

Leading Methane Abatement Policies for Oil and Gas Operations

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This document provides:

- A. A brief overview of the most important oil and gas air and climate pollutant regulations promulgated by 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.

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.

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Introduction



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Overview of O&G Regulations

National and sub-national jurisdictions across the Canada, Colombia, Europe, Mexico, Nigeria, and the United States 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 develop policies that can reduce methane emissions, including Ghana, Ecuador, 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 2024, the U.S. Environmental Protection Agency (USEPA) published methane regulations for new and existing oil and gas sources, establishing one of the world's most stringent nation-wide standards. This regulation was bolstered by a powerful economic incentive under the Methane Emissions Reduction Program (MERP) as part of the Inflation Reduction Act (IRA), which introduced the Waste Emissions Charge and a requirement to update methane reporting requirements.² [These rules were in the process of being

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 *Waste Emissions Charge for Petroleum and Natural Gas Systems: Procedures for Facilitating Compliance, Including Netting and Exemptions*, 89 Fed. Reg. 16,820 (Nov. 18, 2024). Available at: <https://www.federalregister.gov/documents/2024/11/18/2024-26643/waste-emissions-charge-for-petroleum-and-natural-gas-systems-procedures-for-facilitating->

repealed and/or postponed due to a change in US administration at the time of updating this white paper in 2025 – all measures are discussed in the present tense, unless otherwise noted.]



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As passed in the Inflation Reduction Act, the Waste Emissions Charge became effective in 2024, with an initial fee of \$900 per ton methane emitted by the oil and gas sector, rising to \$1,200 per ton in 2025, and settling at \$1,500 per ton in 2026 and thereafter. EPA finalized a rule implementing the Waste Emissions Charge in 2024,³ but that rule was disapproved by Congress on March 14, 2025 pursuant to the Congressional Review Act and thus the implementing regulations have been removed.⁴ Additionally, the effectiveness of the Waste Emissions Charge was postponed until 2034 after passage of the One Big Beautiful Bill Act in 2025.

The EPA's finalized rules for new and existing sources mandate comprehensive leak detection and repair (LDAR) programs, with required monitoring frequencies that vary by facility type.⁵ An important component of the 2024 requirements is the Super-Emitter Program (SEP), which allows certified third parties to use advanced remote sensing technology to detect large methane leaks and notify EPA, which will verify the source and then notify the relevant owner or operator. That notification establishes a requirement to investigate and fix the emissions within a set timeframe. Additionally, the 2024 requirements established a zero-bleed requirement for all controllers that became effective in May 2025 and phased out routine flaring of associated gas for new sources by May 2026.

In July 2025 the effective date of the SEP, along with effective dates for controllers, state plan submittals, and various compliance mechanisms was delayed until Jan 22, 2027.⁶

[compliance#:~:text=Agency%20Environmental%20Protection%20Agency%20Agency.Published%20Content%20%2D%20Document%20Details; Greenhouse Gas Reporting Rule: Revisions and Confidentiality Determinations for Petroleum and Natural Gas Systems](#), 89 Fed. Reg. 42,062 (May 14, 2024). Available at: <https://www.govinfo.gov/content/pkg/FR-2024-05-14/pdf/2024-08988.pdf> (last accessed Oct. 15, 2025).

³ *Waste Emissions Charge for Petroleum and Natural Gas Systems: Procedures for Facilitating Compliance, Including Netting and Exemptions*, 89 Fed. Reg. 91,094 (Nov. 18, 2024). Available at: <https://www.govinfo.gov/content/pkg/FR-2024-11-18/pdf/2024-26643.pdf> (last accessed Oct. 15, 2025).

⁴ *Congressional Review Act Revocation of Waste Emissions Charge for Petroleum and Natural Gas Systems: Procedures for Facilitating Compliance, Including Netting and Exemption*, 90 Fed. Reg. 21225 (May 19, 2025). Available at <https://www.govinfo.gov/content/pkg/FR-2025-05-19/pdf/2025-08688.pdf> (last accessed Oct. 15, 2025).

⁵ *Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review*, 89 Fed. Reg. 16,820 (Mar. 8, 2024). Available at: [https://www.federalregister.gov/documents/2024/03/08/2024-00366/standards-of-performance-for-new-reconstructed-and-modified-sources-and-emissions-guidelines-for#:~:text=A%20Rule%20by%20the%20Environmental,%2D00366%20\(89%20FR%2016820\)](https://www.federalregister.gov/documents/2024/03/08/2024-00366/standards-of-performance-for-new-reconstructed-and-modified-sources-and-emissions-guidelines-for#:~:text=A%20Rule%20by%20the%20Environmental,%2D00366%20(89%20FR%2016820))

⁶ *Extension of Deadlines in Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review Final Rule*, 90 Fed. Reg. 35,966 (July 31, 2025). Available at <https://www.govinfo.gov/content/pkg/FR-2025-07-31/pdf/2025-14531.pdf> (last accessed Oct. 15, 2025).



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Prior to the 2024 EPA methane regulation, in June 2016, the USEPA had 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 in the production, processing, and transmission and storage segments.⁷ The 2016 rule was built on a rule issued in August 2012 (NSPS OOOO) that focused on emissions of VOCs from new and modified natural gas production and processing facilities.⁸

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.⁹

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 Federal and Indian lands.¹⁰ This rule was vacated by a US Federal Court in October 2020 and is no longer applicable.

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.¹¹ 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

⁷ 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>

⁸ 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>.

⁹ 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>.

¹⁰ 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>.

¹¹ 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>.

well sites, plants that process natural gas, and gas pipeline compressor stations.



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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.

Europe

EU’s methane regulation was initiated by the European Commission with a proposal in 2021 to curb methane emissions from the energy sector. The legislation was the subject of extensive deliberation before a final agreement was reached in 2023 with the approval of the European Parliament and the Council of the European Union.¹² Upon its formal adoption in 2024, the regulation began a phased implementation, with EU Member States granted a subsequent period to integrate its mandates into their national legal frameworks. The core of the EU Methane Regulation is a multi-pronged policy approach that imposes strict requirements on the oil, gas, and coal sectors, both within the EU and on imported fossil fuels. The regulation's key pillars are mandatory monitoring, reporting, and verification (MRV), leak detection and repair (LDAR) campaigns, and strict bans on non-emergency venting and flaring.

