State of California
AIR RESOURCES BOARD

FINAL STATEMENT OF REASONS

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

DATE OF RELEASE: May 2017

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LIST OF ACRONYMS

AAQS	Ambient Air Quality Standards
AB	Assembly Bill
APCD	Air Pollution Control District
AQMD	Air Quality Management District
ARB or Board	California Air Resources Board
BAU	Business as Usual
BLM	Bureau of Land Management
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
Cal/EPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
CPUC	California Public Utilities Commission
CPUC	California Public Utilities Commission
CTG	Control Technology Guidance
DOF	Department of Finance
DOGGR	Department of Conservation, Division of Oil, Gas, and Geothermal Resources
EA	Environmental Analysis
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
F-gases	Fluorinated Gases
GHG	Green House Gas
GSP	Gross State Product
GWP	Global Warming Potential
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
HC	Hydrocarbon
HF	Hydraulic Fracturing
HFC	Hydro-fluorocarbon
I&M	Inspection and Maintenance
ICF	ICF International
ISOR	Initial Statement of Reason
LDAR	Leak Detection and Repair
MCF	Thousand Cubic Feet
MMT	Million Metric Tonnes
MOA	Memoranda of Agreement
MOU	Memorandum of Understanding
MRR	Mandatory Reporting Regulation
MT	Metric Ton
$MTCH_4/Yr$	Metric Ton of Methane per Year

N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NG	Natural Gas
NGO	Non-governmental Organization
NO_x	Nitrogen Oxides or Oxides of Nitrogen
NSPS	New Source Performance Standard
OGI	Optical Gas Imaging
PM	Particulate Matter
PYs	Person Years
RACT	Reasonably Available Control Technology
REC	Reduced Emissions Completion
REMI	Regional Economic Models, Inc.
RWQCB	Regional Water Quality Control Boards
SB	Senate Bill
scfh	Standard Cubic Feet per Hour
scfm	Standard Cubic Feet per Minute
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLCP	Short Lived Climate Pollutants
SO_2	Sulfur Dioxide
SoCal Gas	Southern California Gas
SOx	Sulfur Oxides or Oxides of Sulfur
SRIA	Standard Regulatory Impact Assessment
SRIA	Standardized Regulatory Impact Assessment
TAC	Toxic Air Contaminant
TPY	Tons Per Year
UIC	Underground Injection Control
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VCS	Vapor Collection System
VOC	Volatile Organic Compounds
VRS	Vapor Recovery System
VRU	Vapor Recovery Unit
WS	Well Stimulation
WSPA	Western State Petroleum Association

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**Final Statement of Reasons for Rulemaking,
Including Summary of Comments and Agency Response**

PUBLIC HEARING TO CONSIDER THE REGULATION FOR GREENHOUSE GAS EMISSION STANDARDS FOR CRUDE OIL AND NATURAL GAS FACILITIES

Public Hearing Dates: **July 21, 2016 and March 23, 2017**
Agenda Item No.: **16-7-2 and 17-3-6**

I. GENERAL

A. The Staff Report: Initial Statement of Reasons for Rulemaking (staff report), entitled Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities**,** released May 31, 2016, is incorporated by reference herein. The staff report, which is incorporated by reference herein, contained a description of the rationale for the proposed amendments. On May 31, 2016, all references relied upon and identified in the staff report were made available to the public.

At its public hearing on July 21, 2016, the Air Resources Board (ARB or Board) directed the Executive Officer to determine if additional conforming modification 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 in accordance with Government Code section11346.8. 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 are required by ARB's certified regulations at California Code of Regulations, title 17, sections 60000-60007 and Government Code section 11346.9(a). The Executive Officer was further directed to present to the Board, at a second public hearing, staff' 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 the modified regulatory text, reflecting the changes presented at the hearing and directed by the Board, was made available for a supplemental 15-day comment period by issuance of a "Notice of Public Availability of Modified Text and Availability of Additional Documents". The 15-Day Notice described each modification, and the rationale for the modifications. The 15-day Notice and attachments were mailed to all parties identified in California Code of Regulations, title 1, section 44(a) and other interested parties. The 15-day Notice and attachments were also posted on the ARB's website for the rulemaking on February 3, 2017, and made available for public comment through February 21, 2017. On February 17, 2017, ARB sent an ERRATA via electronic communication pursuant to Government Code 11340.85, to correct errors in the Summary of Cost Estimates. The 15-day Notice, its attachments, and the ERRATA are incorporated by reference into this document.

At its public hearing on March 23, 2017, the Board approved the Regulation in Resolution 17-10, including the Final Environmental Analysis.

B. MANDATES AND FISCAL IMPACTS TO LOCAL GOVERNMENTS AND SCHOOL DISTRICTS

The Board has determined that this regulatory action will not result in a mandate to any local agency or school district.

C. CONSIDERATION OF ALTERNATIVES

Staff considered alternatives to the proposed regulation that would be less burdensome to the affected industry. Since Oil and Gas industry operations are exempted from being considered a small business, this regulation has no effect on small business according to California Government Code 11342.610(b).

For the reasons set forth in the Staff Report, in staff's comments and responses at the hearing, and in this FSOR, the Board determined that no alternative considered by the agency would be more effective in carrying out the purpose for which the regulatory action was proposed, or would be as effective and less burdensome to affected private persons, or would be more cost-effective to affected private persons and equally effective in implementing the statutory policy or other provisions of law than the action taken by the Board.

II. MODIFICATIONS MADE TO THE ORIGINAL PROPOSAL

A. MODIFICATIONS APPROVED AT THE BOARD HEARING AND PROVIDED FOR IN THE 15-DAY COMMENT PERIOD

Pursuant to the Board direction provided in Resolution 16-09, ARB released a 15-day Notice on February 3, 2017, which placed additional documents into the rulemaking file and presented modifications to the regulatory text after stakeholder feedback. The 15-day Notice described each substantive modification to the Oil and Gas proposal, and the rationale for the modifications. The modifications to the regulatory language were clearly identified by underline and strikeout, and were attached to the 15-day Notice.

B. NON-SUBSTANTIAL MODIFICATIONS

Subsequent to the 15-day public comment period mentioned above, staff identified the following additional non-substantive changes to the regulation:

Section 95669(i)(5)(A)1: Table 2 was renamed to Table 4

Section 95671(d): reference to section 95668(c) was change to 95671(c)

Explanations to Corrections made to the 15-Day Notice

Section 95669(h)(3) – in the 15-day the word 'Schedule" as described by being added to section 95669(h)(3), when in fact the word "schedule" was added to table 2.

Appendix C – Test Procedure

3.14 Percent water cut – The percent water cut definition was struck because it was no longer used in the test procedure. The reporting requirements were changed to request total water and total oil instead of the percent water cut.

4.4 The phrase "without displacing an immiscible liquid from the cylinder" was struck because an additional option was added to the procedure and this phrase was no longer applicable for the collection of water samples.

5.2 Section 5.2 was struck because 5.1 and 5.2 were combined and applicable to all pressure gauges.

8.1 Section 8.1 was struck because staff determined this method was appropriate for condensate sampling, as suggested in the 45 day comment letter from SPL.

The above-described modifications constitute non-substantial changes to the regulatory text because it more accurately reflects the numbering of a section and correct spelling and grammatical errors, but do not materially alter the requirements or conditions of the proposed rulemaking action.

15-Day: The following documents relied upon and references were added to the record and made available pursuant to Government Code Section 11347.1.

- 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.
- External Scientific Peer Review of the Flash Analysis Test Procedure.
- Brandt A.R., Heath G.A., Cooley D. Methane Leaks from North American Natural Gas Systems (2014) 343 Environmental Science and Technology 733-735.
- Lamb et al., Direct Measurements Show Decreasing Methane Emissions from Natural Gas Local Distribution Systems in the United States (2015) 49 Environ. Sci. Technol. 5161-5169.
- Zavala-Araiza et al., Reconciling divergent estimates of oil and gas methane emissions (Nov. 10, 2015) Proceedings of the National Academy of Sciences 1-S34.
- Zavala-Araiza et al., Toward a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites (2015) 49 Environ. Sci. Technol. 8167-8174.
- Protocol for Equipment Leak Emission Estimates (Nov. 1995) US EPA-453/R-95-017.

III. DOCUMENTS INCORPORATED BY REFERENCE

The regulation adopted by the Executive Officer incorporates by reference the following documents:

Oil and Gas Regulation, Incorporated by Reference:

45-day:

1. ASTM D70-09 Standard Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method), which is incorporated herein by reference. 2009.

2. ASTM D 287-92 Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method), which is incorporated herein by reference. Reapproved 2000.

3. ASTM D1945-03 Standard Test Method for Analysis of Natural Gas by Gas Chromatography, which is incorporated herein by reference. Reapproved 2010.

4. ASTM D 3588-98 Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels, which is incorporated herein by reference. Reapproved 2003.

5. ASTM D 4052-09 Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter, which is incorporated herein by reference. 2009

6. ASTM D5002-16 Standard Test Method for Density and Relative Density of Crude Oils by Digital Density Analyzer, which is incorporated herein by reference. 2016.7. ASTM D7096-16 Standard Test Method for Determination of the Boiling Point Range Distribution of Gasoline by Wide Bore Capillary Gas Chromatography, which is incorporated here by reference. 2016

8. US EPA Method 8021B Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, which is incorporated herein by reference. 2014.

9. US EPA Method 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), which is incorporated herein by reference. 1996.

10. US EPA Method TO-14A Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters with Subsequent Analysis By Gas Chromatography, which is incorporated herein by reference. 1999.

11. US EPA Method TO-15 Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters and Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS), which is incorporated herein by reference. 1999.

12. GPA Standard 2174-93 Obtaining Liquid Hydrocarbon Samples for Analysis by Gas Chromatography, which is incorporated herein by reference. 2000.

13. GPA Standard 2177-03 Analysis of Natural Gas Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography, which is incorporated herein by reference. 2003.

14. GPA Standard 2261-00 Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography, which is incorporated herein by reference. 2000.

15. GPA Standard 2286-95 Tentative Method for the Extended Analysis of Natural Gas and Similar Gaseous Mixtures by Temperature Program Gas Chromatography, which is incorporated herein by reference. Reprinted 1999.

16. US EPA Method 21. Determination of Volatile Organic Compound Leaks. October 1, 2017.

17. Public Utilities Commission General Order No. 58A, Standards for Gas Service in the State of California. November 10, 2016.

18. 14CCR Secestion 1761(a)

19. 17CCR Section 95153(e)

These documents were incorporated by reference because it would be cumbersome, unduly expensive, and otherwise impractical to publish them in the California Code of Regulations. In addition, some of the documents are copyrighted, and cannot be reprinted or distributed without violating the licensing agreements. The documents are lengthy and highly technical test methods and engineering documents that would add unnecessary additional volume to the regulation. Distribution to all recipients of the California Code of Regulations is not needed because the interested audience for these documents is limited to the technical staff at a portion of reporting facilities, most of whom are already familiar with these methods and documents. In addition, the incorporated documents were made available by ARB upon request during the rulemaking action and will continue to be available in the future. The documents are also available from college and public libraries, or may be purchased directly from the publishers.

IV. SUMMARY OF COMMENTS AND AGENCY RESPONSE

Written comments were received during the 45-day comment period in response to the July 21, 2016 public hearing notice, and written and oral comments were presented at the Board Hearing. In addition, comments were received during a 15-day comment period from February 3 – 21, 2017, and at the March 23, 2017, Board adoption hearing.

Listed below are the organizations and individuals that provided comments during these periods:

Comment Code	Comment Period Received
OP	Comments received during the 45-day comment period of the original proposal, June 3, 2016 – July 18, 2016
B	Comments received in written materials during the board hearing, July 21, 2016
T	Comments received as testimony at the board hearing, July 21, 2016
F	Comments received during the 15-day comment period February 3, 2017 – February 21, 2017
SB	Comments received in written materials during the second board hearing, March 23, 2017
ST	Comments received as testimony at the second board hearing on March 23, 2017

Comment Code[1]	Commenter	Affiliation
Comments received during the 45-day comment period of the original proposal, June 3, 2016 – July 18, 2016		
OP-1	Smith, Mark A.	Individual
OP-2	Landers, Joe	SPL
OP-3	Shelby, Heather	Environmental Defense Fund
OP-4	Lish, Christopher	Individual
OP-5	Von Bargen, Patrick	Center for Methane Emissions Solutions
OP-6	Mauldin, Jamie L.	Coalition of California Utility Employees
OP-7	Boehme, John	Central Valley Gas Storage, LLC
OP-8	Prichard, Michele	Liberty Hill Foundation
OP-9	Moffitt, Lena	Sierra Club
OP-10	Reheis-Boyd, Catherine	Western States Petroleum Association
OP-11	Burga, Irene; Stano, Madeline; Decena, Vinai; Holmes-Gen, Bonnie; Takahashi,	Environmental Defense Fund; Center on Race, Poverty & the Environment; Alliance of Nurses for

[1]Decoding the Comment Code field OP-OP-1 is Oil and Gas Regulation (OG), Original Proposal, or 45-day comment period (OP), first letter received (1).

