶
- Over a period of several years all operators of wells or natural gas gathering systems must limit venting and flaring, including that from allowable sources of venting and flaring such as that for maintenance, testing, unloading, etc., to 2% of produced natural gas.⁹⁷
- Operators shall minimize venting flaring by doing the following:
 - Design production separation equipment and storage tanks for maximum anticipated throughput and pressure.⁹⁸
 - Storage tanks should be equipped with an automatic gauging system that reduces natural gas venting.⁹⁹
 - Flare stack must be properly sized and designed to ensure a design destruction efficiency of at least 98%, including automatic ignition or continuous pilot, or technology that alerts operator that flare may have malfunctioned.¹⁰⁰
- Monitoring
 - Operator shall measure volume of natural gas vented, flared, or used beneficially during drilling, completion, and production using equipment that conforms to an industry standard such as American Petroleum Institute (API) Manual of Petroleum Measurement Standards (MPMS) Chapter 14.10 Measurement of Flow to Flares.¹⁰¹
 - If metering is not practicable due to circumstances such as low flow rate or low pressure venting and flaring, the operator may estimate the volume of vented or flared natural gas using a methodology that can be independently verified. In addition, the company must conduct an annual GOR test and submit results to the regulator so volume estimates can be independently verified.¹⁰²
- Recordkeeping
 - The operator shall make and keep records of the measurements and estimates, including records showing how it calculated the estimates, for no less than five years and make such records available for inspection by the division upon request.¹⁰³

⁹⁶ [NM OCD Flaring Rule](#) at 19.15.27.8.D; [Colorado Flaring Rule](#) at 903.d.(1)

⁹⁷ [NM OCD Flaring Rule](#) at 19.15.27.9.A.

⁹⁸ [NM OCD Flaring Rule](#) at 19.15.27.8.E (1).

⁹⁹ [NM OCD Flaring Rule](#) at 19.15.27.8.E (2).

¹⁰⁰ [NM OCD Flaring Rule](#) at 19.15.27.8.E (3); [Colorado Flaring Rule](#) at 903.d.(5)

¹⁰¹ [NM OCD Flaring Rule](#) at 19.15.27.8.E. (1)-(4); [Colorado Flaring Rule](#) at 903.d.(4)

¹⁰² [NM OCD Flaring Rule](#) at 19.15.27.8.E. (5)-(7).

¹⁰³ [NM OCD Flaring Rule](#) at 19.15.27.8.G. (2).



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Boston, MA 02109

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F: 617.624.0230

- Reporting
 - Operator must submit monthly reports of natural gas vented and flared.¹⁰⁴
 - Operator must report all venting or flaring caused by an emergency, a malfunction, or of long duration if the event exceeds 50 mcf no later than 15 days following discovery or commencement of venting or flaring.¹⁰⁵
 - Operator must report all venting or flaring caused by an emergency, a malfunction, or of long duration if the event exceeds 500 mcf no later than 24 hours following discovery or commencement of venting or flaring.¹⁰⁶
 - The operator must file a natural gas management plan for each new or recompleted well or well pad detailing the actions it will take to meet the natural gas capture requirements.¹⁰⁷
 - The gas management plan will certify that the operator will be able to connect the well to a natural gas gathering system with sufficient capacity to transport 100% of the anticipated production volume starting on the first day or production. If the operator is *not* able to certify that it will be able to connect the well to a natural gas gathering system with sufficient capacity to transport 100% of the anticipated production volume starting on the first day or production, it must either shut in the well until it is able to do so, or it must submit a venting and flaring plan that utilizes an alternative beneficial use of natural gas until the gas gathering system is available. These alternative beneficial uses include:
 - Power generation on lease
 - Power generation for grid
 - Compression on lease
 - Liquids removal on lease
 - Reinjection for underground or temporary storage or enhanced oil recovery.¹⁰⁸

Definitions

Breathing Losses describes gas vapors that are released from an uncontrolled storage tank when the tank is subjected to a temperature rise, for example as a result of sunshine during a day.

¹⁰⁴ [NM OCD Flaring Rule](#) at 19.15.27.8.G. (2).

¹⁰⁵ [NM OCD Flaring Rule](#) at 19.15.27.8.G. (1)(a)(i); [Colorado Flaring Rule](#) at 903.d.(2)

¹⁰⁶ [NM OCD Flaring Rule](#) at 19.15.27.8.G. (1)(a)(ii).

¹⁰⁷ [NM OCD Flaring Rule](#) at 19.15.27.9.D; [Colorado Flaring Rule](#) at 903.e.(1)

¹⁰⁸ [NM OCD Flaring Rule](#) at 19.15.27.9.D.

Combustion device: A combustion device means an enclosed device with a design destruction efficiency of at least 98% for hydrocarbons and equipped with an auto-igniter.



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114 State Street, 6th Floor
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P: 617.624.0234
F: 617.624.0230

Critical component: component that would require the shutdown of a critical process unit if component was shut down or disabled. A critical process unit is a process unit that must remain in service because shutdown of the unit could affect the safety and/or reliability of the natural gas supply system.¹⁰⁹

Flash gas means gas dissolved in crude oil, condensate, or produced water under pressure which 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 a storage tank maintained at atmospheric pressure.

Large compressor station means a compressor station where the total power of all compressors is three megawatts or greater.¹¹⁰

Storage tank measurement system means equipment and methods used to determine the quantity and quality of the liquids inside a storage tank without requiring direct access through the storage tank thief hatch.¹¹¹

Vapor collection system: equipment and components installed on pressure vessels, separators, tanks, or sumps including piping, connections, and flow-inducing devices used to collect and route emissions to a processing, sales gas, or fuel gas system; to a gas disposal well; or to a vapor control device.¹¹²

Vapor Collection and Return System means a closed system designed to control the release of VOCs displaced from a vessel during transfer of hydrocarbon liquids by using the transferred hydrocarbon liquids for direct displacement to force vapors from the vessel being loaded into either the storage tank being unloaded or to air pollution control equipment.¹¹³

Working losses describes gas vapors that are released from an uncontrolled storage tank when the liquid level rises in the tank, pushing the vapor in the headspace above the liquid out of the tank.

¹⁰⁹ [CARB](#) § 95667(a)(12)

¹¹⁰ [BC regulation](#) § 52.05 (1)

¹¹¹ [Colorado Regulation](#) § D.II.A.22.

¹¹² [CARB](#) § 95667(a)(62)

¹¹³ [Colorado Regulation](#) § D.II.A.25.