The timeline for the import rules is phased: from 2027, importers will be required to provide comprehensive data on the methane emissions associated with their imported oil, gas, and coal. Then, by 2028, importers within the EU will start reporting the methane intensity of imported fossil fuels. Beginning in

¹² Regulation (EU) 2024/1787, 2024 O.J. (L 1787) 1. Available at: <https://eur-lex.europa.eu/EN/legal-content/summary/reducing-methane-emissions-in-the-energy-sector.html#:~:text=MAIN%20DOCUMENT,RELATED%20DOCUMENTS>



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2030, the regulation will introduce a maximum threshold for the reported methane intensity. Penalties for non-compliance are considered in the regulation and enforced at the Member State level. Enforcement will be a shared responsibility, with national authorities overseeing domestic compliance and a new Methane Transparency Database serving as a central hub for all reported data. By linking access to its vast market to verifiable methane performance, the EU is effectively establishing a new global standard for the fossil fuel industry.

Mexico

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.¹³ 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.

¹³ 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

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.

Nigeria

The Nigerian Upstream Petroleum Regulatory Commission (NUPRC) released guidelines in 2022 to establish actions and mechanisms for operators to prevent and control the emission of greenhouse gases from upstream oil and gas operations at new and existing facilities.¹⁴ The guidelines were designed to: reduce environmental and social impacts; prevent the waste of natural resources; and support the achievement of Nigeria's emissions mitigation and reduction targets, including the elimination of routine gas flaring by 2030, and a 60% reduction in fugitive methane emissions/leakages from oil and gas operations by 2031.

These guidelines establish certain protocols for operators to follow for leak detection and repair, as well as to install certain classes of technology like high-destruction efficiency flares. Other central tenants of these guidelines include technical inspection requirements and inventory reporting.

Colombia

The Colombian Ministry of Mines and Energy (MME) and the National Hydrocarbons Agency (ANH) established a regulatory framework in 2022, later updated in 2023, that directly addresses methane emissions from the oil and gas sector.¹⁵ The framework was developed to support Colombia's ambitious climate commitments, including its participation in the Global Methane Pledge, and to minimize the waste of valuable natural resources while reducing environmental impact.

These regulations establish specific protocols for operators to follow, including a strict prohibition on venting natural gas during both exploration and production, with flaring permitted only under specific, licensed conditions. Other central tenets of the guidelines include mandatory leak detection and repair (LDAR) programs and the installation of certain classes of technology to capture and utilize gas, such as vapor recovery units and dry seal compressors.

Norway

The Norwegian Ministry of Petroleum and Energy (MPE), guided by the Norwegian Petroleum Directorate (NPD) and the Norwegian Environment Agency (NEA), established a zero-tolerance policy on routine flaring and cold

¹⁴ Nigerian Upstream Petroleum Regulatory Commission (NUPRC), Guidelines for Management of Fugitive Methane and Greenhouse Gases Emissions in the Upstream Oil and Gas Operations in Nigeria, (November 2022), available at: <https://www.nuprc.gov.ng/wp-content/uploads/2022/11/METHANE-GUIDELINES-FINAL-NOVEMBER-10-2022.pdf>

¹⁵ Colombian Ministry of Mines and Energy (MME) Resolution 40317 of 2023 Res. 40317, Ministerio de Minas y Energía, dic. 21, 2023, D.O. No. 52,624, available at: https://gestornormativo.creg.gov.co/gestor/entorno/docs/resolucion_minminas_40317_2023.htm



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venting in the 1970s through the Petroleum Act.¹⁶ This foundational policy was strengthened in the 1990s using the Pollution Control Act to require permits and set emission limits.¹⁷ In the 2000s, the policy was reinforced by placing a carbon tax on emissions from oil and gas activities, including emissions resulting from permitted flaring.¹⁸ These regulations were designed to conserve national petroleum resources for commercial use, reduce environmental impact; and ensure that flaring is only permitted for safety reasons or during operational upsets.

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 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 and 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. In 2025, the rule was further updated to require the full-phase out of the natural gas-driven pneumatic controllers at oil and gas production sites by 2029.¹⁹ A methane intensity program, developed and implemented by the Colorado Air Quality Control Commission (AQCC) and the Colorado Department of Public Health and Environment (CDPHE), began to take shape with the adoption of its core greenhouse gas intensity standards in 2021. A critical follow-up rule was adopted in 2023 to define how operators must verify their emissions through direct measurement. The program officially began its phased implementation in 2025, at which point operators are limited to a specific level of methane emissions per barrel of oil and gas equivalent (BOE) they produce. This intensity cap will become progressively more stringent, with an even lower emissions-per-BOE standard set for 2027 and a final, tighter limit in 2030.²⁰

¹⁶ Norwegian Petroleum Act: <https://lovdata.no/dokument/NL/lov/1996-11-29-72?q=petroleum+flaring>

¹⁷ Norwegian Act on Protection against Pollution and Waste (Pollution Act): <https://lovdata.no/dokument/NL/lov/1981-03-13-6>

¹⁸ Norwegian Carbon Tax: <https://www.skatteetaten.no/en/business-and-organisation/vat-and-duties/excise-duties/about-the-excise-duties/mineral-product/>

¹⁹ Colorado Department of Public Health and Environment, Colorado takes action to further reduce methane emissions from oil and gas operations (Feb. 21, 2025), <https://cdphe.colorado.gov/press-release/colorado-takes-action-to-further-reduce-methane-emissions-from-oil-and-gas-operations>.

²⁰ Colorado Regulation, 5 Colo. Code Regs. 1001-22 (2024), available at: <https://cdphe.colorado.gov/oil-and-gas-greenhouse-gas-intensity-program>



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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).²¹

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.²²

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 ozone air quality problems.²³ In 2015 WYDEQ developed a regulation for new and existing sources specific to the core area, the Upper Green River Non-Attainment Area.²⁴

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.²⁵

²¹ 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 Piggings 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>.

²² 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://downloads.regulations.gov/EPA-R08-OAR-2015-0709-0052/content.pdf>.

²³ Wyoming DEQ, Air Quality Division, Chapter 6, Section 2 Permitting Guidance (“Wyoming Permitting Guidance”) available at <https://drive.google.com/file/d/1IbN-U0sDMDsYjhaPwwfIGnFX1avKsIdv/view?usp=sharing>.

²⁴ 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.

²⁵ California Air Resources Board, California Final Regulation Order, 17 C.C.R., (March 10, 2017), available at <https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasfro.pdf>.



