

UPDATED INFORMATIVE DIGEST

REGULATION FOR GREENHOUSE GAS EMISSION STANDARDS FOR CRUDE OIL AND NATURAL GAS FACILITIES

Sections Affected: Adoption to California Code of Regulations, title 17, Subarticle 13, Sections 95665, 95666, 95667, 95668, 95669, 95670, 95671, 95672, 95673, 95674, 95675, 95676, 95677 and Appendix A, Appendix B, and Appendix C.

Background and Effect of the Regulatory Action:

In 2006, the Legislature passed and Governor Schwarzenegger signed the California Global Warming Solutions Act of 2006 (Stats. 2006, chapter 488). In Assembly Bill (AB 32), the Legislature declared that global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The Legislature further declared that global warming will have detrimental effects on some of California's largest industries, including agriculture and tourism, and will increase the strain on electricity supplies. The Legislature recognized that action taken by California to reduce emissions of greenhouse gases (GHG) will have far-reaching effects by encouraging other states, the federal government, and other countries to act. AB 32 creates a comprehensive, multi-year program to reduce GHG emissions in California, with the overall goal of restoring emissions to 1990 levels by the year 2020. AB 32 requires the Air Resources Board (ARB or Board) to take actions that include:

- Establishing a statewide GHG emissions cap for 2020, based on 1990 emissions; and
- Adopting a scoping plan by January 1, 2009, indicating how emission reductions will be achieved from significant GHG sources via regulations, market mechanisms, and other actions.

Both the original 2008 Scoping Plan and the subsequent First Update to the Scoping Plan identified the regulation of oil and gas operations covered in the regulation as a potential GHG mitigation measure. Accordingly, this regulation covers greenhouse gas emissions, predominately methane, from production, gathering and boosting stations, and processing as well as natural gas storage and transmission compressor stations (collectively "oil and gas"). This regulation is one of a suite of measures to reduce methane emissions. Methane emissions, if not controlled, will put continued pressure on the statewide GHG limit, as well as complicate any efforts to achieve deeper emissions reductions in the future. Steps therefore must be taken to control these emissions in order to fulfill AB 32's mandates.

Oil and gas operations are also subject to the federal Clean Air Act, including its permitting requirements. They are subject to United States Environmental Protection Agency (U.S. EPA) performance standards for oil and gas operations. These regulations, Title 40 Code of Federal Regulations (CFR) Part 60, Subpart OOOO ("Quad O"), limit emissions of volatile organic compounds from new equipment installed at crude oil and natural gas operations. These regulations achieve co-benefits of methane reductions. Corresponding air toxics standards for certain pieces of oil and gas equipment are also codified in 40 CFR Part 63. In August 2015, U.S. EPA also

proposed standards under section 111 of the Clean Air Act for methane emissions that would cover new equipment in oil and gas fields, finalizing these standards in May 2016. As part of this effort, U.S. EPA also has proposed additional requirements for new and modified sources in the oil and gas sector and suggested Control Technology Guidance for existing sources in non-attainment areas. On March 10, 2016, President Obama announced steps to reduce emissions from all existing oil and gas facilities. Controls in this regulation would aid in (and may suffice entirely for) compliance with any federal standards developed.

The Bureau of Land Management (BLM) has also recently issued new regulations to reduce the waste of natural gas from venting, flaring, and leaks during oil and gas operations on federal and tribal lands (43 CFR 3162 and 3179).

The new Presidential Administration has indicated that it is reviewing, and may reconsider some of these rules. California continues to support strong federal action. Regardless of federal decisions, however, the regulation will provide important protections for California.