Comment Code[1]	Commenter	Affiliation
	Scott; Thomas, Taylor; Fong, Gisele; Magavern, Bill	Healthy Environments; American Lung Association in California; Asthma Coalition of Los Angeles County; East Yard Communities for Environmental Justice; EndOil; Coalition for Clean Air
OP-12	Boccella, Mark	FLIR Systems, Inc.
OP-13	Boss, Terry	Interstate Natural Gas Association of America
OP-14	Lacey, Pamela	American Gas Association
OP-15	May, Julia; Vanderwarker, Amy; Thomas, Taylor; Stano, Madeline; Hasson, Michele; Eidt, Jack; Galliani, Joe; Chavez, Anabell; Marquez, Jesse N.; Wood, Drew; Pulido, Ricardo; Carrillo, Alfred; Quezada, Anthony; Sanchez-Hall, Magali; Padilla, Veronica; Ibrahim, Nancy Halpern; Argüello, Martha Dina	Communities for a Better Environment; California Environmental Justice Alliance; East Yard Communities for Environmental Justice; Center on Race, Poverty & the Environment; Center for Community Action & Environmental Justice; SoCal 350 Climate Action; South Bay Los Angeles 350 Climate Action Group; Wilmington Improvement Network; Coalition for a Safe Environment; California Kids IAQ, Wilmington; Community Dreams, Wilmington; Apostolic Faith Center, Wilmington; American Veterans, Long Beach; EMERGE, Wilmington; Pacoima Beautiful; Esperanza Community Housing Corporation; Physicians for Social Responsibility – Los Angeles
OP-16	Moritz, Anna; Nowicki, Brian	Center for Biological Diversity
OP-17	Mendoza, Jerilyn López	Southern California Gas Company; San Diego Gas & Electric Company
OP-18	Rubio, Michael J.	Chevron U.S.A., Inc.
OP-19	Schroeder, Darin; McCabe, David;	Clean Air Task Force; Environmental Defense

Comment Code[1]	Commenter	Affiliation
	Fleischman; O'Conner, Tim; Paranhos, Elizabeth; Hull, Hillary; Mordick, Briana; Geertsma, Meleah; Benson, Elly	Fund; Natural Resources Defense Council; Sierra Club
OP-20	McBride, Barbara; Vickers, Scott	Calpine Corporation
OP-21	Steube, Milan	Independent Environmental Consultant
Comments received in written materials during the board hearing, July 21, 2016		
B-1	Mann, Jonathan D.	M-Square Products & Services, Inc.
B-2	Baizel, Bruce	Earthworks
B-3	Wagoner, W. James	Butte County Air Quality Management District
B-4	Rivera, Willie (Zierman, Rock)	California Independent Petroleum Association
B-5	Schroeder, Jaclyn	Moms Clean Air Force
B-6	Russell, Loni	Moms Clean Air Force
B-7	Moeller, Jennifer	Moms Clean Air Force
B-8	Hector, Jason	Individual
B-9 (resubmission of OP-19)	Benson, Elly	Sierra Club
B-10	Begtsson, Nathan	Pacific Gas and Electric Company
B-11	Pisty-Lyhne, Daisy (Shonkoff, Seth)	PSE Healthy Energy
B-12	Tobias, Elias	Safety Scan USA on behalf of Environmental Defense Fund
Comments received as testimony at the board hearing, July 21, 2016		
T-1	Lambert, Morgan	San Joaquin Valley Air Pollution Control District
T-2	Roggenkamp, Jean	Bay Area Air Quality Management District
T-3	Greene, Larry	Sacramento Metropolitan Air Quality Management District
T-4	Tobias, Elias	Environmental Defense Fund, Safety Scan USA
T-5	Paranhus, Elizabeth	Environmental Defense Fund
T-6	Benson, Elly	Sierra Club
T-7	Mann, John; Mann, Charles	360-International M^2; Charles Mann Company
T-8	Derohanian, Cheri	Porter Ranch Neighborhood Council
T-9	Carmichael, Tim	Southern California Gas Company

Comment Code[1]	Commenter	Affiliation
T-10	McInnis, Karen	Southern California Gas Company
T-11	Begtsson, Nathan	Pacific Gas and Electric Company
T-12	Rivera, Willie	California Independent Petroleum Association
T-13	Lovley, Tim	MacPherson Oil
T-14	Horne, Randy	NAFTEX Operating Company
T-15	Baizel, Bruce	Earthworks
T-16	Herrera, Gloria	Individual (resident of Kern County)
T-17	Trujillo, Felipa	Individual (community member of Shafter)
T-18	Flores, Juan	Individual (resident of Delano)
T-19o	Stano, Madeline	Center on Race, Poverty, and the Environment in Delano; residents of Bakersfield, Arvin, Delano, Shafter, Wasco, and Lamont
T-20	Decena, Vinai	Alliance of Nurses for Heathy Environments
T-21	Schroeder, Jaclyn	Moms Clean Air Force
T-22	Russell, Loni	Moms Clean Air Force
T-23	Moeller, Jennifer Avila	Moms Clean Air Force
T-24	Pakucko, Matt	Save Porter Ranch
T-25	Magavern, Bill	Coalition for Clean Air
T-26	Nakatani, Keith	Clean Water Action
T-27r	Hector, Jason	Individual (resident of Porter Ranch)
T-28	Clark, Les	Independent Oil Producers Agency
T-29	Pitcher, Jenifer	Western States Petroleum Association
T-30	Pistey-Lyhne, Daisy	PSE Healthy Energy
Comments received during the 15-day comment period February 3, 2017 – February 21, 2017		
F-1	Clarke, Jim B.	City of Culver City
F-2	Deiker, Steven	Kairos Aerospace
F-3	Zierman, Rock	California Independent Petroleum Association
F-4	O'Conner, Timothy; Paranhos, Elizabeth; Hull, Hillary	Environmental Defense Fund
F-5	Blanc, A.; et.al.	5,482 Californians
F-6	Tobias, Elias	Safety Scan
F-7	Wagoner, W. James	Butte County Air Quality Management District

Comment Code[1]	Commenter	Affiliation
F-8	Trowbridge, Ann L.	Independent Storage Providers
F-9	Carmichael, Tim	SoCalGas, SDG&E
F-10	Decena, Vinai; et.al.	Alliance of Nurses for Healthy Environments; et.al.
F-11	Umenhofer, Thomas A.	Western States Petroleum Association
F-12	Umenhofer, Thomas A.	Western States Petroleum Association
F-13	Pitcher, Jenifer; Jaurena, Michael F.	Western States Petroleum Association; Safety Management Systems
F-14	Ali, Fariya	Pacific Gas and Electric Company
Comments received in written materials during the second board hearing, March 23, 2017		
SB-1	Yao, Laura	Kairos Aerospace
SB-2	Rechtschaffen, Clifford	State of California Public Utilities Commission
SB-3	Baizel, Bruce	Earthworks
SB-4	Pitcher, Jenifer	WSPA
Comments received as testimony at the second board hearing on March 23, 2017		
ST-1	Baizel, Bruce	Earthworks
ST-2	Eder, Harvey	Public Solar Power Coalition
ST-3	Thomas, Taylor	East Yard Communities for Environmental Justice
ST-4	Ali, Fariya	Pacific Gas and Electric
ST-5	Phillips, Kathryn	Sierra Club California
ST-6	Barrett, Will	American Lung Association, California
ST-7	Marquez, Jesse	Coalition for a Safe Environment, Los Angeles Environmental Justice Network, California Communities Against Toxics
ST-8	Pitcher, Jenifer	Western States Petroleum Association
ST-9	Rivera, Willie	California Independent Petroleum Association
ST-10	Morris, Jennifer	SoCalGas
ST-11	Burga, Irene	Environmental Defense Fund
ST-12	Magavern, Bill	Coalition for Clean Air

The comments below are organized by topic. Commenters wishing to find a response to their comment may look it up by number. The bracketed comment letters and testimony are attached as Appendices A through G to this document.

Outside of Regulatory Scope

OP-9-8 Comment: The comment directs ARB to review the anthropogenic GHGs emitted by the beef and dairy industries.

OP-9-9 Comment: The comment recommends taxing dairy and livestock, to de-incentivize production and consumption, thus reducing the anthropogenic methane emissions.

OP-9-10 Comment: The comment requests ARB staff to include testing and detecting of other VOCs released from fossil fuel extraction, processing, and distribution, such as a campaign to educate the public on how to spot leaks near their homes and who to notify if a leak is suspected.

OP-9-12 Comment: The comment is a general statement that the Board should consider and assess climate change impacts from anthropogenic methane emissions from livestock and dairy production.

B-2-9 Comment: The comment states support of the upcoming rulemaking ARB and CPUC are developing to regulate methane emissions from oil and gas pipelines.

B-11-4 Comment: The comment recommends implementing minimum surface setbacks as recommended by CCST Independent Scientific Study of Well Stimulation, published in 2015.

T-5-5 Comment: The comment urges for further analysis to identify regulatory gaps, such as inspection and maintenance requirements for additional source categories. The commenter describes the near-surface waste gas line at an oil and gas facility in Arvin that leaked for nearly eight months in 2014.

T-17-1 Comment: The comment is an appeal to stop fracking.

T-30-4 Comment: This comment reiterates the comment B-11-4, urging ARB to consider implementing minimum surface setbacks..

B-4-6 Comment: Part 1 of 2 - The comment complains that the oil and gas regulation is not consistent with the MRR.

B-4-7 Comment: The comment recommends clarifying requirements with 15-day regulatory language

The consolidated response below addresses the above comments: OP-9-8, OP-9-9,, OP-9-10, OP-9-12, B-2-9, B-11-4, T-5-5, T-17-1, T-30-4, B-4-6 part 1 of 2, and B-4-7

Agency Response: The above comments are beyond the scope of this rulemaking.

Comments Received After The 15-day Regulatory Notice

F-1-1 Comment: The comment supports many provisions in the Oil and Gas regulation.

F-5-1 Comment: The comment lends a note of support for the Oil and Gas regulation, requesting immediate adoption.

F-6-1 Comment: The comment lends a supportive note to the Oil and Gas GHG regulation.

F-10-1 Comment: The comment supports the adoption of the Oil and Gas GHG regulation.

F-10-3 Comment: The comment supports the LDAR requirements set forth by staff.

The consolidated response below addresses the above comments: F-1-1, F-5-1, F-6-1, F-10-1, and F-10-3

Agency Response: ARB staff appreciates the note of support for the Oil and Gas GHG regulation.

ST-2-2 Comment: The comment states that fracking activities used to produce oil and gas contributes to greenhouse gas emissions and oil and gas should be phased out to be replaced by solar as soon as possible.

ST-2-2 Agency Response: ARB staff made no changes based upon the received comment. We appreciate the feedback. We agree that fracking in California can contribute to air pollution, and we have included a provision in the regulation to address this. However, the comment about phasing out oil and gas in favor of solar is outside the scope of the oil and gas regulation.

ST-7-2 Comment: The comment states support of the natural gas underground storage air monitoring provisions, however the commenter wants to make sure this includes all categories of chemicals.

ST-7-2 Agency Response: ARB staff made no changes based upon the received comment. We appreciate the feedback. This ambient air monitoring provision is designed around methane, since the regulation is a methane reduction regulation. Accordingly, this comment is outside the scope of the oil and gas regulation. Nevertheless, as part of our community monitoring efforts, the ARB is also in the process of obtaining instrumentation that can monitor other gaseous compounds, including toxic air contaminants, which can be deployed for studies or in response to emergency incidents.

ST-7-4 Comment: The comment states support for using best available control technology for vapor collection systems and vapor control devices. The commenter further states that these requirements should apply to storage tanks at oil refineries.

ST-7-4 Agency Response: ARB staff made no changes based upon the received comment. We appreciate the feedback. However, the comment concerning oil refineries is outside the scope of the oil and gas regulation.

Clarification/Definition

OP-1-1 Comment: This comment asserts that the regulatory text is not clear on the method for showing compliance with certain limits that are relevant for small operators.

OP-1-1 Agency Response: This comment refers to suggested changes in comments 1-2 and 1-3. Please see those responses below, for more information.

OP-1-2 Comment: The comment recommends an amendment to section 95668(a)(2)(A) to include the volume of crude oil and produced water, as reported to and verified by the Division of Oil and Gas and Geothermal Resources (DOGGR), annually.

OP-1-2 Agency Response: ARB staff amended the regulation to clarify that the volume determination shall be based on the DOGGR reported data, in line with this comment.

OP-1-3 Comment: The comment recommends an amendment to section 95669(b)(2) for the inclusion of "average" API Gravity to be taken into account, and a definition of "average API Gravity."

OP-1-3 Agency Response: ARB staff amended the regulation to clarify that the API gravity shall be the annual average and shall be based on the DOGGR reported data, in line with this comment. The updated provision appears in the 15-day regulatory language.

OP-7-5 Comment: Part 1 of 3 - The comment points out an apparent typographical error, stating that in the first sentence of section 95668(i)(6), "is" should be "a."

OP-7-5 Agency Response: Based on stakeholder comments as well as updates to the provision since the July 2016 Board Hearing, ARB staff modified this section and released a revised version of the regulation for 15-day public comment. This typographical error was addressed or replaced with modified language in the revised regulation.

OP-7-6 Comment: The comment states that the LDAR provision listed in section 95669 duplicates the inspection requirements for underground gas storage facilities specified in section 95668(i)(1)(B) or (C).

OP-7-6 Agency Response: ARB staff made no changes to the provision based upon the above comment. The underground storage facility daily or continuous leak monitoring requirement is required for the early detection of leaks at injection/withdraw head assemblies. The quarterly LDAR inspections are required in addition to the daily or continuous monitoring requirement and are intended to cover additional equipment

located at the facility, as well as the wellheads if Method 21 is not being used as the daily leak screening approach.

OP-10-5 Comment: The comment recommends clarification for definitions to address equipment that cannot be controlled in a cost-effective manner, such as sumps.

T-29-5 Comment: This comment refers to comment OP-10-5 submitted during the 45 day comment period.

The consolidated response below addresses the above comments: OP-10-5, T-29-5

Agency Response: ARB staff made no changes related to this comment. As part of the technology review, staff evaluated sumps that have been replaced with tanks or covered and controlled with the use of a vapor collection system. This evaluation showed that controlling emissions from sumps is technically feasible and in line with cost estimates for controlling emissions from those sources.

OP-10-16 Comment: The comment is a block of text from the regulation, striking out all occurrences of “natural gas” and inserting “methane” in its place.

OP-10-16 Agency Response: ARB staff made no changes in response to this comment because “natural gas” is the correct term. The regulation is intended, among other things, to reduce natural gas leaks from covered equipment and facilities. Because natural gas contains more than just methane, it would be inappropriate to limit the definition as suggested.

OP-10-17 Comment: The comment states that ARB staff did not align the definition of a sump with the other several district, state, and perhaps federal regulations that already exist. The commenter’s preferred definition is that of the San Joaquin Valley Air Pollution Control District.

OP-10-17 Agency Response: Staff included some changes to the definition as requested but did not include the suggested term “continuous” because the exemption in section 95668(a)(2)(E) states that any sump used for more than 45 calendar days is subject to the regulation. The definition as written is necessary to adequately define a sump and define this source category.

OP-10-18 Comment: The comment recommends removal of the words “or sump” from the definition of the separator and tank system in the provision.