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In 2017 the Ohio Environmental Protection Agency issued General Operating Permits for new and modified natural gas compressor stations.²⁶

In 1997, the Texas Commission on Environmental Quality (TCEQ) issued rules to control emissions of volatile organic compounds (VOCs) for oil and gas equipment and operations.²⁷

In December 2018 the Alberta Energy Regulator (AER) published an Update to Directive 060, covering Flaring, Incinerating, and Venting in the Upstream Petroleum Industry.²⁸

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.²⁹

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, specifically excluding lack of a pipeline from the reasons to flare, 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 2026.³⁰ In August 2022, the New Mexico Energy Department Environmental Improvement Board (EIB) issued final regulations covering volatile organic compounds (VOC) and oxides of nitrogen (NOx) for oil and gas production, processing, compression, and transmission sources.³¹

²⁶ Ohio Environmental Protection Agency, General Permits, (“Ohio General Permits”), available at <https://epa.ohio.gov/divisions-and-offices/air-pollution-control/permitting/general-permits-natural-gas-compressor-stations-and-similar-facilities>.

²⁷ 30 Texas Administrative Code (TAC) §106.492(c)

²⁸ 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>.

²⁹ 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.

³⁰ New Mexico Energy, Minerals and Natural Resources Department (EMNRD) Oil Conservation Division (NM OCD), Title 19, Chapter 15, Part 27 Venting and Flaring of Natural Gas (“NM OCD Flaring Rule”), (May 25, 2021), available at: <https://www.emnrd.nm.gov/oed/wp-content/uploads/sites/6/19.15.27newrule.pdf>.

³¹ New Mexico Energy Department Environmental Improvement Board, Title 20, Chapter 2, Part 50 Oil And Gas Sector – Ozone Precursor Pollutants (“NM EIB Rule”), (August 5, 2022), available at: <https://www.srca.nm.gov/parts/title20/20.002.0050.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 Exhaust

- Control requirements
 - If a flare or other *combustion device*³² 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 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.³³
- 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.³⁴
- Recordkeeping
 - Records of performance tests, semi-annual portable analyzer monitoring, catalyst monitoring, combustion process adjustment, and exemption application must be

³² [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.D.3.a; § II.C.1.b; § II.D.3; § II.F; § VI.D.1 [last accessed July 7, 2023].

³³ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § VI.D.1.a [last accessed July 7, 2023].

³⁴ [EPA NSPS OOOOa](#) § 60.5417a.



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kept for a period of five (5) years and made available upon request.³⁵

- Reporting
 - The owner or operator of each engine must submit an annual report containing a statement of the status of performance testing, and the date and results of that testing; an identification of any engines placed in service, modified, relocated, or replaced, and a certification as to whether the emission standards are met; the date on which the monitoring was performed; and the date that all required semi-annual portable analyzer testing was performed, and the results of that testing.³⁶

Pneumatic Controllers (also referred to as ‘Process Controllers’)

- Control requirement
 - Controllers at new or modified sites shall not vent natural gas and VOC to the atmosphere.³⁷ Operators can meet this requirement by either using no-bleed devices (air-driven or electric controllers/actuators) or by routing emissions to a *closed vent system* that captures the emissions.³⁸ If it is not feasible to capture the emissions with a closed vent system, operators may use a self-contained natural gas-driven process controller with no identifiable emissions.
 - Operators must demonstrate based on specific process needs that a natural gas-driven process controller with a bleed rate higher than 6 scfh is required for facilities with no access to electrical power.³⁹
 - Operators using intermittent vent controllers must not emit to the atmosphere during idle periods.⁴⁰
 - Operators of all existing facilities must convert their entire fleet of natural gas-driven pneumatic controllers.
 - For exempted controllers (North Slope of Alaska without access to electricity), operators of these

³⁵ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.F.3 [last accessed July 7, 2023].

³⁶ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.D.5.g [last accessed July 7, 2023].

³⁷ [Alberta regulation](#) § 8.6.1 (1) (applies to any new controller installed at any site after 1 January 2022); [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § III.C.4.a [last accessed July 7, 2023]; [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)).

³⁸ [Wyoming Permitting Guidance](#), p. 11; Cal. Code Regs. tit. 17 § 95668(e)(5)(A); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm’n Guide 0024-2022 (2022), § 3.4.1 (1.i.) (Nigeria), [US EPA’s Final Rule](#) 40 CFR 60.5390b (a).

³⁹ [US EPA’s Final Rule](#) 40 CFR 60.5390b(b)(2).

⁴⁰ [US EPA’s Final Rule](#) 40 CFR 60.5390b.



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facilities must route emissions from natural gas-driven pneumatic controllers to a control device achieving a 95 percent emissions reduction or use low-bleed or intermittent vent natural gas-driven controllers.⁴¹

- Monitoring
 - Operators must monitor any natural gas-driven controllers as part of the leak detection and repair (LDAR) program.
 - Operators must monitor each natural gas-driven intermittent vent controllers to ensure that it is not emitting to the atmosphere during idle periods. If emissions are identified, operators must take corrective action within 5 calendar days of the initial detection date.⁴²
- Recordkeeping
 - Owners and operators are required to keep records of the information submitted in the annual reports regarding the process controller affected facility, list of deviations, and if applicable, the records required for monitoring and inspections of closed vent systems, control devices, self-contained process controllers, and intermittent vent process controllers.⁴³
 - Documentation that pneumatic controller is designed and operated to achieve a bleed rate less than or equal to 6 scfm.⁴⁴
- 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.⁴⁵

Pneumatic Pumps

- Control requirement
 - Within a year of the rule's finalization at **new** facilities, or three years for existing facilities, sites with electricity or with three or more gas-driven pumps, operators must

⁴¹ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § III.C.4.c [last accessed July 7, 2023]; US EPA Final Rule 40 CFR § 60.5394c(b)(2)(ii).

⁴² [US EPA's Final Rule](#): 40 CFR § 60.5390b(b)(2)(ii) (new sources); 60.5394c(b)(2)(ii) (existing sources)

⁴³ US EPA Final Rule 40 CFR § 60.5420b(c) (new sources); 60.5420c(c) (existing sources).

⁴⁴ [EPA NSPS OOOO](#) §§ 60.5390(c)(1), 5420(b)(5)(i); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.1 (3) (Nigeria); US EPA OOOOc 40 C.F.R. § 60.5410c(e)(2)(i); 5420c(c)(5)(iii)(A).

⁴⁵ [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](#) 5 C.C.R. 1001-9 Part B § III.F.5 [last accessed July 7, 2023]; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.1 (4) (Nigeria).