California has authority to set its own standards to reduce emissions further to meet federal and state ambient air quality standards and climate change requirements and goals, and to require additional and separate reporting. The regulation addresses existing facilities and equipment where Quad O, and the U.S. EPA's federal methane standards, only applies to new or modified sources as of August 2011 (or September 2015 for some sources); the BLM regulations also do not reach many California sources. The regulation is generally more restrictive, as well as reaching additional sources, and is necessary to achieve additional benefits for human health, public welfare, and the environment. The regulation is consistent with U.S. EPA's rules mentioned above and would apply to sources not covered in those rules. ARB's regulation does not apply to tribal lands; however, it does apply to federal lands, in which case ARB may develop an MOU with BLM to coordinate enforcement.

In addition to direct federal regulations, many air districts with significant oil production have rules designed to reduce particulate matter less than 2.5 microns in diameter (PM_{2.5}) as well as oxides of nitrogen (NO_x) and volatile organic compound (VOC) emissions specifically from the oil and gas sector in order to meet federal ambient air quality requirements and generally to improve local air quality. The district rules do not cover methane specific sources and the regulation addresses emissions from equipment and processes not already controlled by those existing district rules.

ARB staff carefully reviewed existing and proposed regulations as this regulation was developed. The proposal is designed to be as strong as, or stronger than, existing rules in other jurisdictions and in certain California air districts, and to extend strong elements of those rules. The proposal is also designed to integrate well with regulatory efforts for other aspects of the sector, as well as to provide a complementary basis for compliance with potential proposed federal rules.

Objectives and Benefits of the Regulatory Action:

The regulation covers greenhouse gas emissions, predominately methane, from production, gathering and boosting stations, and processing as well as natural gas

storage and transmission compressor stations (collectively “oil and gas”). It addresses both vented (intentional) and fugitive (unintentional) releases of greenhouse gases by processes at facilities in the following sectors:

- Onshore and offshore crude oil or natural gas production,
- Crude oil, condensate and produced water separation and storage;
- Natural gas gathering and boosting stations;
- Natural gas processing plants;
- Natural gas transmission compressor stations; and
- Natural gas underground storage.

The regulation establishes emission standards for active and idle equipment and components at these facilities. Depending on the equipment or component, control mechanisms include vapor recovery, leak detection and repair (LDAR), and equipment replacement. Additionally, the regulation includes monitoring at underground natural gas storage facilities for the early detection of large leaks or well failures. Storage facility monitoring provisions were added to the regulation in response to the catastrophic release that occurred at the Aliso Canyon natural gas storage facility in late 2015-early 2016.

Some methane reductions are already achieved as co-benefits of local air district regulations governing emissions of volatile organic compounds (VOC); methane is not considered to be a VOC but can be captured along with VOCs. Although methane emissions do not affect regional scale ozone production that occurs over hours to days like VOCs do, regional methane emissions are fairly well mixed in the atmosphere and contribute to global methane levels, which in turn contribute to global background levels of ozone. The goal of the regulation is to obtain the maximum GHG emission reductions from the sector in a technically feasible and cost-effective manner, building upon the existing regulations already being implemented by the air districts. The source categories covered under the regulation currently emit approximately two and a half million metric tons (MMT) of CO₂e. The regulation will reduce those emissions by over fifty percent. The proposal is also expected to reduce both VOC and toxic air contaminant (TAC) emissions and provide an essentially neutral NO_x impact statewide.

The specific provisions of the regulation are:

1. Collection and use (or destruction) of methane and associated gases from uncontrolled oil and water separators and storage tanks with emissions above a set methane standard;
2. Collection and use (or destruction) of methane and associated gases from all uncontrolled well stimulation circulation tanks;
3. Leak Detection and Repair (LDAR) requirements for active and idle components, such as valves, flanges, and connectors, currently not covered by local air district rules;
4. Methane emission standards for large reciprocating compressors in addition to LDAR for the other large compressor components and smaller compressors;

5. Collection and use (or destruction) of methane and associated gases from specified centrifugal compressors, or replacement of higher emitting “wet seals” with lower emitting “dry seals;”
6. Use of “no bleed” pneumatic pumps and “no bleed” continuous bleed pneumatic devices with limited exemptions and restrictions on intermittent bleed pneumatic devices;
7. Enhanced monitoring for underground natural gas storage facilities including leak detection and ambient air monitoring; and
8. Reporting requirements for liquids unloading and well casing vents.