OP-10-18 Agency Response: ARB staff made no changes in response to this comment. The intent of the regulation is that it applies to tanks or sumps that are connected directly to a separator.

OP-10-19 Comment: The comment states that ARB's definitions of "sump" and "pond" are overlapping, requests clarifying in the text that "steam blowdown pits are not ponds", and requests that staff add a definition for "clean produced water."

OP-10-19 Agency Response: Staff modified the definition of sump partially, please refer to response OP-10-18. Staff is aware of the San Joaquin Valley Air Pollution Control District definitions of pond and clean produced water. The definition of pond as written reflects the intent of the regulation, and an exemption is provided for any ponds that operate less than 45 calendar days per year. The definition of clean produced water is not required or applicable because there is no produced water standard contained in the regulation.

OP-10-20 Comment: The comment requests that the word "continuous" be added to "vapor loss" in the pressure vessel term definition.

OP-10-20 Agency Response: Staff made this requested change for clarity. This clarification is reflected in the 15-day regulatory language.

OP-10-21 Comment: The comment recommends an update to the definition of vapor control device, replacing the word "used" with the words "with the primary purpose."

OP-10-21 Agency Response: ARB staff made no changes in response to this comment. All vapor control devices are used to control emissions under constant or intermittent conditions.

OP-10-38 Comment: The comment recommends the addition of language to the definition of the circulation tank term, which helps to describe it as "before the well is put into production."

OP-10-38 Agency Response: Based on stakeholder feedback, staff modified the definition of a circulation tank to indicate that the tanks are used prior to a well being put into production. This modification better describes when the tanks are used.

OP-10-39 Comment: The comment recommends clarifications to the language of the provision, including making the management plan available only "upon request" instead of submitting all plans to ARB for approval. Additionally, the commenter's updates eliminate the language to provide substantial evidence or a management plan for use when employing circulation tanks.

OP-10-39 Agency Response: Staff modified the regulation to specify that operators must maintain a "best management" practice and make the plan available upon the request of an inspector. This change ensures that compliance with the provision can be monitored without the need for additional reporting or agency approvals.

OP-10-74 Comment: The comment recommends adding language from the San Joaquin Valley Unified APCD rule 4409 (3.41), which defines an unmanned and a manned facility.

OP-10-74 Agency Response: Based upon the above recommendation, ARB staff made changes to clarify the requirement without creating two new definitions. This clarification is reflected in the 15-day regulatory language.

OP-10-75 Comment: The comment suggests that section 95669(e) is confusing and recommends edits to the language of the provision, to indicate an exemption for unsafe or inaccessible components. The commenter also requested to add language in this section to indicate that DOGGR inspections fulfill the AV inspection requirements of the provision.

OP-10-75 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The requirement applies to gathering lines that contain natural gas, and requires annual or more frequent audio-visual inspections of all gathering pipelines regardless of location.

OP-10-125 Comment: The comment suggests adding clarity to the definition of "flash or flashing" by including the following language: "or from a pressure vessel to an atmospheric tank."

OP-10-125 Agency Response: To include the recommended language, staff made the recommended language change, which was reflected in the 15-day regulatory package.

OP-10-126 Comment: The comment suggests adding clarity to the definition of "natural gas gathering and boosting station" by inserting "natural gas" before processing plant to specify they type of processing plant.

OP-10-126 Agency Response: Staff made the recommended language change, which was reflected in the 15-day regulatory language.

OP-10-127 Comment: The comment suggests striking "or operates" from the definition of "owner," because there is already a definition for "operator" in the regulation.

OP-10-127 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The terminology between the two definitions is applicable and consistent with the intent of the regulation, and that the term "operates" is technically accurate and applicable when defining both owners and operators. An operator can be an owner but does not have to be the owner. Therefore, it is necessary to define both of these terms.

OP-10-128 Comment: The comment suggests adding “treated and used for irrigation” to the definition of “produced water” to include examples of other uses of produced water.

OP-10-128 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The definition clearly states that produced water may be recycled, which can include water used for irrigation or a number of other purposes.

OP-10-129 Comment: The comment suggests adding “natural gas” to the definition of “separator” for clarity

OP-10-129 Agency Response: Staff made the recommended language change, which was reflected in the 15-day regulatory language.

OP-12-8 Comment: The comment suggests ARB add a detailed definition of “Optical Gas Imaging” that defines as “an instrument that employs spectral wavelength filtering and an array of infrared detectors to visualize the infrared absorption of hydrocarbons and other gaseous compounds.”

OP-12-8 Agency Response: ARB staff added a definition for Optical Gas Imaging, based on the above stakeholder comments. In addition, staff also further clarified the training requirements for using these types of instruments, which should also aid in ensuring that the proper instruments are used for performing LDAR inspections.

OP-13-30 Comment: The comment recommends titling section 95668(a) to read “Production Separator and Tank Systems” instead of just “Separator and Tank Systems” to limit the applicability of those only to production separator and tank systems that are not used in natural gas transmission and storage facilities.

OP-13-30 Agency Response: ARB staff did not make any changes to the regulation based upon the above comment. The intent of the oil and gas regulation is to reduce methane emissions at production, processing, and storage facilities as specified in section 95666. All separator and tank systems, including but5 not limited to those used in natural gas separator and tank systems facilities, are covered unless explicitly included in an exemption.

OP-13-31 Comment: The comment recommends titling section 95668(b) “Circulation Tanks for Production Well Stimulation Treatments” to add clarity to the applicability of the provision as well as ensure consistency with the definition of “well stimulation treatment” in section 95667(a)(65). The comment alternatively suggests revising the definition of “well stimulation treatment” in section 95667(a)(65) to indicate clearly, that natural gas storage wells are excluded.

OP-13-31 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The intent of the circulation tank provision is to apply to any type of well used in crude oil and natural gas production, processing, and storage. This includes underground natural gas storage facilities.

OP-17-36 Comment: The comment requests clarity and flexibility for section 95668(i)(1)(A)-(C) which requires continuous ambient air monitoring and dialy or continuous wellhead monitorning, in order to allow for adherence to two of the three requirements only, as compliance with all three criteria is not warranted.

OP-17-36 Agency Response: ARB staff made no changes to the provision based on the above recommendation. To clarify the above-mentioned provision, ARB staff proposed both ambient air monitoring, as well as daily or continuous leak monitoring at the wellheads.

OP-17-51 Comment: The comment lists 10 clarifications for definitions and other minor provisions.

Item 1: In the definition of "flash or flashing", replace the word "entrained" with "dissolved."

Item 2: The definition for "natural gas" does not further define what is meant by the term "pipeline quality natural gas."

Item 3: Recommend adding the phrase "from production fields" when describing moving gas to gathering/boosting stations.

Item 4: Recommend ensuring the terms "pressure separator" and "separator" are consistent.

Item 5: Include the words "natural and/or produced water" in the definition of the term "separator."

Item 6: Replace the word "concentration" with the words "mass flow rate" in the definition of "Vapor control efficiency."

Item 7: Urges staff to allow an exemption for compressors with the use of less than 200 hours per year.

Item 8: Include the word "stationary" as a descriptor to applicable compressors under the regulation, to harmonize with MRR.

Item 9: Requests the following exemption "Component types in streams with gas content less than 10 percent CH_4 plus CO_2 by weight" to harmonize with MRR.

Item 10: Clarify requirements by including the following phrase to section 95669(b)(7) "…during the first quarterly survey performed after their installation date."

OP-17-51 Agency Response: Item 1: Based upon the received comment, staff replaced the term “entrained” with “dissolved” because this is a more accurate term.

Item 2: ARB staff made no changes to the provision based upon the above comment. The definition of natural gas includes any gas containing a naturally occurring mixture or process derivative of hydrocarbon and non-hydrocarbon gasses. This includes any type of natural gas. The terms field quality and pipeline quality are included as examples only and are not specified elsewhere in the regulation.

Item 3: ARB staff made no changes to the provision based upon the above comment. The term production field was defined in place, and as stated with the phrase “within a facility fence line.” ARB often defines terms in place if they are only used one time in the course of the regulation or document.

Item 4: No changes made in response to this comment. Separator and Pressure Separator definitions clearly describe each vessel and are consistent in terms of describing for what each vessel is used.

Item 5: Staff made updates as requested in the above comment, that the term “or” was not necessary, and that the term “and” is sufficient to describe a separator. In some crude oil systems, separators are used to separate oil, water, and natural gas, and in some natural gas systems, separators are used to separate natural gas from produced water or condensate.

Item 6: Based upon the received comment, staff changed the term “concentration” to “mass flow rate” because mass flow rate is a more accurate description of how efficiency is calculated when using the results of testing with measurements provided in terms of mass and rate.

Item 7: Staff eliminated the term “powered” from references to reciprocating and centrifugal natural gas compressors because compressors can be powered with different sources other than natural gas, including electricity.

Item 8: ARB staff made no changes to the provision based upon the above comment. The intent of the requirements clearly state that the standards apply to compressors based upon the location, and is not intended to distinguish between portable and stationary compressors.

Item 9: Staff included new exemptions for components that contain steam or water. Staff did not include an exemption based upon methane content. This decision was based primarily upon enforceability and costs. This type of approach would require gathering a gas sample and performing a gas sample analysis during each inspection.

Item 10: This provision was modified to accommodate the testing of new components, which may be performed at startup or during the first inspection performed after installation. It is consistent with the intent of the regulation and allows greater flexibility for testing these components.

OP-17-54 Comment: Part 1 of 2 The comment states that section 95668(e)(3) and section 95669(b) should be revised to clarify that dry seals on centrifugal compressors are not subject to the LDAR requirements.

OP-17-54 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The regulation does not specify emissions testing for dry seals. The regulation clearly states that LDAR emission testing is required for all components found on the compressor but does not specify that the dry seal require testing. ARB staff will continue to monitor this provision during implementation of the regulation and will determine if future amendments to the requirements are necessary.

OP-17-74 Comment: The comment directs ARB to clarify that the requirements of sections 95668 (b) and (g) do not apply to storage wells, also clarifying applicability for section 95668 (h) for well casing vents. The reason is that ARB has not specified in the above 3 sections whether the applicability refers to production wells, storage wells, or both.

OP-17-74 Agency Response: ARB staff made no changes in response to this comment. The intent of the regulation is to control emissions from any well that is subject to a well stimulation treatment regardless of where the well is located and to measure or calculate emissions from liquids unloading and measure emissions from well casing vents regardless of where the well is located.

OP-17-76 Comment: The comment reiterates that the applicability standard for well casing vents is unclear, stating that there is no information on background documents stating whether storage wells are excluded. Additionally, the comment directs ARB to exempt the well casing vent from LDAR requirements.

OP-17-76 Agency Response: ARB staff made no changes in response to this comment. The intent of this requirement applies to all wells regardless of use or location. This provision is intended to gather information and provide direction in the case of enforcement action that may result during a routine leak inspection.

OP-19-19 Comment: The comment supports the provisions of the regulation, ARB staff's ability to work with stakeholders to increase compliance flexibility, and the provision to include daily screening or continuous monitoring for underground storage wells. Additionally, the comment requests clear guidelines to lay out criteria for approval of other screening instruments, and requests that monitoring requirements are clarified, to apply to active, idle, and capped wells alike.

OP-19-19 Agency Response: ARB staff made changes to the underground monitoring provision as part of the 15-day changes. The daily or continuous monitoring requirement at natural gas underground storage facilities is intended to check for leaks at the high-pressure injection/withdrawal wells. Although this type of screening may require specialized, sophisticated instruments or daily instrument inspections by an operator, this screening is necessary to monitor these facilities.

This pertains to the active, high-pressure wells, and is not intended to cover idle wells or observation wells, since those wells do not pose the same risk for a blowout. In addition, this provision was designed to allow owners or operators to propose different types of leak screening instruments for use in this application, including Method 21 instruments, OGI, and emerging technologies, if approved by the ARB Executive Officer. The ARB Executive Officer would mostly likely base approval on equivalency with Method 21 or OGI instruments.

OP-19-20 Comment: The comment requests clarification on the applicability of inspection, in sections 95668 and 95669.

OP-19-20 Agency Response: ARB staff made no changes to the provision based on the above recommendation. The requirements listed in sections 95668 and 95669 apply to all facilities. The intent was for both to apply to storage facilities; the provisions are correctly written.

OP-21-3 Comment: The comment suggests replacing the word “sectors” with “segments” for clarification and consistency with MRR and U.S. EPA’s Subpart W.

OP-21-3 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The term sectors is appropriate for describing the applicability of the regulation and that the term is clear and understood by most readers. Staff also notes that this regulation is different from MRR and EPA Subpart W, in that those regulations are for reporting requirements that apply broadly to large facilities, whereas this regulation provides equipment standards that apply to more facilities and equipment.

OP-21-5 Comment: The comment noted that numerous areas of the regulation mentioned facilities in section 95666, however section 95666 only listed sectors and segments, therefore a clarification on the reference of facilities in section 95666 was requested.

OP-21-5 Agency Response: In response to the comment, staff made changes to clarify that the regulation applies to facilities located in sectors specified in section 95666. This modification more accurately describes facilities and the sectors in which they are located.

OP-21-6 Comment: The comment includes a short discussion of several defined terms, with recommendations for updates and clarifications to harmonize with U.S. EPA and other ARB regulations, such as MRR. The terms that the commenter wishes to update are Component, Facility, Natural Gas Gathering and Boosting Station, Pressure Vessel, Separator, Vapor Control Device, and Vapor Control Efficiency.

B-4-6 Comment: Part 2 of 2 The comment states that the definitions of "component" and "facility" are inconsistent with what is in MRR.

The consolidated response below addresses the above comments: OP-21-6, B-4-6 part 2 of 2

Agency Response: ARB staff made no changes to the provisions based on the above recommendation. These definitions were developed independently from Subpart W and MRR. This approach was necessary to harmonize with local air district definitions, and to ensure that the definitions are clear, accurate, and enforceable. The stationary source definition was further refined in collaboration with the local air districts. Additionally, the separation and tank facilities described would be subject to the regulation standards, including the LDAR requirements. Staff has included a provision for remote facilities to ease the required testing and leak check requirements. Based on feedback received, most unmanned facilities are checked at least one time weekly.