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achieve zero emissions of VOC and GHG from all pneumatic pumps by either using pumps that are not driven by natural gas, by routing natural gas-driven pump vapors through a closed vent system to a process, or by other means that achieves the standard of zero emissions.⁴⁶

- For sites without access to electrical power that have fewer than three diaphragm pumps, Route pump emissions through a closed vent system to a process if a VRU, vapor collection system⁴⁷, is onsite; if no VRU onsite, route emissions to a control device that reduces emissions by ≥ 95 percent; if no control device capable of reducing emission by ≥ 95 percent is present then still route to control device if present.⁴⁸
- Monitoring
 - Natural gas-driven pneumatic pumps must be monitored initially and bimonthly using AVO,⁴⁹ and subsequently must be monitored quarterly using OGI or EPA Method 21..⁵⁰
- Recordkeeping
 - Owners or operators must maintain records for at least five (5) years containing identification of each natural gas-driven diaphragm pneumatic pump; the days of operation each calendar year; control devices designed to achieve less than 95% emission reduction, engineering assessment and certification by a qualified professional engineer that routing natural gas-driven diaphragm pneumatic pump emissions to a control device or process is technically infeasible; each closed vent system inspection and any resulting responsive actions; and each closed vent system on the delay of inspection or repair list, the reason for and duration of the delay of inspection or repair, and the schedule for inspecting or repairing such closed vent system and make records available upon request.⁵¹
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth,

⁴⁶ EPA, 40 C.F.R. § 60.5393b(a) (new); 60.6395c(a) (existing)

⁴⁷ [BLM Waste Rule](#) 3179.202(c); Cal. Code Regs. tit. 17 § 95668(e)(5)(B); [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).

⁴⁸ US EPA Final Rule 40 CFR § 60.5393b(b) (new); 60.5395c(existing)..

⁴⁹ EPA, 40 C.F.R. § 60.5397b(g)(iv)(E) (new); 40 C.F.R. § 60.5397c(g)(iv)(E) (existing)

⁵⁰ EPA, 40 C.F.R. § 60.5397b(g)(iv)(F) (new); 40 C.F.R. § 60.5397c(g)(iv)(F) (existing)

⁵¹ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.K.3.a [last accessed July 7, 2023].

accuracy and veracity of the report signed by a responsible official.⁵²

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.⁵³
 - Existing wells: Require existing wells to use any means of creating differential pressure to unload the liquids from a well without venting.⁵⁴ 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.⁵⁵
- Monitoring
 - The owner or operator must be present on-site during any planned downhole well maintenance, well liquids unloading, or well plugging event and must ensure that any emissions from the well associated with the event are limited to the maximum extent practicable.⁵⁶
- Recordkeeping
 - Operators must retain records of the cause, date, time, duration and estimated volume of each venting event.⁵⁷
- 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.⁵⁸

Equipment leaks

⁵² [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for gas well completions); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.2 (2) (Nigeria).

⁵³ [BLM Waste Rule](#) § 3179.204(a); *See also* South Coast Air Quality Management District R. 1148.1 (prohibiting venting from oil or gas facility).

⁵⁴ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.G.1.a. [last accessed July 7, 2023]; [ASEA](#) § Chapter IX, Article 66.

⁵⁵ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.G.1.b. [last accessed July 7, 2023]; [BLM Waste Rule](#) § 3179.204(d)(1).

⁵⁶ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.G.1.b [last accessed July 7, 2023].

⁵⁷ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.G.2.b.(i) [last accessed July 7, 2023]; [BLM Waste Rule](#) § 3179.204(d)(2)

⁵⁸ [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](#) 5 C.C.R. 1001-9 Part B § II.G.3.a. [last accessed July 7, 2023].



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- Applicable to well sites, compressor stations, tank batteries and gas processing plants, and any oil or gas facility with a hydrocarbon liquids storage tank.⁵⁹
- Control requirement
 - Inspection within 30 days after startup.⁶⁰
 - Instrumental LDAR: Conduct quarterly inspections⁶¹ of components in accordance with US EPA Reference Method 21,⁶² using an optical gas imaging device,⁶³ or using an alternative approved device that is equally or more effective at detecting leaks.⁶⁴
 - For alternative methods (i.e., remote sensing), operators must conduct measurements at specified intervals depending on the detection limit of the method and investigate confirmed detections of emissions, including conducting OGI or Method 21 on all fugitive components.⁶⁵
 - Components means any component that has the potential to emit fugitive emissions of methane or VOC including but not limited to⁶⁶ 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 or seal, combustion devices and vapor recovery systems.⁶⁷

⁵⁹ US EPA Final Rule 40 CFR 60.5397b, [Colorado Regulation](#) 5 Colo. Code Regs. 1001-7, EU Regulation 2024/1787.

⁶⁰ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.2.d [last accessed July 7, 2023]

⁶¹ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.1.a; I.B.3 [last accessed July 7, 2023] (defining approved monitoring methods); Cal. Code Regs. tit. 17 § 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; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.2.2 (Nigeria).

⁶² Cal. Code Regs. tit. 17 § 95669(g), [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.1.a; I.B.3 [last accessed July 7, 2023] (defining approved monitoring methods)

⁶³ [BLM Waste Rule](#) § 3179.302(a); [EPA NSPS OOOOa](#) § 50.5397a(a), [ASEA](#) § Chapter XI, Article 73; EPA, 40 C.F.R. § 60.5397b (new), 60.5397c (existing).

⁶⁴ US EPA Final Rule 40 CFR 60.5398b (new); 60.5398c (existing)

⁶⁵ EPA, 40 C.F.R. § 60.5398b(b)(5)(ii) (new), 60.5398c(b)(5)(ii) (existing)

⁶⁶ [EPA NSPS OOOOa](#) § 60.5430a.

⁶⁷ Cal. Code Regs. tit. 17 § 95667(a)(9); [EPA](#), 40 C.F.R. § 60.5430b, 60.5430c.



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- Conduct audio, visual, or olfactory inspections monthly,⁶⁸ OR daily for facilities that are visited daily and weekly for facilities that are not visited daily.⁶⁹
- 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.⁷⁰ 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.⁷¹
 - Fugitive emissions means
 - For optical gas imaging inspections, any visible emission from a fugitive emissions component observed using optical gas imaging.⁷²
 - For Method 21 inspections, any concentration of hydrocarbon above 500 ppm for any monitoring using approved quantitative instrument-based monitoring.⁷³
 - Continuous Monitoring
 - At wellhead only sites, actionable emissions are a 90-day rolling average of 1.2 kg/hr over baseline or a 7-day rolling average of 15 kg/hr.⁷⁴
 - At facilities with major equipment, a 90-day rolling average of 1.6 kg/hr or a 7-day rolling average of 21 kg/hr.⁷⁵

⁶⁸ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.E.4.e.(ii), Table 4 [last accessed July 7, 2023].; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.2.3 (vii) (Nigeria).