The proposal represents an ARB effort starting in 2008 to reduce emissions from the oil and gas sector. ARB staff coordinated a comprehensive industry wide survey of equipment, conducted research and analysis to better understand emissions and reduction opportunities, and visited several oil and gas facilities. ARB staff worked with major stakeholders such as oil and gas producers, storage operators, public utilities, environmental and public health advocates and local air districts to solicit input via meetings and public workshops on the proposal. Staff developed the proposal based on research, analysis, and feedback from stakeholders.

Description of the Regulatory Action

At its public hearing on July 21, 2016, the Air Resources Board considered staff’s proposed regulation, Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities, Title 17, California Code of Regulations, sections 95665 through 95676 and Appendices A through C. The regulation would impose emissions controls on equipment located at onshore and offshore production and processing facilities as well as natural gas compressor stations, underground storage facilities, and gathering and boosting stations.

The Board directed the Executive Officer to determine if additional conforming modifications to the regulation were appropriate and to make any proposed modified regulatory language available for public comment, with any additional supporting documents and information, for a period of at least 15 days. The Board further directed the Executive Officer to consider written comments submitted during the public review period and make any further modifications that are appropriate available for public comment for at least 15 days. The Executive Officer was directed to evaluate all comments received during the public comment periods, including comments raising significant environmental issues, and prepare written responses to such comments. The Executive Officer was further directed to present to the Board, at a subsequently scheduled public hearing, staff’s written responses to environmental comments and the final environmental analysis for consideration for approval, along with the finalized regulation for consideration for adoption.

On February 3, 2017, ARB staff published a Notice of Public Availability of Modified Text and Availability of Additional Documents and/or Information, for which comments were due by February 21, 2017. The modifications to the original proposal are summarized below under “Summary of Modifications to the Original Proposal”.

On March 23, 2017, staff brought the modified proposal back to the Board for consideration, along with responses to environmental comments and the final

Environmental Analysis. The Board conducted another public hearing and accepted further public comment and testimony on the proposed regulation.

On March 23, 2017, the Board approved Resolution 17-10 to approve responses to environmental comments and to certify the Environmental Analysis, to adopt the regulation as modified, and to adopt Findings and Statement of Overriding Considerations. As part of Resolution 17-10, the Board directed staff to make any non-substantial or solely grammatical changes in the regulation as may be warranted and submit the adopted regulation and related documents to the Office of Administrative Law. All comments received have been responded to in the Final Statement of Reasons and in written responses to comments on the Environmental Analysis.

Summary of Modifications to the Original Proposal

The major amendments to the regulations are identified below. The following summary does not include all modifications. For a complete account of all modifications, refer to the February 3, 2017, Notice of Public Availability of Modified Text.

Circulation Tanks for Well Stimulation Treatments

ARB staff revised the regulation to require each owner or operator, either individually or as part of a group of owners and operators, to conduct a technology assessment and undertake emissions testing in at least three different production fields from wells with different characteristics. The regulation was also revised to include a list of information, to be provided by the technology assessment that is needed for ARB to evaluate emission control equipment. In addition, section 95668(b)(3) was added to specify that ARB must review the results of a technology assessment and make a determination on the requirement for the installation of vapor collection systems by no later than July 1, 2019. In the event that vapor collection systems for circulation tanks are not feasible, an owner or operator is not required to install a vapor collection system by January 1, 2020. These modifications were necessary to provide affected stakeholders with a date that they can expect to see an ARB determination on the use of vapor control equipment. These changes clarify the intent of the regulation and provide greater clarity on how the requirements will be implemented.