OP-21-10 Comment: The comment recommends rearranging the sentence in the provision, to place the effective date at the end of the sentence.

OP-21-10 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. This language was phrased to keep the implementation date at the beginning of the sentence for clear and easy reference.

OP-21-14 Comment: The comment makes recommendations to clarify that ARB staff is required to approve the best management practices for circulation tanks, and the timeframe for submission and approval.

OP-21-14 Agency Response: Staff made clarifications so a best management practices plan is required to be maintained by the owner or operator and provided at the request of an inspector, but it is not required to be submitted to ARB for approval. This revision was made to reduce the burden of submitting plans to ARB and for ARB approval, which could result in production delays.

OP-21-22 Comment: The comment suggests adding "crude oil, condensate, and produced water separation and storage facilities" to section 95668(d)(3), to the types of facilities subject to those requirements, based on explanatory material in the Staff Report.

OP-21-22 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The regulation is intended to apply to onshore and offshore facilities as specified in section 95666. The requirements are not intended to apply to a smaller segment of facilities as suggested in the comment.

OP-21-24 Comment: The comment questions what is meant by the phrase “subject to” in section 95669(b)(1) and attempts to clarify the language in the provision to also exempt components not “subject to” but still complying with existing local air district LDAR programs.

OP-21-25 Comment: The comment suggests its proposed language will alleviate unnecessary overlap and redundancy.

The consolidated response below addresses the above comments: OP-21-24, OP-21-25

Agency Response: ARB staff made no changes to the provision based upon the above recommendations. In the event that components are exempted by a district, then those components are subject to the regulation standards. However, the regulation also includes exemptions for certain components, and some of the same components exempted by a district may be exempted under the regulation. If district-exempted components are voluntarily inspected by a facility, those components may already comply with the regulation, provided they are inspected and repaired as specified.

The reporting and recordkeeping requirements are designed to determine compliance and enable ARB to evaluate the effectiveness of the regulation. These requirements may result in some facilities having to report additional information not required by a local air district. However, staff made efforts to harmonize with the districts where possible and minimize the amount of information to be reported.

OP-21-26 Comment: The comment suggests deleting “stainless steel” from section 95669(b)(6), to simplify the regulatory language.

OP-21-26 Agency Response: Based upon the received comment, staff made changes to eliminate the term stainless steel. This change was made to reflect the intent of the regulation and not to require testing of any lines, regardless of material type, used in compressed air service.

OP-21-27 Comment: The comment suggests deleting the qualifier “stainless steel” from the exemption described in section 95669(b)(7) to be consistent with MRR and Subpart W and to avoid potential confusion and errors.

OP-21-27 Agency Response: ARB staff made no changes to the provision based upon the received comment. The intent of this provision is to ensure that lines used to deliver natural gas to instrumentation are checked for leaks. This provision states that these components are only required to be tested once, to ensure that the lines are sealed and not leaking, but are not required to be tested during subsequent leak inspections.

OP-21-36 Comment: The comment requests clarification regarding the definition of “facility” and “throughput” in the language of defined terms in both the regulation and all

associated reporting forms therein. This is a follow up of comments 21-1, 21-5, and 21-7.

OP-21-36 Agency Response: ARB staff made clarifications indicating that the regulation applies to facilities located in sectors specified in section 95666. Changes were also made in section 95668(a) to specify how throughput is determined and calculated.

OP-21-37 Comment: Comment requests clarification for language used on the reporting forms in the regulation, specifically “day in operation per year,” “pressure vessels,” “separators,” and “sumps” in Table A1.

OP-21-37 Agency Response: Staff made no changes to specify the calendar days per year in which a vessel is operated, because as written, the language follows the intent of the regulation. However, based on the comment received, staff did make changes to include the term “pressure separators” to better describe these vessels. Staff also made no changes to the field for sumps. Any sumps used at a facility must be listed in this category, and it is not necessary to clarify whether they are used as separators for the purpose of this reporting form.

OP-21-38 Comment: Comment requests clarification for language used on the reporting forms in the regulation, specifically “inspection date” in Table A4.

OP-21-38 Agency Response: Staff made no changes to the reporting form based upon the comment. It is acceptable to list multiple dates for a quarterly inspection period if the owner or operator chooses to do so. Alternatively, they may choose to list the initial or final inspection date.

OP-21-39 Comment: The comment requests clarification for language used on the reporting forms in the regulation, specifically “inspection date” and “instrument calibration date” in Table A5.

OP-21-39 Agency Response: Staff made no changes to the reporting form based upon the received comment. There is sufficient room on the form to list multiple dates for instrument calibrations. The owner or operator may also attach additional sheets to list all dates of calibrations. Alternatively, they may choose to list the initial or final calibration date.

OP-21-40 Comment: The comment requests clarification for language used on the reporting forms in the regulation, specifically “number of wells” in Table A6.

OP-21-40 Agency Response: Staff made no changes to the reporting form based upon the received comment. However, staff did make changes to the definition of “well” to

clarify which wells that the regulation covers. The owner or operator must list the number of wells covered by the regulation at the facility.

B-3-2 Comment: part 1 of 2 The comment requests that recordkeeping requirements for underground natural gas storage facilities should be required regardless of whether the wells are tested by performing daily inspections or monitored with the use of a continuous monitoring system.

B-3-2 Agency Response: part 1 of 2 ARB staff modified sections 95668(h)(5)(B)2.f and 95668(h)(5)(B)7 of the regulation to specify that recordkeeping is required regardless of whether daily or continuous monitoring is conducted, and that the records must be made available upon request by the ARB Executive Officer. These modifications are specific to the daily or continuous monitoring provision, and are in addition to other recordkeeping requirements for other equipment.

B-3-2 Comment: part 2 of 2 The comment requests that the compliance standards and the reporting requirements be formatted in an organized fashion.

B-3-2 Agency Response: part 2 of 2 The format of the regulation is intended to group the requirements of each provision so that owners or operators and districts can easily find all of the applicable requirements. In some cases, such as liquids unloading, ARB staff have provided several options of meeting compliance in order to provide owners or operators with flexibility. In this example, the operator uses option A, B, or C to comply, but there is an “and” to indicate that the results also need to be recorded, as specified in D. Staff believes this format is clear and understood by most readers, although staff understands the commenter’s point on improving clarity. Nevertheless, the commenter has correctly interpreted the language using the Staff Report. Staff will monitor the format of the language during implementation and determine if future modifications are necessary to provide greater clarity.

OP-2-4 Comment: The comment states that the term “steady state conditions” when referring to separators is misleading, as separators are dynamic systems, which flow continuously. According to the flash analysis test published in the regulation, operators would not be allowed to use snap-acting dump valves (standard practice) and only be able to use throttle dumps.

OP-21-42 Comment: This comment points out that “steady state” is used in Section 5.5 in the Flash Test Procedure, but is not defined.

OP-21-43 Comment: The comment makes a case that because flash analysis occurs on a pressurized separator, it rarely achieves steady-state operation, and therefore is a misnomer; instead, ARB should, perhaps, replace it with a more reasonable term that holds the same meaning.

The consolidated response below addresses the above comments: OP-2-4, OP-21-42 and OP-21-43

Agency Response: Based upon the received comment, staff removed the term “steady-state” from the test procedure. This term was not necessary because the technician is required to measure the temperature and pressure of the sample at the time of sampling.

OP-21-45 Comment: The comment states that natural gas processing plants do not always produce pipeline quality gas, but the gas produced is still suitable for use.

OP-21-45 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Not all gas processed at these facilities is pipeline quality, however the definition of “natural gas” contained in the regulation is broad and accommodates all types of field quality and processed natural gas. Therefore, it is not necessary to specify a particular type of gas quality.

OP-21-46 Comment: The comment requests clarity in the language establishing emissions standards for compressors, pointing out that the term “non-field” is undefined, and suggests adding the requirement that equipment exceeding the standard must be replaced or repaired.

OP-21-46 Agency Response: No changes were made to the regulation in response to this comment. The intent of the regulation is clear: the regulation specifies that certain testing and repair requirements apply to compressors located in production fields and that different testing and repair requirements apply to compressors located at specified facilities.

OP-21-47 Comment: The comment requests clarification for footnote 40 on Table 5 of the Staff report, which states, “Also includes remaining emission from sources controlled by districts. For example, tank measures are 95% effective so there are 5% of the original emissions remaining.”

OP-21-47 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The quoted language means that 5% of the total emissions from equipment are lost to the atmosphere, while 95% are estimated to be captured by the vapor collection system.

OP-13-32 Comment: The comment directs ARB staff to clarify the applicability of section 95668(g) to indicate that it does not apply to storage wells. Additionally, the comment asks that the definition of “liquids unloading” be revised to clearly indicate that natural gas storage wells are excluded.

OP-17-75 Comment: The comment directs ARB staff to clarify the applicability of section 95668(g) should be clarified, indicating it does not apply to storage wells, only production wells and the definition of “liquids unloading” could be revised to clearly indicate that natural gas storage wells are excluded.

The consolidated response below addresses the above comments: OP-13-32 and OP-17-75

Agency Response: ARB staff made no changes to the provision based upon the above recommendations. This requirement pertains to natural gas wells that are vented to the atmosphere to remove liquids that accumulate at the bottom of the wellbore and obstruct gas flow. The requirement pertains to all facilities in sectors specified in section 95666 and is not intended to apply only to certain sectors.

Comments Received After The 15-day Regulatory Notice

F-3-2 Comment: The comment requests a clarification for the term “petroleum waste product” to state that the term does not include direct by products of production or separator operation.

F-3-2 Response: ARB staff made no changes to the provision based on the above recommendation. The term “petroleum waste product” is referred to in section 95668(a)(2)(H) as applying to tanks used to store petroleum waste products from equipment, such as waste oils or lubricants from engines or machinery. Petroleum waste product is a a clear term and would not include direct products of production or separation as these are useful products, not wastes.

F-3-6 Comment: The comment requests clarification on the term “water flood wells” to state whether this term includes both water injection and oil production wells and if water injection wells are covered does this cover water disposal wells.

F-3-6 Agency Response: ARB staff made no changes to the provision based on the above recommendation. This new exemption to the requirements was added to clarify that wells used for injecting steam or produced water are not required to be tested per LDAR. It is not intended to apply to wells that are used for producing crude oil or natural gas from an underground reservoir. Water flooding is a commonly used industry term for water injection to stimulate production. As such, the term is clear that it would include wells used for injecting water to stimulate production but would not include water disposal wells or oil production wells.

F-3-7 Comment: The comment requests clarification on the intent of the section pertaining to the separator and tank system emissions to calculate the emissions by dividing total annual throughout of the prior calendar year by 365 days.

F-3-7 Agency Response: ARB staff made no changes to the provision based on the above recommendation. The term per day is clear and considered commonly

understood that the annual throughput can be converted to daily by dividing by 365. The source of total annual throughput data is identified in the regulation as the amount reported to DOGGR.

F-7-3 Comment: part 1 of 2 The comment suggests clarifying alarm conditions for daily or continuous wellhead monitoring and modifying the regulation to exclude local air districts that opt out of implementing the regulation.

F-7-3 Agency Response: part 1 of 2 ARB staff believes the language is clear and understood by most readers, but will provide additional written guidance if needed. The intent of the regulation is to require reporting of leaks greater than 10,000 ppmv that persist for more than five continuous calendar days, and the intent was for this provision to be the same as that which is specified under LDAR for other components. The notification within 24 hours in this case would begin after the fifth continuous day. In the event that a facility is in doubt or has questions as to the intent of this language, we advise the facility contact ARB for further clarification.

With respect to district notification in the event of an alarm condition, we belive that districts would be interested in being notified of a condition that has eben verified by the facility to be greater than four times the baseline conditions. However, we understand the nature of this comment and can make clear in MOAs if districts do not want to be notified, and we may make future modifications to the regulation to address this aspect.

F-7-3 Comment: part 2 of 2 The comment requests including a definition for DOGGR.

F-7-3 Agency Response: part 2 of 2 We agree that this term is used several times in the regulation, but we also believe it is important to spell out the agency title. This language was developed in conjunction with stakeholders that requested spelling out the agency title as opposed to using an acronym. However, staff understands the nature of this comment and will consider adding a new definition in future revisions to the regulation.

F-8-1 Comment: The comment requests that the definition for “blowout” be clarified to narrow the scope.

F-8-1 Agency Response: ARB staff made no changes to the provision based on the above recommendation. This definition has been interpreted correctly by the commenter. Although there are similarilties in the definitions of “leak” and “blowout”, there are key differences that make them distinct. ARB staff used the DOGGR definition of a blowout for consistency and to limit confusion. The term defines a blowout as an uncontrolled flow from a well onto the surface. The term leak is an unintentional release of emissions above or at the thresholds. A blowout specifically mentions a release from the well to the surface. This excludes small leaks from components on the well since those components are above ground and

are not flowing from subsurface to the surface. ARB staff does not believe the definition could be misconstrued or interpreted to mean small leaks from components. The intent of this definition is to define an incident where the owner or operator has lost control of the gas, liquids, or solids escaping the reservoir and flowing to the surface, as opposed to a leak from a component found and Staff believe the definition is appropriate and consistent with DOGGR's definition.

F-8-2 Comment: The comment requests that produced water tanks from natural gas storage wells be added explicitly tothe exemption from section 95668(a) for tank systems that produce less than 200 barrels of produced water.

F-8-2 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. This distinction is unnecessary, because exemptions for crude oil and produced water are both included, and the exemptions apply to all facilities specified in section 95666. In addition, some natural gas storage facilities produce both crude oil and produced water, so including a specific call out for those facilities could be technically inaccurate or cause confusion. In the case where a gas storage facility only produces water, then the 200 barrels per day of produced water limit applies. In the case where the facility also produces crude oil, the 50 barrels per day of crude oil limit would also apply.

F-8-3 Comment: The comment requests that ARB staff refer to Senate Bill 1281 in order to clarify how underground natural gas storage facilities report information to DOGGR for use in verifying annual production data.

F-8-3 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The provision states that annual production is determined through reports filed with DOGGR, while the comment states that gas storage facilities file quarterly reports with DOGGR. The intent of this exemption is to specify that data reported to DOGGR is used to determine compliance with the provision and staff believes it is clear that the four quarterly certified reports are equivalent to an annual certified report.