⁶⁹ Cal. Code Regs. tit. 17 § 95669(e); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.2.3 (vii) (Nigeria).

⁷⁰ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.5.a [last accessed July 7, 2023].; Cal. Code Regs. tit. 17 § 95669(h)(2).

⁷¹ Cal. Code Regs. tit. 17 § 95669(h)(3)); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.2.4 (1, iii) (Nigeria).

⁷² [EPA NSPS OOOOa](#) § 60.5397a(a); [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.4.b. [last accessed July 7, 2023]

⁷³ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.4.a. [last accessed July 7, 2023]

⁷⁴ EPA, 40 C.F.R. § 60.5398b(c)(4)(i) (new), 60.5398c(c)(4)(i) existing

⁷⁵ EPA, 40 C.F.R. § 60.5398b(c)(4)(ii) (new), 60.5398c(c)(4)(ii) existing



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- 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.⁷⁶
- 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.⁷⁷
- 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 list,⁷⁸ accompanied by certification of the truth, accuracy and veracity of the report signed by a responsible official.⁷⁹

Dehydrators

- Control requirement
 - Operators shall control emissions of methane and VOC from new and existing glycol dehydrators by 98%.⁸⁰
- Monitoring

⁷⁶ [EPA NSPS OOOOa](#) § 60.5397a(j)(2), [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.5.b [last accessed July 7, 2023]; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.2.4 (2) (Nigeria).

⁷⁷ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.6 [last accessed July 7, 2023]; [ECCC](#) § 53.

⁷⁸ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.7 [last accessed July 7, 2023]; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.2.4 (4) (Nigeria).

⁷⁹ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.L.7.g [last accessed July 7, 2023]; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.2.4 (4) (Nigeria).

⁸⁰ [Wyoming Permitting Guidance](#) at 25 (requiring all new dehydrators to control emissions by 98%); [Wyoming Nonattainment Area Regulations](#) § 6(d)(1)(A); [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § III.D.3. [last accessed July 7, 2023]. 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.



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- Inspect and check that any condenser or air pollution control equipment used to control emissions is operating properly and documented on weekly basis.⁸¹
- Recordkeeping
 - Owners or operators of glycol natural gas dehydrators must retain records for five (5) years of the date of each inspection, a description of any problems observed during the inspection of the condenser or air pollution control equipment, a description and date of any corrective actions taken to address problems observed during the inspection of the condenser or air pollution control equipment, the pilot light on a combustion device is lit, that the valves for piping of gas to the pilot light are open, and visually check for the presence or absence of smoke, the maintenance of the condenser or air pollution control equipment, consistent with manufacturer specifications or good engineering and maintenance practices.⁸²
- 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.⁸³

Centrifugal compressors

- 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.⁸⁴
- Monitoring

⁸¹ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.H.6.a [last accessed July 7, 2023]; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.5 (2) (Nigeria).

⁸² [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.H.5.a [last accessed July 7, 2023].

⁸³ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420(c)(1) (EPA requirements for gas well completions); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.5 (3) (Nigeria).

⁸⁴ Cal. Code Regs. tit. 17 § 95669(d)(5)-(7); [EPA NSPS OOOOa](#) §§ 5380(a)(1)-(2); 5380a(a)(1)-(2); [ASEA](#) § Chapter III, Articles 43-44; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.3 (1) (Nigeria).



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- Inspect compressor, wet seals, isolation valves, vapor recovery system or control device as part of instrumental LDAR.⁸⁵
- Recordkeeping
 - Owners or operators must maintain the following records of identification of each centrifugal compressor using a wet seal system, each combustion device visible emissions inspection and any resulting responsive actions, each cover and closed vent system inspection and any resulting responsive actions; and each cover or closed vent system on the delay of inspection or repair list, the reason for and duration of the delay of inspection or repair, and the schedule for inspecting or repairing such cover or closed vent system for at least five (5) years and make records available upon request.⁸⁶
- 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.⁸⁷

Reciprocating compressors

- Control requirement
 - 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.⁸⁸
- Monitoring
 - Inspect compressor, compressor seals, rod-packing and vapor recovery system or control device as part of instrumental LDAR.⁸⁹
- Recordkeeping
 - Owners or operators must maintain the following records for at least five (5) years containing identification of each

⁸⁵ Cal. Code Regs. tit. 17 § 95668(d)(1); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.3 (2) (Nigeria).

⁸⁶ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.J.1.(i) [last accessed July 7, 2023].

⁸⁷ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for gas well completions); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.3 (3) (Nigeria).

⁸⁸ Cal. Code Regs. tit. 17 § 95668(c)(3)(C)-(D); [Ohio General Permits](#) 17.1 Template C.1.(b)(1); [Pennsylvania GP-5A](#) § D.1.; [EPA NSPS OOOOa](#) § 60.5420a(c).

⁸⁹ Cal. Code Regs. tit. 17 § 95668(c)(3)(A)-(B); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.4 (2) (Nigeria).



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reciprocating compressor, the hours of operation or the number of months since the previous rod packing replacement, or a statement that emissions from the rod packing are being routed to a process through a closed vent system under negative pressure, the date of each rod packing replacement, or date of installation of a rod packing emissions collection system and closed vent system, each cover and closed vent system inspection and any resulting responsive actions, and each cover or closed vent system on the delay of inspection or repair list, the reason for and duration of the delay of inspection or repair, and the schedule for inspecting or repairing such cover or closed vent system and make these documents available upon request.⁹⁰

- 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.⁹¹

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*.⁹²
 - Prohibit venting of hydrocarbon emissions from hatches and other access points on tanks during normal operation.⁹³
 - Require operators of controlled tanks to evaluate their systems for controlling tank emissions and certify that each

⁹⁰ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.J.2.c.(i) [last accessed July 7, 2023].

⁹¹ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements); [EPA NSPS OOOOa](#) § 60.5420a(c)(1) (EPA requirements for gas well completions); Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.4 (3) (Nigeria).

⁹² Colorado Regulation 5 C.C.R. 1001-9 Part B § I.D.3.a.(i) [last accessed July 7, 2023]; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.6 (1.i.) (Nigeria).

⁹³ 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; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.6 (1.iii.) (Nigeria).