Natural Gas Underground Storage Facility Monitoring Requirements

Section 95668(h) was modified to specify equipment specifications and procedures for performing monitoring at underground gas storage facilities. The revisions are primarily a result of Senate Bill 887¹, which requires facilities to implement a leak prevention and response program that addresses the full range of natural gas leaks possible at a facility, along with specific response plans that provide for immediate control of leaks. The monitoring plan contains three primary elements, including ambient methane monitoring, wellhead leak detection monitoring, and optical gas imaging of a well blowout. These modifications are necessary to ensure that the full range of leaks are monitored as required under Senate Bill 887, while implementing the use of the best available instrument technologies and procedures. The revisions also specify that leak detection protocols

¹ Pavley, Statutes of 2016, codified in part as section 42710 of the Health and Safety Code

approved by the Department of Conservation shall remain in effect until an ARB monitoring plan is approved and all monitoring equipment is operational, and that the owner or operator has 180 days from the date of ARB approval to implement a monitoring plan and begin monitoring at a facility. This provides an owner or operator with sufficient time to purchase, install, and test equipment after the ARB fully approves a monitoring plan. Revisions also include adding detailed requirements of the ambient methane monitoring system, alarm thresholds for both the ambient and wellhead monitoring, and requirements for OGI in case of a well blowout. Staff also added legal citations to the authority and reference sections of the note at the end of Section 95668 to reflect that the regulation implements recent statutory direction on underground natural gas storage monitoring programs. These additional statutory citations are needed to identify additional authority for the regulation.

Leak Detection and Repair

Section 95669 was modified to remove a provision that allowed for changing the inspection frequency from quarterly to annually based on staff's recommended 15-day changes and Board member direction. This provision was removed based on information we received since the release of the 45 day package, including a study which further emphasized the random nature of super emitter leaks and that more frequent monitoring is necessary. Therefore, the effectiveness of an LDAR program is tied to the frequency of inspections, in addition to the leak standards alone. In addition, U.S. EPA dropped a similar step-down provision in its rules, and there have been additional natural gas leaks, although not of the magnitude of Aliso Canyon. The regulation was also modified to incorporate a new definition of Optical Gas Imaging (OGI) and to clarify that OGI instruments may not be used in place of US EPA Reference Method 21 during quarterly inspections. Several sections were also modified to add new provisions for extending the repair timeframe in the event that parts or equipment required to make repairs are on order, or in the event that a natural gas utility cannot remove a system from service due to system reliability issues. These modifications were necessary to allow for instances where an owner or operator is not able to make repairs due to special conditions.

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

Appendix C was modified to incorporate a new bubble point sample integrity check and to provide additional clarity for performing a laboratory flash analysis test procedure. The revisions provide greater clarity and detail on how a laboratory must perform the measurements, including clarity on how a sample is conditioned. These changes were necessary to ensure that all measurements are performed consistently as intended in the procedure and provide uniformity amongst different laboratories conducting the procedure. Section 8.9 was also modified to change the sampling rate to no more 60 milliliters per minute and specify that the cylinder must not be filled to more than 70 percent of capacity, which ensures that gas remains entrained in liquid and provides added safety for transporting cylinders from a job site to a laboratory. Finally, Section 11 was modified in conjunction with changes to Form 1. These changes clarify that Division of Oil, Gas, and Geothermal Resources (DOGGR) certified reports are data points used for determining the annual emission rate and are the responsibility of the owner or operator to provide. These

modifications are necessary so that the sampling technician and the owner or operator understand which party is responsible for providing data.

Additional Documents Added to the Record

Staff has added to the rulemaking record the following additional documents:

- Summary of Cost, Emissions, and Cost per Ton using the 20 year and 100 year Global Warming Potential, respectively;
- Revised Emission and Cost Estimates for the Leak Detection and Repair Provision;
- Revised Cost Estimates for the Natural Gas Underground Storage Facility Monitoring Requirements Provision; and
- External Scientific Peer Review of the Flash Analysis Test Procedure.

Documents Incorporated by Reference (Cal. Code Regs., tit. 1, § 20, subd. (c)(3)):

The following documents are incorporated by reference into the regulation.