F-8-4 Comment: The comment recommends that ARB should specify that one upwind and one downwind sensor meets the standard for performing ambient methane monitoring.

F-8-4 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. During the development of this provision, staff considered the fact that each facility is laid out differently and that geographical conditions may determine how many sensors must be installed in order to adequately cover the facility. A vital part of the monitoring provision is to ensure that a sufficient number of sensors are installed to provide real-time monitoring of emissions, and to provide sufficient information that can used in the event of blowout.Staff concluded that the best approach to addressing this issue would be to consider each facility individually. Some facilities may only require one downwind

sensor while others may require additional sensors. Installing additional sensors may add to the overall cost of equipment, which staff will consider when reviewing the monitoring plans and evaluating the facilities with owners and operators directly.

F-9-23 Comment: The comment recommends adding the word “concentration” to the definition of leak, because the measurement is in ppmv (a concentration) and not scf/hr (a rate).

F-9-23 Agency Response: ARB staff made no changes to the provision, based upon the above recommendation. The term “rate” is understood in this field to correlate with the allowable leak thresholds, which are measured in terms of concentration. However, the commenter is correct that the term concentration may be a more technically accurate term to use in this context.

F-9-24 and F-9-25 Comment: The comments requests clarifying language to prevent duplicative testing of seals.

The consolidated response below addresses the above comments: F-9-24 and F-9-25

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. The regulation is intended to require testing of all components found on centrifugal compressors regardless of if they use wet seals or dry seals. However, there are no provisions in the regulation that requires testing of dry seals by way of direct measurement. Section 95669(b)(14) does specify that testing is not required for reciprocating compressor rod packings that are subject to a flow rate test method, but there was no apparent need to specify the same provision for centrifugal compressors at this time.

F-14-11 Comment: The comment recommends adding separate language for unmanned and manned facilities to clarify that manned facilities do not need to have alarms visible and audible in remote facilities.

F-14-11 Agency Response: The intent of this provision is to ensure that an owner or operator is notified of an alarm condition as quickly as possible; the language as currently written is adequate to specify the requirement. The langauge is clear that the alarm should sound in any control rooms or centers for the facility.

Corrections

OP-21-21 Comment: The commenter requests that the word “powered” in section95668(d)(2)(A) be deleted.

OP-21-21 Agency Response: Based on the submitted comment, ARB staff modified the regulation to eliminate the word "powered" because the compressors may be powered by different methods such as gasoline, diesel, or electricity.

OP-21-44 Comment: The comment points out an inconsistency—15 percent versus 13 percent—in the Staff Report: Initial Statement of Reasons (Staff Report or ISOR) regarding the percentage of statewide methane emissions from oil and gas systems.

OP-21-44 Agency Response: This was a typographical error; the correct value is 13 percent, as the commenter noted. No further updates to the Staff Report are required.

OP-21-48 Comment: The comment suggests there is a possible error in the Staff Report Summary of section 95668(a)(2)(E), and requests the words "following completion" are deleted.

OP-21-48 Agency Response: Staff agrees this was a typo in the Initial Statement of Reasons (Staff Report) but the regulatory language is correct.The Staff Report is a non-regulatory document meant to explain the technical aspects and rationale of the regulation, as well as the development and background, in plain language.

OP-21-49 Comment: The comment recommends updating the Staff Report headings to reflect an inadvertent omission of the word "compressors" in the summary/rationale section.

OP-21-49 Agency Response: ARB staff agrees with this comment, however, the Staff Report is not a living document and cannot be updated.

OP-21-50 Comment: The comment offers a minor grammatical correction to the staff report.

OP-21-50 Agency Response: ARB staff agrees with this comment, however, the Staff Report is not a living document and cannot be updated.

Comments Received After The 15-day Regulatory Notice

F-11-10 Comment: The comment pointed out a typographical error and its correction.

F-11-10 Agency Response: ARB staff agrees with this comment and made the correction in the final version of the Regulation

F-11-11 Comment: The comment states that parts of the regulation are unclear with respect to emissions controls for circulation tanks and provides suggested language to clarify this issue.

F-11-11 Agency Response: In response to this comment, ARB staff modified section 95668(b)(4) to state that a vapor collection system is required unless ARB makes a determination that the installation of such equipment is not feasible.

F-12-2 Comment: This comment is a summary of F-11-10 thru F-11-11.

F-12-2 Agency Response: ARB staff made no changes to the provision based upon the above recommendations. Please see responses F-11-10 and F-11-11.

Applicability

OP-10-73 Comment: The comment recommends that ARB exempt from the regulation all components that are fashioned to handle exclusively compressed air, potable water, or produced water (clean), as there are no emissions associated with these items.

OP-10-73 Agency Response: Based on the above recommendation, ARB staff made an allowance to exempt all components that are used to deliver compressed air to equipment, but not for other types of components, such as produced water. The change is reflected in the 15-day regulatory language.

OP-13-29 Comment: The comment states that the regulation is unclear in applicability requirements for sections 95668(a),(b),(g), and (h), and requests clarification whether these sections apply to production, transportation, or distribution for separators, tanks and wells. .

OP-13-29 Agency Response: ARB staff made no changes to the provision based on the above recommendation. The requirements apply to all oil and gas production, processing, and storage facilities as stated in section 95666.

OP-15-11 Comment: The comment recommends the removal of exemptions for low-volume facilities until California gathers more site-specific data since emissions could be higher than predicted.

OP-15-11 Agency Response: ARB performed emissions analyses that are specific to low volume systems, as well as small (low volume) gauge tanks used to measure the percentage of oil and water from a well. These analyses were based upon site-specific flash analysis data gathered from a variety of wells and is outlined in the Staff Report . The low volume exemption was clarified in the 15 day package. This change has no impact on our original emissions analysis and was made to clarify the exemption. The results of the low volume analysis show that such low volume systems will not produce enough emissions to exceed the 10 metric ton per day emission standard. The analysis for small gauge tanks, less than 100 barrels in size, based on new information documented in the 15 day regulatory package, also showed that emissions from these small tanks will not approach the emission standard. Based on the newer information,

staff included an exemption for these small gauge tanks in order to prevent the need for performing unnecessary emissions testing.

OP-20-1 Comment: The comment lends general support to ARB's goals, however is concerned that the regulation applies to very small operations.

OP-20-2 Comment: The commenter points out definitions regarding applicability of the regulation and how they appear to include CPN Pipeline Company facilities.

The consolidated response below addresses the above comments: OP-20-1, OP-20-2

Agency Response: ARB staff made no changes to the provision based upon the above recommendation. These facilities are intended to be covered under section 95666(2).

OP-20-3 Comment: The comment describes the commenters' operations, suggesting that their operations fall within the scope of section 95666(a)(2).

OP-20-3 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The regulation applies to crude oil and natural gas production, processing, and storage facilities. Therefore, the facility described in the comment falls under the processing and storage categories.

OP-20-4 Comment: The commenter states that ARB may not have intended for the separator and tank provision to apply to remote separator and tank systems and explains that the high cost and regulatory burden of compliance as something that would overshadow the potential benefits achieved through implementation.

OP-20-4 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The intent of the regulation is control emissions from crude oil and natural gas production, processing, and storage facilities. However, even though a facility is covered by the regulation it may be possible that the separator and storage tank system is exempt from flash analysis testing and vapor control requirements in the event that it processes liquids in quantities that are below the exemption levels specified in section 95668(a)(2). These systems would still be subject to LDAR as intended by the regulation. LDAR costs vary by size of facilty as smaller facilities have fewer components to monitor. Please also see response OP-20-6.

OP-21-4 Comment: The comment recommends refining the regulatory language by harmonizing with U.S. EPA's Subpart W and MRR's Subarticle 5 regarding the addition of the terms "onshore" and "offshore" to indicate the whereabouts of the affected operations.

OP-21-4 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. This section clarifies that the regulation applies to all equipment located at onshore or offshore production facilities; this language is clear as

written. Staff meant to balance language that could have been too specific, and possibly exempt unintended equipment, thereby undermining the regulation.

Comments Received After The 15-day Regulatory Notice

ST-8-2 Comment: The comment reiterates previously submitted comments emphasizing the importance of ensuring that the Regulation recognizes existing control requirements and does not unnecessarily impose duplicative requirements.

ST-8-2 Agency Response: ARB staff made no changes based upon the received comment. The regulation recognizes existing local air district emission control requirements, and includes exemptions for equipment that is already covered by local rules. These requirements were developed in direct consultation with the local air districts and stakeholders to ensure that we did not create duplicative requirements.

New Wells

OP-19-51 Comment: The comment directs ARB staff to require controls for tanks at all new wells immediately after production starts, similar to that of Colorado.

OP-19-51 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Similar to the Colorado oil and gas rule, the ARB regulation also proposes emissions controls for separator and tank systems, although the timeframes forcontrolling the systems differ. This regulation was designed around the approach of requiring owners or operators to apply for permits and install equipment on production tank systems that have been operational for longer than 90 calendar days, whereas Colorado requires vapor collection systems to be installed at startup. Staff's approach was primarily based upon a cost-effectiveness analysis and designed to ensure that permanent systems are controlled. This approach ensures emissions are controlled without unnecessary expense by allowing time for testing to determine if control requirements are appropriate.

OP-19-52 Comment: Because VOCs and methane can be emitted in the initial stages of a new well, the comment requests ARB to require initial testing of a new production well to occur within 30 days of initial production with controls in place by 60 days after initial production.

OP-19-52 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Under the requirement, emissions testing must be completed and reported to ARB within 90 days of initial startup. This timeframe was chosen because the flash analysis test procedure typically requires more than 30 days to gather samples, run laboratory analyses, and report results back to facilities. Once the facility has the results of testing, they must report results to ARB. The 90 day turnaround time to report results is reasonable in order to gather this type of emissions data.

OP-19-53 Comment: The comment directs ARB to ensure that operators use the proper annual throughput values in the test procedures section when calculating emissions for new wells.

OP-19-53 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The regulation is designed to ensure that staff receives typical average emissions from well or group of wells that are serving a single separator and tank system. This is accomplished by requiring facilities to use average annual throughput figures that are reported to the Department of Oil, Gas, and Geothermal Resources and that testing annually over three consecutive calendar years and then again once every five years after. This approach was designed to address well production anomalies that may be attributed to well stimulation or initial production characteristics.

OP-21-9 Comment: The comment recommends revised language to change the term "constructed" to "completed," to account for the fact that some wells may not be brought into production for a time after construction.

OP-21-9 Agency Response: ARB staff made no changes to the provision based upon the above recommendation; the timeline is appropriate as it is a limited exemption for temporary tank systems and thus cannot be allowed indefinitely if the tank system is above the threshold. Testing must occur if the system is in place more than 90 days.

Consolidated Comments

OP-10-53 Comment: The comment directs staff to attachment A of their letter for the full comment.

OP-10-95 Comment: This comment refers to the commenter's line by line edit changes requested to be made in the regulation text in Attachment A. Those comments are listed as comments OP-10-125 through OP-10-138.

The consolidated response below addresses the above comments: OP-10-53, OP-10-95

Agency Response: Please see responses to comments OP-10-125 through OP-10-138 for specific responses.

OP-17-2 Comment: The comment is a summary of the remainder of the document, and therefore will be addressed in detail, as they appear.

OP-18-1 Comment: The comment summarizes support of WSPA's comments submitted to ARB during this rulemaking.

OP-19-4 Comment: The comment is a summary of the many requests detailed in the remainder of the commenter's letter.

OP-21-34 Comment: This comment directs the reader to other comments regarding throughputs and flash emission calculations.

B-2-14 Comment: This comment reiterates comment B-2-6 and B-2-10.

B-4-1 Comment: The comment summarizes the issues, which the commenter considers to be outstanding and unresolved, to be addressed in detail, later in their letter.

B-10-1 Comment: The comment is a summary of the remaining comments in the letter.

The consolidated response below addresses the above comments: OP-17-2, OP-18-1, OP-19-4, OP-21-34, B-2-14, B-4-1, and B-10-1

Agency Response: ARB staff appreciates all stakeholder commentary and feedback during the public process, because it helps to refine and improve the regulation. The above-noted comments will be described further, and responded to, later in this document.

Separator and Tank Systems

Separator and Tank Systems – Applicability/Scope

OP-10-27 Comment: The comment requests that ARB staff make changes to the exempted production levels for crude oil and produced water processed in separator and tank systems. The comment also requests that condensate be considered.

OP-10-27 Agency Response: Based on the received comment, staff modified the language concerning low production systems in the 15 day package. This change has no impact on our original emissions analysis in the Staff Report (Appendix D) and was made to clarify the exemption. The results of the low volume analysis show that such low volume systems will not produce enough emissions to exceed the 10 metric ton per day emission standard. These changes are consistent with the intent of the regulation, which should not require testing of systems that will not exceed the emission standard. ARB staff also included condensate in the low throughput exemption.

OP-10-28 Comment: The comment recommends clarifying section 95668(a)(2) by adding language to specify that separator and tank systems with an API gravity of 20 or lower, are exempt from the regulation "because the amount of flash gas is insignificant."

OP-10-28 Agency Response: ARB staff made no changes in response to this comment. Based on staff's review of flash analysis data, heavy oil with API less than 20 may still contain methane, and if produced in sufficient quantity, may result in flash emissions that exceed the 10 MT CH4/Yr emission standard.

OP-10-29 Comment: The comment recommends adding language to exempt small tanks from the regulation because the estimated emissions are “expected to be insignificant.”

OP-10-29 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. This emission standard is based on flash analysis testing and throughput, with the exception of gauge tanks of 100 barrel or less capacity. The exemption for gauge tanks was added because of staff’s analysis that shows how gauge tanks see limited throughput as compared to separator and tank systems. In addition, the regulation already includes an exemption for low volume producers. Small tanks could still have emissions that exceed the standard, and testing would determine if controls are necessary.

OP-10-30 Comment: The comment requests that staff modify section 95668(a)(2) to increase the amount of time a separator and tank system can hold liquid before it was subject to the regulation.