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- system is designed and is adequate to capture all flash gas, working losses and breathing losses from the tank.⁹⁴
- 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.⁹⁵
- Operators of facilities loading 5,000 barrels or more of hydrocarbon liquids per year into transport vehicles must 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.⁹⁶
- 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.⁹⁷
 - Monitor storage vessels, access points and vapor collection systems and combustors as part of instrumental LDAR.⁹⁸
 - 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.⁹⁹
- Recordkeeping
 - Retain records of monthly visual and AVO inspections.¹⁰⁰
- 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.¹⁰¹

⁹⁴ Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.6 (1.iv.) (Nigeria).

⁹⁵ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.4.a(ii), § II.C.4.b. [last accessed July 7, 2023].

⁹⁶ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.5.a. [last accessed July 7, 2023].

⁹⁷ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.E.4.a., § I.E.2.b. [last accessed July 7, 2023].; [ASEA](#) § Chapter VII, Article 62.

⁹⁸ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.2.b.(ii)(I) [last accessed July 7, 2023]; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.6 (2.ii.) (Nigeria).

⁹⁹ Cal. Code Regs. tit. 17 § 95668(a)(3)-(5).

¹⁰⁰ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.E.4.d. [last accessed July 7, 2023].

¹⁰¹ [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](#) 5 C.C.R. 1001-9 Part B § I.F.3.c.(vii), § I.F.1.g.(xiv) [last accessed July 7, 2023]; Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas



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Liquid Storage Tanks: Measurement Systems (Thieving)

- Control requirements
 - Applicable to new and modified controlled storage tanks at well production facilities, natural gas compressor stations, or natural gas processing plants.
 - Affected tanks must be equipped with measurement systems that enable operators to measure the quantity of liquid in the tank and collect samples of the liquid without direct access to the interior of the tank through the tank thief hatch.
 - Use the measurement system and keep thief hatches (or other access points to the tank) and pressure relief devices on storage tanks closed and latched during activities to determine the quality and/or quantity of liquids in the storage tank(s).¹⁰²
- Monitoring
 - Operators may inspect, test, and/or calibrate the storage tank measurement system semi-annually, or as directed by the system manufacturer. Opening the thief hatch if required to inspect, test, or calibrate the system is allowable.¹⁰³
 - Install signage at or near storage tank and conduct annual training program for employees and/or third-party operators conducting tank measurements indicating which equipment and method(s) is used for tank measurement and the appropriate and necessary operating procedures for that system.¹⁰⁴
- Recordkeeping
 - Owner or operators must retain records for at least two (2) years and make such records available to regulators upon request.¹⁰⁵

Liquid Storage Tanks: Truck Loadouts

- Control requirements
 - Applicable to well production facilities, natural gas compressor stations, and natural gas processing plants with a hydrocarbon liquids loadout to transport vehicles throughput of greater than or equal to 5,000 barrels per year on a rolling 12-month basis

Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.4.6 (4) (Nigeria).

¹⁰² [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § III.C.4.b. [last accessed July 7, 2023].

¹⁰³ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.4.c. [last accessed July 7, 2023].

¹⁰⁴ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.4.d-e. [last accessed July 7, 2023].

¹⁰⁵ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.4.f. [last accessed July 7, 2023].



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- Operator must control emissions from the loadout of hydrocarbon liquids from controlled storage tanks to transport vehicles by using (a) submerged fill and (b) a vapor collection and return system and/or air pollution control equipment.¹⁰⁶
 - Storage tanks must operate without venting at all times during loadout.¹⁰⁷
- Monitoring
 - The owner or operator must observe loadout to confirm that all storage tanks operate without venting when loadout operations are active. These inspections must occur at least monthly, unless loadout occurs less frequently, then as often as loadout is occurring.¹⁰⁸
 - Install signage at or near loadout control system and conduct annual training program for employees and/or third-party conducting loadout activities.¹⁰⁹
- Recordkeeping
 - Owners or operators must retain records for at least two (2) years and make such records available upon request.¹¹⁰

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.¹¹¹
 - Require each sampling connection system to be equipped with a closed-loop, vent or purge system.¹¹²
- Recordkeeping
 - Must retain, for five (5) years from inspection, records documenting each LDAR inspection, and a component leak concentration and repair form for each inspection.¹¹³
- Reporting
 - Owner or operator must submit an annual report documenting results of each leak detection and repair inspection conducted during the calendar year, and the initial and final leak concentration measurements for

¹⁰⁶ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § I.M.1 [last accessed July 7, 2023].

¹⁰⁷ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.5.a.(ii) [last accessed July 7, 2023].

¹⁰⁸ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.5.(iv)(A) [last accessed July 7, 2023].

¹⁰⁹ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.5.(iv)(C-D) [last accessed July 7, 2023].

¹¹⁰ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.C.5.a.(v) [last accessed July 7, 2023].

¹¹¹ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § II.B.3.a [last accessed July 7, 2023].

¹¹² [Ohio General Permits](#) 12.1.C.5.d.3.b.

¹¹³ [Cal. Code Regs.](#) tit. 17 § 95672(a)(17)-(18)

components measured above the minimum allowable leak threshold.¹¹⁴

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 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.¹¹⁵
- Monitoring
 - Monitor compressor, vapor collection system and combustor as part of instrumental LDAR.¹¹⁶
- 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.¹¹⁷
- 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.¹¹⁸

Pigging

- Control requirements
 - During pigging activities operator must limit methane emissions by using a vapor recovery system, or if not feasible, a combustion device.¹¹⁹
- Recordkeeping

¹¹⁴ [Cal. Code Regs.](#) tit. 17 § 95673(a)(13)

¹¹⁵ [Ohio General Permits](#) 17.1.C.3.

¹¹⁶ Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), §§ 3.2.2 (2.i.-ii.), 3.3.1 (2) (Nigeria).

¹¹⁷ [Ohio General Permits](#) 17.1.C.1.d.2.

¹¹⁸ [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); [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § V.C [last accessed July 7, 2023].

¹¹⁹ [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).



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- Date and time of venting,¹²⁰ and amounts of venting.¹²¹
- 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.¹²²

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 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%, of if a combustion device is used, it must have a design destruction efficiency of at least 98% for hydrocarbons.¹²³
 - 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.¹²⁴

¹²⁰ [Ohio General Permits](#) 21.1.C.1.b.

¹²¹ [Wyoming Permitting Guidance](#) (compliance requirements for well blowdown BMP requirements)

¹²² [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); [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § V.B [last accessed July 7, 2023].

¹²³ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § VI.D.1.a [last accessed July 7, 2023].

¹²⁴ [EPA NSPS OOOOa](#) § 60.5375a(a)(1)-(4).