ASTM D-70-09	Standard Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method). 2009.
ASTM D-287-92	Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method). Reapproved 2000.
ASTM D-1945-03	Standard Test Method for Analysis of Natural Gas by Gas Chromatography. Reapproved 2010.
ASTM D-3588-98	Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels. Reapproved 2003.
ASTM D-4052-09	Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter. 2009.
ASTM D-5002-16	Standard Test Method for Density and Relative Density of Crude Oils by Digital Density Analyzer. 2016.
ASTM D-7096-16	Standard Test Method for Determination of the Boiling Point Range Distribution of Gasoline by Wide Bore Capillary Gas Chromatography. 2016.
EPA Method 21	Determination of Volatile Organic Compound Leaks. 2016.
EPA Method 8021B	Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors. 2014.
EPA Method 8260B	Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). 1996.
EPA Method TO-14A	Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters with Subsequent Analysis By Gas Chromatography. 1999.

- EPA Method TO-15 Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters and Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS). 1999.
- GPA 2174-93 Obtaining Liquid Hydrocarbon Samples for Analysis by Gas Chromatography. 2000.
- GPA 2177-03 Analysis of Natural Gas Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography (2003).
- GPA 2261-00 Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography 2000.
- GPA 2286-95 Tentative Method of Extended Analysis for Natural Gas and Similar Gaseous Mixtures by Temperature Programmed Gas Chromatography. Reprinted 1999

GPA means Gas Processing Association.

Changes to Underlying Laws

Between the first hearing in July 2016 and the second hearing in March 2017, State law was changed to add section 42710 to the Health and Safety Code, requiring the ARB to develop a natural gas storage facility monitoring program, in consultation with local air districts and DOGGR. This statute was addressed as described above under section 95668(h), Natural Gas Underground Storage Facility Monitoring Requirements.

Comparable Federal Regulations:

U.S. EPA's New Source Performance Standards (NSPS) for Crude Oil and Natural Gas Production, Transmission, and Distribution (40 CFR Part 60 Subpart OOOO) applies to onshore oil and gas facilities newly constructed, reconstructed, or modified after August 23, 2011, and as of September 18, 2015 for some sources. The types of facilities covered are natural gas well sites, oil well sites, production gathering and boosting stations, natural gas processing plants, and natural gas compressor stations (transmission and storage). U.S. EPA's recently finalized methane standards add to these rules in 40 CFR Part 60 Subparts OOOO and OOOOa. ARB's regulation is generally more stringent, as is discussed above, and will apply to more facilities in California compared to U.S. EPA's NSPS because the NSPS are limited to new and modified sources and ARB's regulation will apply to all new and existing facilities as well as offshore oil and natural gas production facilities.

An Evaluation of Inconsistency or Incompatibility with Existing State Regulations (Gov. Code, § 11346.5, subd. (a)(3)(D)):

During the process of developing the regulatory action, ARB conducted a search for any similar regulation on this topic and concluded the regulation is neither inconsistent nor incompatible with existing state regulations.

Many air districts with significant oil production have rules designed to reduce criteria pollutant emissions from the oil and gas sector in order to meet federal ambient air quality requirements. ARB staff carefully reviewed existing air district rules applicable to similar sources at oil and natural gas facilities. The district rules control emission of volatile

organic compounds from tanks, separators, compressors, and specify requirements for leak detection and repair (LDAR). The district rules do not cover methane specific sources and the regulation addresses emissions from equipment and processes not already controlled by those existing district rules. ARB has used the district rules as a starting point, particularly for leak detection and repair, where districts have been implementing programs for decades. ARB staff carefully reviewed existing and proposed regulations as this regulation was developed. The proposal is designed to be as strong as, or stronger than, existing rules in other jurisdictions and in certain California air districts, and to extend strong elements of those rules. The proposal is also designed to integrate well with regulatory efforts for other aspects of the sector, as well as to provide a complementary basis for compliance with potential proposed federal rules.