OP-10-30 Agency Response: Based upon the above comment, staff revised the regulation to allow separator, tanks, and sumps that have not contained crude oil, condensate, or produced water up to 45 calendar days to not be subject to the regulation standards. This change is designed to allow for the use of temporary tank systems. The original 30 calendar day timeframe was extended to 45 calendar days based on stakeholder feedback, which stated that 30 calendar days was insufficient time for some systems. ARB staff determined that the additional time would result in minimal emission impacts and is still consistent with the intent of this provision.

OP-10-31 Comment: The comment suggests a change to section 956689(a)(2) to specify barrels/day instead of the current gallons/day.

OP-10-31 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. However, staff made changes to this section for clarification. This exemption applies to tanks used to store petroleum waste products and does not apply to production tanks or separators.

OP-10-32 Comment: The comment makes a suggested update for section 95668(a)(2)(D) and (E) to change language related to the temporary tank exemption to clarify that circulation tanks are not included as part of this exemption.

OP-10-32 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The current regulatory language is equivalent to that the change recommended by the commenter. The intent of the language is to ensure that exemption does not apply to any tanks used in conjunction with circulating liquids from wells subject to a well stimulation treatment. Circulation tanks are subject to the requirements specified in section 95668(b).

OP-10-94 Comment: The comment requests changes to section 95673(b)(2)(A)(3)(b), changing language from pressure vessels, tanks, separators, sumps, and ponds from the provision, and substituting in "separator and tank systems" to account for the fact that some pressure vessels may not contain methane and may not be part of the separator and tank system. .

OP-10-94 Agency Response: ARB staff made no changes to the provision in response to the above recommendation. This requirement is needed to document equipment located at facilities for monitoring and enforcement purposes and the forms in concert with the regulation provide appropriate registration of related equipment. Pressure vessel and other information are needed to ensure equipment can be located and verified to be included or not in the complaince requirements.

OP-10-130 Comment: The comment recommends an edit to section95668(a)(2)(B) to specify the deadline for separator and tank systems to be controlled with a vapor collection system.

OP-10-130 Agency Response: Based on the received comment, staff revised the regulation to specify that tank systems that are controlled for emissions as of January 1, 2018 are exempted from emissions testing and additional control requirements. This change is consistent with the intent of the regulation.

OP-14-5 Comment: The comment states a request to exempt natural gas transmission and storage facilities from storage tank and production well requirements.

OP-14-5 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The regulation was designed with the primary purpose of controlling emissions from equipment regardless of a facility's natural gas sector, and is not intended to exempt facilities based on their overall purpose.

OP-19-47 Comment: The comment requests that ARB remove the exemption for small separator and tank systems with a low annual throughput.

OP-19-47 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff performed an emissions analysis of crude oil tank systems and estimated that low throughput systems, with throughput of less than 50 barrels per day of oil, will not exceed the 10 MT/Year emission threshold that wouldrequire a vapor collection system. Staff plans to monitor flash emission data reports from all systems closely and may consider changes to the throughput exemption based on additional test data and information.

OP-20-5 Comment: The comment notes that the operator's facility does not measure condensate in gallons per day, but instead gallons per month. The comment requests the addition of language in 95668(a)(2)(F) to reflect this issue.

OP-20-5 Agency Response: ARB staff modified this provision to allow the owner or operator to average the petroleum waste product volume over the course of the calendar year. This accounts for sudden changes in volume without affecting the intent of this provision and provides greater flexibility when measuring volumes, such as measuring on a monthly basis, as pointed out in the comment. This provision does not apply to separator and tank systems used for the production of oil or condensate or produced water and the language was clarified in the 15 day package.

OP-20-6 Comment: The comment returns to the difficulty of implementing an LDAR program due to the size and remote nature of the facilities. The comment formally requests that separator and tank systems with a throughput less than 300 gallons per month of condensate and not associated with any production facility be exempt from the regulation.

OP-20-6 Agency Response: LDAR is necessary on separator and tank systems no matter the size and location. Leaks can occur at small facilities and if the facilities are remote, leaks could remain emitting without an LDAR program. Since LDAR costs are dependent on the number of components being inspected and time spent performing inspections, a facility with few components will have lower costs. For more information, please see Appendix B, page 35 and 36 of the Staff Report.

OP-21-8 Comment: The comment requests that systems that do not contain crude oil, condenstate, or produced water at the time field sampling is scheduled be exempt.

OP-21-8 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The flash analysis testing has an exemption for systems that do not contain product, so those systems are not required to conduct testing. In addition, new systems are required to be tested within 90 days of initial production.

Comments Received After The 15-day Regulatory Notice

F-14-10 Comment: The comment requests that section 95668(a)(2)(H) include the term “pipeline liquid” as a modifier of the term “waste product.”

F-14-10 Agency Response: The exemption for petroleum waste products is intended to mean waste products from equipment, such as petroleum waste products from engines or machinery. The term is clear, and could include pipeline liquid waste as the description states petroleum waste products from equipment.

Separator and Tank Systems – Flash Analysis Test

OP-10-34 Comment: The comment requests the addition of a provision exempting facilities from performing the flash analysis test to determine applicability, and instead,

simply installing vapor recovery systems on uncontrolled separator and tank systems, in conformance with the specifications of the regulation.

OP-10-34 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The intent of the provision is clear: in the event of an owner or operator choosing to install a vapor collection system prior to the effective date of the regulation, flash analysis testing is not required.

OP-10-35 Comment: The comment points out that applicability is based upon the results of one flash analysis test on the separator and tank system, recommending that to remedy this apparent weakness, operators should be allowed to perform additional flash analysis testing in a year, averaging all results.

OP-10-35 Agency Response: ARB Staff updated the regulatory language to allow for the use of an average of all flash testing provided appropriate documentation is maintained and reported.

OP-10-36 Comment: The comment details the turn-around time from the initial flash analysis test to installation of the vapor collection system – 180 days – is short, and that depending on air district workload, the process may take longer than half a year. The recommendation to alleviate this possible discrepancy is to allow 2 years from initial flash test to installation of vapor recovery system.

T-13-3 Comment: The comment states that 180 days is unrealistic, as there are multiple administrative and technical processes required in response.

The consolidated response below addresses the above comments: OP-10-36, T-13-3

Agency Response: ARB staff made no changes to the provision, based upon the above comment. According to discussions with local air districts, the district is likely to issue a permit to construct a new system within the 180-day timeframe. In addition, the owner or operator will have already received the results of flash analysis testing and will have adequate time to plan for the construction of a new system.

Separator and Tank Systems – Cost

OP-10-33 Comment: The comment requests ARB staff to revise the economic analysis with latest cost data, in order to reconsider the threshold of applicability at 100 MT CH_4.

OP-10-33 Agency Response: ARB Staff made no changes in response to this comment. ARB's Staff Report analysis showed a cost-effectiveness of \$25/MT CO_2e reduced (100 year GWO) to \$9/ MT CO_2e reduced (20 year GWP), even without savings, which are very reasonable. The cost of the largest vapor recovery systems from the 2006 EPA document are consistent with the cost of vapor recovery systems in the 2014 ICF report. Smaller systems were chosen to match the appropriate throughput according to ARB data. The gas saved is based on the estimated emission reductions

from the vapor recovery systems, and an adjustment is made to convert a volume of gas in production with a methane content of 78.8% to a volume of pipeline quality of 94.9%. A unit or operator level cost-effectiveness is not possible with the currently available data.

Separator and Tank Systems – Emission Estimates

OP-21-1 Comment: The comment recommends that average daily throughput of a separator/tank system to be used in the determination of the annual emission threshold of 10 MT CH4 per year instead of the annual throughput. The commenter believes that this is more consistent with the manner in which emissions estimates were calculated in Appendix D.

OP-21-2 Comment: The comment direct ARB staff to base throughput data on sales data when available; and when sales data is not available, data should be consistent with sales data and with crude oil and produced water production data reported to DOGGR.

The consolidated response below addresses the above comments: OP-21-1, OP-21-2

Agency Response: ARB staff made no changes to the provision based upon the above recommendations. Staff used annual throughput to calculate the annual emission estimates in Appendix D. Using actual annual throughput, as opposed to average daily throughput, will give a more accurate determination of annual emissions.

Additionally, sales data is not representative of the actual throughput that goes through the system and thus not representative of the actual emissions produced by each system. The actual measured throughput of each system represents the best data available to determine annual emissions.

Circulation Tanks for Well Stimulation Treatments

Circulation Tanks – Emissions

OP-10-41 Comment: The comment disagrees with ARB's statewide emissions estimate from circulation tanks, indicating that staff did not provide a technical basis for proposing this regulation to control emissions from a source that the commenter considers insignificant.

T-29-2 Comment: The commenter believes that ARB should not include insignificant emission sources, such as circulation tanks and gauge tanks, in the regulation.

The consolidated response below addresses the above comments: OP-10-41, T-29-2

Agency Response: ARB staff made no changes to the provision, based upon the above recommendation. As published in Chapter 5.A.2 of the Staff Report, circulation tanks are used after well stimulation treatments (WST) to remove drilling plugs and excess sand from the wellbore. In all cases, the tanks were open to the atmosphere. This allows methane to vent to the atmosphere during the circulation process. There is also

potential for other fracturing related pollutants to be vented to the atmosphere. Staff reviewed both U.S. EPA and WSPA-submitted estimates for emissions from hydraulically fractured oil wells, deciding that the WSPA data is more representative of California, and due to the limited number of tests, chose the upper limit of the range for the estimates (footnotes 46, 47 of the Staff Report). Staff used the high end of the emissions estimates from WSPA's report on emissions from well stimulation recirculation tanks, 4.32 MT CO_2e per event, based on a GWP of 72. Based on data from the DOGGR website, staff estimated there to be about 1,200 well stimulation events during a typical year, therefore total emissions are estimated to be about 5,184 MT CO_2e per year. For more information, see Appendix B, Economic Analysis, Chapter J.2., which has the detailed calculation.

A recent meta-analysis showed that 87 percent of studies on unconventional natural gas development indicated increased air emissions compared to conventional natural gas development (footnote 49 of the Staff Report). For this reason, and the potential for co-pollutants, and due to the fact that both the U.S. EPA and California industry studies show that uncontrolled emissions of methane are associated with hydraulic fractured oil and gas wells, staff is proposing emissions controls for all circulation tanks used in conjunction with WST.

Circulation Tanks – Savings/Cost

OP-10-42 Comment: The comment registers an objection to ARB staff's valuation of natural gas captured from circulation tanks, asserting that the proposed savings amount is baseless.

OP-10-42 Agency Response: The valuation from the circulation tank savings is consistent with other portions of the regulation, and represents additional product to the operator. If companies choose to complete the testing and associated gas composition analysis in section 95668(b)(2) of the regulation, there will be additional information. In addition, the overall impact of the $17,000 in natural gas savings for this provision is minimal and does not have a significant impact on the overall cost effectiveness for this measure or the overall regulation.

OP-17-43 Comment: The comment requests a source for underlying data or assumptions for well stimulation economic data.

OP-17-44 Comment: The comment states that the number of full time control systems for well stimulations should be twelve, not six.

OP-17-45 Comment: The commenter states that cost estimate for the well stimulation should be revised to take into account transportation, ancillary equipment, operating labor, travel costs, disruption of service, control systems, and management and scheduling.

OP-17-46 Comment: The cost estimate assumes an unrealistic lifespan for equipment, and does not consider pollutants from combustion equipment used to perform inspections.

OP-17-47 Comment: Part 1 of 2 - The comment states that the economic analysis does not consider labor and ancillary equipment costs associated with implementation of the well stimulation provision.

The consolidated response below addresses the above comments: OP-17-43, OP-17-44, OP-17-45, OP-17-46, and OP-17-47 Part 1 of 2

Agency Response: In California, well stimulation typically lasts less than a day, based on conversations with industry and personal experience viewing numerous well stimulation events and information listed on the DOGGR permits available publicly on the DOGGR website. As noted in the Staff Report, the lifespan and cost of the equipment was based on information from operators of gas separator equipment. All equipment was estimated to have a lifespan that exceeds 10 years. A lifespan of 10 years is consistent with the assumed lifespan of other capital equipment, such as vapor recovery systems. As discussed in the Staff Report, staff assumed $290,000 for each gas separator, $160,000 for a low NOx incinerator, plus $80,000 for installation costs (Appendix B, page 45). Additional costs were not included due to lack of data but are not anticipated to have a significant impact on the overall analysis or cost-effectiveness.

Circulation Tanks – Technology Assessment

OP-10-44 Comment: The comment states that ARB does not have a justifiable reason to propose control requirements on emissions from circulation tanks. Additionally, it states that controlling circulation tanks cannot be achieved safely or without additional emissions of criteria pollutants. The commenter recommends ARB allow the continued use of best management practices to achieve emissions reductions beyond 2020.

OP-10-54 Comment: The comment states that the testing requirements of Section 95668(b)(2) is unclear and should specify exactly who must conduct the test, how many tests must be conducted, et. cetera.

OP-10-55 Comment: The comment states that ARB has yet to identify a viable control technology that would achieve the control requirements, and that engineering and safety evaluations need to be completed on any technology considered.

OP-10-56 Comment: The comment purports that the economic impact of testing potential control technologies, which commenter estimates will cost from $25,000 to $100,000, has not been taken into account in the Economic Analysis and states that new technologies developed for circulation tanks should be researched and funded by ARB, not to burden operators.

OP-10-57 Comment: The comment states that the commenter does not believe 95 percent control is possible for circulation tanks in a safe and cost effective manner. Further, the comment directs ARB staff to conduct additional economic and environmental analysis, allowing alternative methods of compliance, including best management practices.

T-29-3 Comment: The comment requests that best management practices be allowed beyond 2020 if control technology for circulation tanks is not developed by then.

The consolidated response below addresses the above comments: OP-10-44, OP-10-54, OP-10-55, OP-10-56, OP-10-57, and T-29-3

Agency Response: After reading the comments and further stakeholder input, ARB staff chose to update the 15-day regulatory language to ensure that no compliance responses to the requirements will result in additional emissions. Section 95668(b)(2) now explains how owners/operators shall provide ARB with a report with the results of a technology assessment of equipment used to control emissions from circulation tanks. The report shall include vapor control efficiency and methane, criteria pollutant, and toxic air contaminant emissions before and after installation of equipment. After a review of the technology assessment, the ARB Executive Officer will provide a determination regarding whether the installation of vapor control equipment is possible, and therefore required.