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- 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.¹²⁵ Operator must employ reduced emission completion practices on all completed and re-completed wells, regardless of whether the well was hydraulically fractured.¹²⁶
 - 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.¹²⁷
- Notification
 - 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.¹²⁸
- Monitoring
 - 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.¹²⁹
- 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.¹³⁰
- Reporting
 - Annual report demonstrating compliance and recording any deviations accompanied by certification of the truth,

¹²⁵ [EPA NSPS OOOOa](#) at § 60.5410a

¹²⁶ [Colorado Flaring Rule](#) at 903.c.(1)

¹²⁷ [Colorado Flaring Rule](#) at 903.c.(3)

¹²⁸ [EPA NSPS OOOOa](#) at § 60.5420a(a)(2);

¹²⁹ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § VI.C.1 [last accessed July 7, 2023],

¹³⁰ [Colorado Regulation](#) 5 C.C.R. 1001-9 Part B § VI.D.3 [last accessed July 7, 2023]; [EPA NSPS OOOOa](#) at § 60.5375a(b).

accuracy and veracity of the report signed by a responsible official.¹³¹

Associated 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.¹³²
 - 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 tank, dehydration units, amine treatment units, and compressors.¹³³
 - 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.¹³⁴
 - Operators shall minimize venting and flaring by doing the following:
 - Design production separation equipment and storage tanks for maximum anticipated throughput and pressure.¹³⁵
 - Storage tanks should be equipped with an automatic gauging system that reduces natural gas venting.¹³⁶
 - Flare stack must be properly sized and designed to ensure a design destruction efficiency of at least 98%-99%, including automatic ignition or continuous pilot, or technology that alerts operator that flare may have malfunctioned.¹³⁷

¹³¹ [EPA NSPS OOOOa](#) at § 60.5420a(c)(1),

¹³² [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), EU Methane Regs, Article 15 Rule 1, US EPA Final Rule

¹³³ [NM OCD Flaring Rule](#) at 19.15.27.8.D; [Colorado Flaring Rule](#) at 903.d.(1)

¹³⁴ [NM OCD Flaring Rule](#) at 19.15.27.9.A.

¹³⁵ [NM OCD Flaring Rule](#) at 19.15.27.8.E (1).

¹³⁶ [NM OCD Flaring Rule](#) at 19.15.27.8.E (2).

¹³⁷ [NM OCD Flaring Rule](#) at 19.15.27.8.E (3); [Colorado Flaring Rule](#) at 903.d.(5); [EU Methane Regulation](#), Article 17, Rule 1.



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- 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.¹³⁸
 - 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 of 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.¹³⁹
- Operators shall not burn liquids in a flare under any circumstances and must install and maintain equipment to separate liquids from the vapor stream prior to the flare stack to ensure safety and prevent liquid hydrocarbon combustion on grade.¹⁴⁰
- 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.¹⁴¹
 - 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

¹³⁸ [NM OCD Flaring Rule](#) at 19.15.27.9.D; [Colorado Flaring Rule](#) at 903.e.(1)

¹³⁹ [NM OCD Flaring Rule](#) at 19.15.27.9.D, [EU Methane Regulation](#), Article 15, Rule 3.

¹⁴⁰ [30 Texas Administrative Code \(TAC\) §106.492\(c\) \(Flares\)](#)

¹⁴¹ [NM OCD Flaring Rule](#) at 19.15.27.8.E. (1)-(4); [Colorado Flaring Rule](#) at 903.d.(4)



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- GOR test and submit results to the regulator so volume estimates can be independently verified.¹⁴²
- Operators shall inspect all flares or other combustion devices every 15 days, except where they are not used on a regular basis. Where flares or other combustion devices are not used on a regular basis, operators shall inspect them before each use.¹⁴³
- Operator shall install pressure gauges upstream and downstream of the flame arrestor to monitor for clogging by accumulated hydrocarbons.¹⁴⁴
- Operator shall visually inspect flare pilots/ignitors to verify they are in the correct position (elevation and orientation), which may be necessary following high winds or lightning strikes. Adjustment mechanism (e.g., pulleys) should be maintained to allow repositioning.¹⁴⁵
- 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.¹⁴⁶
- Reporting
 - Operator must submit monthly reports of natural gas vented and flared.¹⁴⁷
 - 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.¹⁴⁸
 - 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.¹⁴⁹

Offshore

- Control requirements
 - For manned offshore platforms, operators are required to conduct quarterly inspections at each facility, starting after three years of implementing the guidelines. Operators can phase in inspection frequency in the first 2 years of

¹⁴² [NM OCD Flaring Rule](#) at 19.15.27.8.E. (5)-(7).

¹⁴³ [EU Methane Regulation](#), Article 17, Rule 3.

¹⁴⁴ [40 Code of Federal Regulations \(CFR\) §60.18\(f\)\(6\)](#) (General Flare Requirements)

¹⁴⁵ [40 CFR §60.18\(f\)\(2\)](#) (General Flare Requirements)

¹⁴⁶ [NM OCD Flaring Rule](#) at 19.15.27.8.G. (2).

¹⁴⁷ [NM OCD Flaring Rule](#) at 19.15.27.8.G. (2).

¹⁴⁸ [NM OCD Flaring Rule](#) at 19.15.27.8.G. (1)(a)(i); [Colorado Flaring Rule](#) at 903.d.(2).

¹⁴⁹ [NM OCD Flaring Rule](#) at 19.15.27.8.G. (1)(a)(ii).



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implementing the guidelines: one inspection at each facility in the first year, and two inspections in the second.

- For unmanned offshore platforms, operators are required to conduct LDAR inspections whenever on-site maintenance activities are planned, up to required frequencies for manned facilities.
- Cold venting is prohibited in oil and gas facilities except when an operator is granted an official waiver to vent.
- All vented emissions must be routed to a flare, unless the gas mixture is not flammable or gas volume/pressure is too low for the flare design.¹⁵⁰
- Monitoring
 - Monitor offshore platforms as part of the LDAR program.¹⁵¹
- Recordkeeping
 - Operator shall keep records of all equipment that contributes emissions to each vent and flare stack.¹⁵²
- 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.¹⁵³

Super-Emitter Response Program

- Third parties (such as NGOs, contractors, or other entities) can use remote-sensing technologies – like satellites, aerial surveys, and ground-based technologies – to identify large methane releases. A super-emitter event is defined as an emission rate of 100 kilograms of methane per hour or greater.¹⁵⁴
- Monitoring requirements
 - Certified third-party notifiers must use pre-approved, remote-sensing technology.¹⁵⁵
 - Once a super-emitter event is identified and confirmed by a certified third party, the regulator must be notified within 15 calendar days of detecting the event.¹⁵⁶

¹⁵⁰ Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), §§ 3.2.2 (2.i.-ii.), 3.3.1 (2) (Nigeria).