Additionally, section 95668(b)(2) was edited to include more detail regarding the technology assessment and emissions testing to be conducted by owners/operators that conduct well stimulation treatments. Each owner/operator, individually or as part of a group of owners/operators, must conduct a technology assessment and emissions testing in at least three different production fields from wells with different characteristics. Section 95668(b)(2)(C) lists the information that needs to be included in the technology assessment report to be submitted to ARB.

ARB will review the results of the technology assessment and emissions testing and provide a determination on the installation of vapor collection and control equipment.

Comments Received After The 15-day Regulatory Notice

F-11-1 Comment: The comment recommends clarifying language in the circulation tanks provision.

F-11-2 Comment: The comment recommends clarifying the circulation tanks provision by removing apparent excess language.

F-11-3 Comment: The comment adds language to the technology assessment section that attempts to clarify requirements.

F-11-4 Comment: The comment recommends clarifying language for circulation tank vapor control technology implementation.

F-12-1 Comment: (summary of F-11-1 thru F-11-4)

The consolidated response below addresses the above comments: F-11-1, F-11-2, F-11-3, F-11-4, and F-12-1

Agency Response: The provision as currently written is clear to the reader and clearly reflects the intent of the regulation.

The purpose of the technology assessment is to evaluate equipment used to control emissions from circulation tanks in a thorough and scientific manner, with emissions test data to validate results and inclusion of safety related aspects. ARB staff are

aware of tanks that are controlled for emissions with the use of vapor collection system, and that this has been proven as a safe and reliable means of controlling of emissions. Staff are also aware that emissions from circulation tanks have already been controlled with the use of a vapor collection system in order to perform emissions testing, and that the testing did not include an emission control device to control the emissions.

Emission testing is required so that equipment manufacturers have adequate information to design and evaluate control equipment, and the same type of information is needed in order to demonstrate that the equipment controls the emissions with at least 95% control efficiency as specified in section 95668(b)(4). Once technology manufacturers are able to gain a better understanding of the system concept, along with the results of emissions testing, they will be able to provide clear and meaningful information of potential emission control equipment. ARB staff has not currently received a technology assessment report from owners or operators of circulation tanks that includes each of the provisions specified in section 95668(b)(2)(C). Staff plans to work with WSPA and technology manufacturers to develop such reports, which are due to ARB by January 1, 2019.

Staff envisions working closely with stakeholders, to evaluate the feasibility of controlling emissions in a safe and effective manner. In the event that the assessment shows that controlling emissions is not possible, or that it is not possible to do so in a safe and reliable manner, staff have included language in section 95668(b)(4) that enables ARB to make a determination that controlling emissions from circulation tanks is not possible. Please see response to OP-10-3, OP-10-43, and OP-10-45 for safety related issues.

ST-8-3 Comment: The comment reiterates previously submitted comments regarding feasible control technologies for circulation tanks. The comment states that there are no feasible control technologies currently available to meet the requirements without the use of supplemental fuel or without raising safety risks. The comment goes on to request that ARB staff revisit the Regulation to make revisions in the event that no technology is available.

ST-8-3 Agency Response: ARB staff made no changes based upon the received comment. The regulation has been modified to thoroughly list all of the components of a technology assessment that must be completed by owners or operators of circulation tanks to determine the technical feasibility of controlling emissions from these sources. The intent of this provision is to provide a thorough, technical review of all possible methods used for controlling emissions from circulation tanks, including technologies that may not require the use of a flare or incinerator. As specified in the regulation, we plan to work closely with the owners or operators during their studies, and once the technology assessment is completed, the ARB Executive Officer will make a determination on whether or not all circulation tanks should be controlled for emissions using a vapor collection system.

Circulation Tanks – Safety

OP-10-3 Comment: The Western States Petroleum Association asserts that there is not a complete understanding of circulation tank operations, with some of ARB staff's recommendations either not safe or not technologically feasible. The comment further states there is no control technology currently available, that is able to provide the efficiency that ARB requires in this regulation. Additionally, the commenter does not believe the regulation contains enough flexibility to perform hydraulic fracking or other well stimulations in the future, without advanced technology and methods, requiring its participants to spend time to research, and money to investigate them.

OP-10-43 Comment: The comment includes a table detailing the commenter's reservations about implementing the regulation, specifically installing a vapor collection system, including potential safety issues, increased criteria pollutant emissions, and contributions from extra use of diesel fuel from monitoring leaks.

OP-10-45 Comment: The comment states that the regulation proposes control measures including vapor collection systems that are unsafe.

The consolidated response below addresses the above comments: OP-10-3, OP-10-43, and OP-10-45

Agency Response: Based on stakeholder comments, staff revised the circulation tank provision. The revisions outline the requirements of a technology assessment to be performed by the owner or operator of circulation tanks. The revisions added in specific language to clarify that emission controls for the tanks are contingent upon the results of that assessment and will be determined by ARB one year before any control requirements take effect.

Fire-related safety concerns related to vapor recovery systems are noted. The claimed fire risks are associated with gathering and processing allegedly oxygen-rich vapors. It is not ARB's intent that owners or operators install equipment that may jeopardize worker safety or create an unsafe situation. Though staff has determined that the Regulation would not substantially increase fire or explosion risk, established safety measures would help ensure any such risks are less-than-significant. For example, Subchapters 14 and 15 of the California Department of Industrial Relations regulations also include petroleum safety related requirements (see California Code of Regulations, Title 8, sections 6500 et seq.). These regulations require a range of safety-related measures, including fire-fighting equipment to be available and maintained in serviceable conditions, written plans to ensure the safe and orderly evacuation of employees, safety measures for flammable waste gases and vapors, and various prohibitions on ignition sources. Changes were made to this provision in the 15 day package. For more information, please see response F-11-1 through F-12-1 and F-13-1 and SB-4-7.

Comments Received After The 15-day Regulatory Notice

F-13-1 Comment: The comment points out potential safety risks associated with the control options presented for circulation tanks.

SB-4-7 Comment: The comment states that the vapor recovery system requirements for circulation tanks are unsafe and pose a substantial fire risk. The comment urges ARB to review the requirements to make them safer for field employees.

The consolidated response below addresses comments F-13-1, SB-4-7

Agency Response: Fire-related safety concerns related to vapor recovery systems are noted. The claimed fire risks are associated with gathering and processing allegedly oxygen-rich vapors. It is not ARB's intent that owners or operators install equipment that may jeopardize worker safety or create an unsafe situation.

Section 95668(b)(2) of the Regulation explains how owners/operators shall provide the ARB with a report with the results of a technology assessment of equipment used to control emissions from circulation tanks. The report shall include vapor control efficiency and methane, criteria pollutant, and toxic air contaminant emissions before and after installation of equipment. After a review of the technology assessment, the ARB Executive Officer will provide a determination regarding whether the installation of vapor control equipment is possible, and therefore required. The purpose of the technology assessment is to evaluate equipment used to control emissions from circulation tanks, and this provision is intended to consider safety related aspects including fire or explosion risks. Staff do not believe that equipment manufacturers would recommend equipment that would create these types of claimed risks. Staff is aware that emissions from circulation tanks have been controlled with the use of a vapor collection system in order to perform emissions testing, although that testing did not include the use of an emission control device to control the emissions. Staff is also aware of other types of portable equipment, such as tanker trucks used to transport gasoline, that have been successfully designed to control emissions. Therefore, requirements for preparation and approval of the technology assessments would minimize the risk of fugitive methane emission leaks from closed vapor recovery systems; thus, there would not be a substantially greater risk of fire hazard associated with vapor recovery system requirements.

Though staff has determined that the Regulation would not substantially increase fire or explosion risk, established safety measures would help ensure any such risks are less-than-significant. For example, Subchapters 14 and 15 of the California Department of Industrial Relations regulations also include petroleum safety related requirements (see California Code of Regulations, Title 8, sections 6500 et seq.). These regulations require a range of safety-related measures, including fire-fighting equipment to be available and maintained in serviceable conditions, written plans to ensure the safe and orderly evacuation of employees, safety measures for flammable waste gases and vapors, and various prohibitions on ignition sources. Please also see responses to OP-10-3, OP-10-43, and OP-10-45.

Well Stimulation Treatments

OP-21-15 Comment: The comment recommends exempting operators from developing a best management practices plan if they perform less than 5 well stimulation treatments per year.

OP-21-15 Agency Response: ARB staff modified the regulation so that owners or operators do not need to submit a best management practices for ARB approval. In the event that they do perform a well stimulation treatement, they must maintain such a plan at the facility and demonstrate that they are following the provisions of the plan.

OP-10-58 Comment: The comment states that through conversations with ARB staff, the commenter understands that the regulation allows for best management practices beyond 2020, if appropriate, safe and compliant, but also notes that it is not clear from the regulatory language that that is staff's intent.

OP-10-59 Comment: The comment suggests updating the circulation tank language in the regulation to allow usage of BMPs beyond 2020.

The consolidated response below addresses the above comments: OP-10-58, OP-10-59

Agency Response: ARB staff made no changes to the provision based upon the above comment. The requirements states that a best management practices plan is required by January 1, 2018 and there is no language included as to when this requirement ends. Therefore, it is implied that this requirement remains in effect indefinitely.

Comments Received After The 15-day Regulatory Notice

ST-7-5 Comment: The commenters would like clarification that the Regulation is not a permit allowing oil well drilling industry to continue fracking or expand fracking.

ST-7-5 Agency Response: ARB staff made no changes based upon the received comment. The regulation contains provisions designed to limit emissions from well stimulation treatment, such as fracking. The regulation is not designed to prevent these types of activities but to reduce emissions from associated equipment.

Reciprocating Natural Gas Compressors

Reciprocating Compressors – Standards

OP-7-1 Comment: The comment makes a recommendation for a cross reference correction.

OP-7-1 Agency Response: Staff made the correction indicated in the comment. The revised language appears in the 15-day regulation.

OP-10-67 Comment: The comment makes recommendations for allowing reciprocating rod packing emissions to be estimated by using a provision specified in MRR in section 95668(d)(4).

OP-10-67 Agency Response: ARB staff made no changes in response to this comment. The intent of this provision is to require an owner or operator to measure the flow rate from a compressor rod packing in order to quantify the emissions directly. MRR allows for emission factor estimates for compressors with engines below 250 hp. Estimating the emissions may not reflect the actual emissions from the component nor may the estimate be used to verify compliance with the standards. For compressors that are measuring flow rates under MRR, ARB staff can issue guidelines clarifying if such requirements can suffice. But typically, MRR allows for reporting emissions, not flow rates, and allows for consolidation of all compressor emissions.

OP-17-52 Comment: The comment implies that ARB staff did not demonstrate that existing control technologies for reciprocating compressors are available according to the specifications outlined. Instead, the comment directs staff to revise the provision to comply with operational requirements of the compressor.

OP-17-53 Comment: The comment accurately describes the technical aspects of the low-NO_x burners evaluated by ARB staff, noting that the operator's existing thermal oxidizers use supplemental fuel, which is not allowed under the regulation. The comment goes on to describe the leak rates of certain components of reciprocating compressors and the efficiencies needed in order to utilize this technology to the letter of the regulation.

The consolidated response below addresses the above comments: OP-17-52, OP-17-53

Agency Response: ARB staff made no changes in response to this comment. The intent is not to require all compressors to be controlled for emissions using this option. Controlling emissions by meeting the flow rate standard, through replacement of rod packing or other means, is the main method of compliance. The provision to allow the use of a vapor collection system was included as one possible option to comply with the regulation. This provision was added because some facilities stated that their compressors are already controlled for emissions using this option. Per discussions with manufacturers and stakeholders during public workshops, staff designed the emission standard to allow for any rod packing that is operating within normal parameters to not require a rod packing replacement or emission controls using a vapor collection system.

ARB staff describes acceptable options for a number of control methodologies for vapor collection systems in the Vapor Collection Systems and Control Devices of Chapter V. in the Staff Report (page 94). In this tiered approach, staff attempted to add flexibility by directing operators down the list of possibilities, which they have the option of complying with the last of which is ceasing operations for components, which are out of compliance.

ARB staff also contacted a manufacturer (footnote 60 of the Staff Report) of reciprocating compressors for guidelines for replacing faulty or defective rod packing systems. Rod packing flow rates measuring above 2 scfm are considered dangerous or a rod packing failure, therefore, the 2 scfm standard for rod packing emissions from compressors used the applicable facilities was designed to correspond with the

manufacturer's recommended guidelines. For more information, see the Reciprocating Natural Gas Compressors section of Chapter V. in the Staff Report (page 96).

OP-19-44 Comment: The commenter calculates that the standard for reciprocating compressors could be 1.82 scfm instead of 2 scfm, and the net cost per ton of methane removed would be zero.

OP-19-44 Agency Response: ARB staff made no changes to the provision based upon the above comment. Manufacturers and end-user data informed the 2 scfm threshold, and was not based purely on the point when the savings would outweigh the cost. Instead, this approach is intended to prevent the need for unnecessary rod packing change-outs while still maintaining a reliable and enforceable means of monitoring emissions and replacing worn out components in a cost-effective manner.

B-1-1 Comment: The comment provides background information for comment B-1-2.

B-1-2 Comment: The commenter lists the features of their packing leak detector, indicating that this device meets the requirements of the reciprocating compressor provisions regarding leak detection.

The consolidated response below addresses the above comments: B-1-1 and B-1-2

Agency Response: ARB staff appreciates the willingness of companies to develop new technologies that work within the confines of this regulation, to the betterment of the public good.

Reciprocating Compressors – Vapor Collection System

OP-19-40 Comment: The comment suggests strengthening the provision to require vapor collection systems whenever possible, for reciprocating compressors. The comment also notes that Ohio EPA recently required that operators capture all compressor emissions with at least 98% efficiency.

OP-19-40 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The intent is to limit emissions below the specified standard. Therefore, requiring all compressors to be controlled with the use of a vapor collection system is an unnecessary cost burden. Operators have the flexibility to use a collection system or measure and repair seals found above the standard. Staff disagrees that flow rate testing is less costly and believe that flow rate testing is more complex and costly than LDAR testing and thus annual testing is appropriate.

OP-19-41 Comment: The comment suggests that staff revise the provision to measure emissions through the vent stack from annually to quarterly, which would result in minimal additional cost, as there are quarterly inspections for LDAR.