¹⁵¹ Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.2.2 (2-3) (Nigeria).

¹⁵² Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.3.1 (3) (Nigeria).

¹⁵³ Guidelines for Management of Fugitive Methane and Greenhouse Gas Emissions in the Upstream Oil and Gas Operations in Nigeria, Nigerian Upstream Petroleum Reg. Comm'n Guide 0024-2022 (2022), § 3.3.1 (4) (Nigeria).

¹⁵⁴ US EPA Final Rule, 40 CFR 60.5371b, <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁵⁵ US EPA Final Rule, 40 CFR 60.5371b(1)(ii), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁵⁶ US EPA Final Rule, 40 CFR 60.5371b(c)(9), <https://www.ecfr.gov/current/title-40/section-60.5371b>



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- The regulator must review each notification for completeness and accuracy before notifying the responsible owners and operator of the attributed facility.¹⁵⁷
- Within 5 calendar days of receiving a notification from the regulator, the owner or operator must initiate an investigation of the super-emitter event¹⁵⁸
- As part of their investigation, the owner or operator is required to survey the entire facility using leak detection methods such as OGI, EPA Method 21, or other approved methods.¹⁵⁹
- If the responsible source is a fugitive emissions component, the owner and operator must take measures to mitigate the emissions in line with applicable leak repair requirements.¹⁶⁰
- Owners and operators must submit a report to the regulator within 15 calendar days of receiving a notification from the regulator regarding the detected event.¹⁶¹
- Recordkeeping
 - Certified notifiers must keep records of their detection technology, methodology, and data submissions.¹⁶²
 - They must get recertified for any significant change to technologies or certifying officials..¹⁶³
 - Owners and operators must maintain comprehensive records of all super-emitter event investigations, including:
 - The date and time the regulator notification was received
 - The investigation methods used
 - The findings of the investigations
 - The source of the emissions
 - Any repairs or mitigation actions taken, including the start and end dates of the event.¹⁶⁴
- Reporting
 - A certified third party must submit a notification to the regulator within 15 calendar days of detecting a super-emitter event.¹⁶⁵
 - Owners and operators must submit a report to the regulator within 15 calendar days of receiving an official notification.¹⁶⁶
 - The report must include a comprehensive plan for addressing the event, detailing the anticipated timeline for resolution. The

¹⁵⁷ US EPA Final Rule, 40 CFR 60.5371b(d), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁵⁸ US EPA Final Rule, 40 CFR 60.5371b(d), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁵⁹ US EPA Final Rule, 40 CFR 60.5371b(d)(2)(v), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁶⁰ US EPA Final Rule, 40 CFR 60.5371b(d)(3), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁶¹ US EPA Final Rule, 40 CFR 60.5371b(e)(1), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁶² US EPA Final Rule, 40 CFR 60.5371b(b)(2), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁶³ US EPA Final Rule, 40 CFR 60.5371b(b)(4), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁶⁴ US EPA Final Rule, 40 CFR 60.5371b(d), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁶⁵ US EPA Final Rule, 40 CFR 60.5371b(c)(9), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁶⁶ US EPA Final Rule, 40 CFR 60.5371b(e)(1), <https://www.ecfr.gov/current/title-40/section-60.5371b>

report must also include an account of maintenance activities, fugitive emissions surveys, and a thorough assessment of the findings from their investigation.¹⁶⁷



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Inactive Wells, Temporarily Plugged Wells and Permanently Plugged and Abandoned Wells

- Control requirements
 - Owners or the responsible parties must develop and implement mitigation plans to address methane emissions and, if deemed necessary, permanently plug the wells.
 - Where methane emissions are detected in inactive wells, temporarily plugged wells or permanently plugged and abandoned wells, the party responsible must take all the necessary measures available to them for remediating, reclaiming and permanently plugging that well.
 - When the responsible party can demonstrate that the implementation of that mitigation plan is not possible within that deadline due to safety, administrative or technical considerations, they may delay its implementation. The mitigation plan shall include all the necessary evidence justifying such a decision. In such cases, the implementation shall be carried out as soon as possible ensuring that the end date for the mitigation actions for each well does not exceed 3 years from the submission of the first report.¹⁶⁸
- Monitoring
 - Methane emissions from all inactive and temporarily plugged wells must be monitored and quantified.¹⁶⁹
- Recordkeeping
 - The responsible party must establish and make publicly available an inventory of all recorded inactive wells, temporarily plugged wells, and permanently plugged and abandoned wells.¹⁷⁰
- Reporting
 - Operators must submit reports containing information on quantification of methane emissions and, where pressure monitoring equipment exists, information on pressure monitoring from all inactive wells and temporarily plugged wells shall be submitted to the competent authorities every year.¹⁷¹
 - Those reports shall include quantification of methane emissions to air and to water and information on pressure

¹⁶⁷ US EPA Final Rule, 40 CFR 60.5371b(e), <https://www.ecfr.gov/current/title-40/section-60.5371b>

¹⁶⁸ EU Regs Article 18 (9)

¹⁶⁹ EU Regs Article 18 (9)

¹⁷⁰ EU Regs Article 18 (1)

¹⁷¹ EU Regs Article 18 (3)



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monitoring, where applicable, using the standards or technical prescriptions specified by the regulator.¹⁷²

- Where the competent authorities are provided with quantification of methane emissions and, where pressure monitoring equipment exists, pressure monitoring data that prove that there have been no methane emissions from an inactive or temporarily plugged well during the last 5 years (3 years for offshore wells¹⁷³), the control and monitoring requirements shall cease to apply to that well.¹⁷⁴
- Before submission to the competent authorities, the reports shall be assessed by a verifier and shall include a verification statement.¹⁷⁵

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.

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.

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.¹⁷⁶

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.¹⁷⁷

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.¹⁷⁸

¹⁷² EU Regs Article 18 (3)

¹⁷³ EU Regs Article 18 (5)

¹⁷⁴ EU Regs Article 18 (4)

¹⁷⁵ EU Regs Article 18 (7)

¹⁷⁶ [Cal. Code Regs.](#) tit. 17 § 95667(a)(12)

¹⁷⁷ [BC regulation](#) § 52.05 (1)

¹⁷⁸ [Colorado Regulation](#) § D.II.A.22.



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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.¹⁷⁹

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.¹⁸⁰

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.

¹⁷⁹ [Cal. Code Regs.](#) tit. 17 § 95667(a)(62)

¹⁸⁰ [Colorado Regulation](#) § D.II.A.25.