OP-19-41 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The annual measurement frequency was chosen because the flow rate measurement is more time consuming and costly to perform in comparison to a Method 21 measurement. In some cases, piping systems may need to be disassembled which can take additional time and labor costs, and those costs are in addition to the more complex flow rate measurement. Further, compressors that are subject to flow rate measurement operate with greater consistency than field compressors and that the wear and tear on those compressors is less than those located in production fields.

OP-19-46 Comment: The comment requests that ARB staff add a requirement for operators to measure direct emissions of the flow-rate for production field compressors rather than requiring repair based on concentration.

OP-19-46 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff observed a number of production field compressors as well as compressors installed in a permanent setting, also evaluating the difference between performing flow rate and Method 21 measurements. The time difference between performing these two different measurements can be considerable. Method 21 was chosen to provide consistency with existing local air district rules and to provide inspectors and operators with an effective, simplified test method used for production field compressors. Operators are required to make quarterly "emission" measurements. The commenter meant to say quarterly "flow rate" measurements.

Reciprocating Compressors – Rod Packing Replacement

OP-19-42 Comment: The comment states that ARB's chosen repair or replace threshold for rod packing seals is based upon an old standard of 2 scfm per cylinder, but the survey data shows that ARB vastly underestimates the emissions reductions that could be achieved under the requirement to repair rod packing

OP-19-43 Comment: The commenter used the data ARB published in the economic analysis and realized a net savings of over $1 per ton CO2e, assuming that repairs are made before the rod packing reaches the "poor" status.

OP-19-45 Comment: The comment recommends reducing the threshold for rod packing replacement between 0.4 to 0.5 scfm, which would balance cost-effectiveness and emissions reductions.

T-6-4 Comment: The comment states that the flow-rate threshold for replacement of rod packing or seals is too high and should be reduced to 0.4-0.5 scfm, which are cost effective and more efficient at reducing emissions.

The consolidated response below addresses the above comments: OP-19-42, OP-19-43, OP-19-45, and T-6-4

Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The ARB survey was primarily conducted to gather a count of

compressors, while the emissions analysis was developed using both manufacturer supplied and stakeholder supplied test data. The two different figures were then used in combination, to develop the emissions and cost-benefit analysis. The rod packing standard was developed using the test data, which ultimately revealed the emission reductions of the provision. The standard was based upon manufacturer recommendations of when a rod packing was considered worn out and requires replacement – not based on costs alone. This approach provides for real emission reductions without the need for early or unnecessary replacement of rod packings, which are considered by the manufacturer to be operating within normal tolerances.

Reciprocating Compressors – Small Compressor Exemption

OP-21-23 Comment: The comment asks for an exemption for reciprocating compressors smaller than 50 bhp or throughput of less than 2 mmscf per year.

OP-21-23 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. All compressors must be tested in order to demonstrate compliance with the standards. The emissions from rod packings are not based upon on the bhp size of the unit, so creating this type of exemption threshold would defeat the intent of the regulation, and could result in significant emissions from a considerable number of compressors that are less than 50 bhp. Staff included a provision for low-throughput compressors that are commonly found idle. In those cases, the compressors must be tested within 7 calendar days of resumed operation.

Centrifugal Natural Gas Compressors

Centrifugal Compressors – Standards

B-4-9 Comment: The comment states that many wet-seal compressors are unable to be switched out to dry-seals, in oil-fields.

B-4-9 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The regulation provides for several different ways to control emissions from wet seals. These include all possible ways that ARB and stakeholders considered. The option for replacing the wet seal compressor with one that uses dry seals is included as a possible option. Additionally, ARB's 2009 Oil and Gas survey combined with recent conversations with industry yielded one wet-seal compressor in the state. It is the understanding of ARB staff that the company anticipates compliance with this provision of the regulation.

Centrifugal Compressors – Cost

OP-5-6 Comment: The comment states that the cost for centrifugal compressors should use a life cycle cost calculator tool from the Fluid Seals Association.

OP-5-6 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff conducted the economic analysis according to ARB's standard approach for greenhouse gas regulations. A life cycle cost is inappropriate for this analysis. Additionally, staff learned that there is only one wet-seal centrifugal compressor in the state. Therefore, staff discussed the costs with the affected party; therefore, the cost analysis for this provision is accurate.

Natural Gas Powered Pneumatic Devices and Pumps

Pneumatics – Low Bleed

OP-4-3 Comment: The comment requests that ARB staff not exempt low-bleed pneumatics from the regulation.

OP-9-3 Comment: The comment requests ARB to reconsider the exemption of low-bleed pneumatics.

OP-16-5 Comment: The comment requests that low-bleed pneumatics devices should not be exempted from the regulation.

OP-19-21 Comment: The comment contends that the pneumatics standards in the regulation allows for excessive emissions, and requests that ARB staff tighten up the provision by prohibiting all continuous bleed pneumatic devices, as well as monitoring the leak-rate of intermittent bleed devices, and prohibiting all venting from pneumatic devices.

OP-19-22 Comment: The comment states that zero emitting pneumatics exist and have been tested as feasible and cost effective.

OP-19-23 Comment: The comment contends that larger oil and gas facilities with access to electric power could feasible utilize instrument air powered pneumatics instead of natural gas powered models, and that retrofit to instrument air is straightforward.

OP-19-24 Comment: The comment states that electric driven pneumatic controllers are feasible, and that eliminating the gas powered controllers will increase revenue because the gas is not vented. Additionally, using alternate systems means less system maintenance (as compared with wet or sour gas), which means fewer site visits.

OP-19-25 Comment: The comment lists factors that contribute to the assumptions needed for cost effectiveness and feasibility in replacing gas-driven pneumatic controllers.

OP-19-26 Comment: This portion of the comment gives further evidence that electric and instrument air systems are a cost effective—especially considering the underestimated social cost of methane emissions—and can be applied at many oil and gas facilities.

OP-19-27 Comment: Lastly, this comment details several non-pneumatic types of approach to fully eliminate the leaky controllers, including self-contained controllers, and

routing the vented emissions into an existing vapor collection system. These methods have been in use in California since at least 2007 and are technically feasible and cost effective.

OP-19-28 Comment: The comment summarizes the non-emitting technologies and points out that all of those approaches are used in California and are cost effective.

OP-19-29 Comment: The comment recommends that ARB staff remove the provision to allow low-bleed continuous bleed pneumatic devices that were in use January 1. 2016 and continue to operate, stating that if ARB allows this gas to continue to vent – despite the numerous alternative options – that ARB should place a time limit on these devices, requiring their replacement at the end of a specific time period. Additionally, the comment directs ARB to include these controllers in the quarterly LDAR inspection, ensuring that they do not leak more than they are expected to.

The consolidated response below addresses the above comments: OP-4-3, OP-9-3, OP-16-5, OP-19-21, OP-19-22, OP-19-23, OP-19-24, OP-19-25, OP-19-26, OP-19-27, OP-19-28, and OP-19-29

Agency Response: ARB staff made no changes in response to the above recommendations. Staff retained a limited exemption for low bleed continuous bleed pneumatic devices and an LDAR provision for intermittent bleed devices. As part of its comprehensive emissions analysis, ARB determined that emissions from low-bleed pneumatics are a relatively small fraction of uncontrolled emissions inventory, and that the low-bleed standard aligns with requirements put in place by U.S. EPA as part of its New Source Performance Standards. It is also consistent with the reporting treatment contained in the Mandatory Reporting Regulation that resulted in facilities replacing high bleed devices with low bleed devices. Both ARB's internal analysis of emissions and the consistency with other regulations support the use of a limited number of low bleed continuous pneumatic devices and intermittent devices.

The Staff Report contains a technical assessment, which fully explains why ARB made the choice to exempt a sub-set of low-bleed pneumatic devices from the scope of the regulation. Please find more information in the Natural Gas Powered Pneumatic Devices and Pumps section of Chapter V. in the Staff Report (page 100). Finally, the annual testing for low-bleed devices was chosen because flow rate testing is more complicated and time consuming compared to leak concentration testing conducted with Method 21.

OP-10-134 Comment: The comment offered clarifying language for pneumatic devices.

OP-10-134 Agency Response: Based on the received comment, staff revised the regulation to accommodate continuous bleed devices installed prior to January 1, 2016, provided they meet the specified criteria. Staff also made change to clarify that the provisions apply to "natural gas powered" pneumatic devices. These changes are consistent with the intent of the regulation.

Pneumatics – Intermittent Bleed

OP-19-30 Comment: The comment details the fact that the regulation does not limit emissions from intermittent bleed pneumatic devices.

OP-19-31 Comment: The comment gives further details on intermittent bleed equipment counts and emissions.

OP-19-32 Comment: The comment continues on to discuss the intermittent bleed device count numbers between the Mandatory Reporting Program in 2015 vs. the Oil and Gas 2007 Survey, noting that the MRR data was the most current, and that device counts may have increased significantly since the 2007 survey.

OP-19-33 Comment: The comment indicates that there is confusion with the way ARB staff treats intermittent-bleed pneumatic controllers, and states that the MRR is unable to differentiate between emissions from intermittent-bleed and continuous bleed controllers.

OP-19-34 Comment: The comment points out that the number of continuous bleed and intermittent bleed pneumatic devices in the state numbers into the thousands, all with commensurate uncontrolled methane emissions. The comment goes on to note that additional intermittent bleed devices may be installed in the future, and the current and additional leaking controllers will be a growing source of pollution.

OP-19-35 Comment: Along with the prior discussion, this comment discusses that the commenter's estimated emissions from properly operating intermittent-bleed pneumatic controllers can be a substantial percentage of emissions from this sector. The comment goes on to explain that these controllers can actuate very frequently, thus allowing a near steady stream of methane to be vented to the atmosphere. In a 2015 study by Allen et al, even properly functioning controllers could actuate up to 50 times in a 15-minute period, emitting up to 40 scfh of whole gas with each actuation.

OP-19-36 Comment: The comment recommends phasing-out the venting of intermittent pneumatic devices to the atmosphere, or at least set a standard for emissions that these devices cannot exceed, citing Wyoming regulations that require LDAR testing on all venting pneumatic devices. Standards that are more stringent would provide a substantial emissions reduction with a simple standard for these devices.

T-5-4 Comment: The comment urges ARB to phase out or prohibit venting from intermittent bleed controllers, which the commenter believes are a significant source of methane emissions.

The consolidated response below addresses the above comments: OP-19-30, OP-19-31, OP-19-32, OP-19-33, OP-19-34, OP-19-35, OP-19-36, and T-5-4

Agency Response: ARB staff made no changes to the provision based upon the above commentary. As part of staff's emissions analysis, staff concluded intermittent bleed devices contribute a small portion of the overall methane emissions based on available data. The devices are about 0.5% of all of the pneumatic devices in the state, and represent about 10% of the emissions from the natural gas-powered devices. The vast majority are fields, located in unassociated natural gas production where access to electricity is often unavailable. As part of implementation of the regulation, staff intends

to track these devices and associated emissions, and may recommend future modifications to the regulation.

Pneumatics – Other

OP-10-133 Comment: The comment is an edit to section95668(f)(5) to add clarity.

OP-10-133 Agency Response: Based upon the comment received, ARB staff modified the regulation to specify the implementation date as requested in the comment. This modification is consistent with the intent of the regulation and specifies the date when equipment change-outs go into effect.

OP-19-37 Comment: The commenter details the provision to require capture of all emission from natural gas driven pneumatic pumps, and suggests that the standards apply to glycol assist pumps (Kimray pumps) listed in the EPA's GHG inventory, as Kimray pumps are estimated to emit over 76,000 MT natural gas/year, nationally, while chemical injection pumps emit over 300,000 MT. The comment goes on to detail the difficulty in controlling emissions from glycol assist pumps, but suggests there are options such as electrification of the pumps, or using a lower pressure glycol separator, or control emissions from the stack. It is essential to note that VOC emission reductions on glycol-assist pumps will not reduce methane in these instances.

OP-19-38 Comment: The comment directs ARB staff to ensure all methane emissions from glycol assist pumps are properly controlled and not relying on dehydrator vent stack controls, which do not control methane to the levels defined by the regulations.

The consolidated response below addresses the above comments: OP-19-37, OP-19-38

Agency Response: ARB staff made no changes made in response to this comment. The regulation does not allow pneumatic pumps to vent natural gas to the atmosphere. This can be achieved by either capturing all of the gas with a vapor collection or replacing the pump with one that does not use natural gas to operate.

Liquids Unloading of Natural Gas Wells

OP-19-55 Comment: The comment requests updates to the language regarding pressurized natural gas in the liquids unloading section,

OP-19-56 Comment: The comment requests that ARB require operators or personnel remain onsite when liquids unloading is taking place.

The consolidated response below addresses the above comments: OP-19-55, OP-19-56

Agency Response: ARB staff made no changes to the provision based upon the above recommendations. The intent of this provision is to quantify emissions that are created

because of using natural gas from the underground reservoir to perform liquids unloading. ARB staff is not aware of other cases where other types of gases or liquids are used to perform this function. Therefore, this requirement only pertains to pressurized natural gas. Staff estimates the majority of wells that are unloaded to remove a blockage that is not a result of kill liquid used to perform well work activities, will use pressurized gas to perform the unloading. In order to better understand these activities, staff is also requesting operators specify if other equipment is installed in the gas well to determine the effectiveness of that equipment. Staff will consider inclusion of other types of liquids unloading in the future.

Additionally, requiring an operator to remain with the well at all times while it is vented is beyond the scope of this requirement, however operators will likely remain at the well site while it is manually vented, as mentioned in the comment. The purpose of this requirement is to quantify the volume of natural gas that is vented, regardless of the duration of the activity. Mitigation options may be considered in the future based on the data collected from this provision.

OP-19-57 Comment: The comment recommends ARB add reporting requirements to monitor liquids unloading emissions to possibly develop targeted standards in the future.

OP-19-57 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff included requirements that the operator report equipment installed in the well to automatically perform liquids unloading, in addition to reporting the date and volume of gas vented. This will provide sufficient information to evaluate the extent of these activities. Staff plans to monitor this provision and data closely, and may determine a need for ARB to conduct a dedicated, more thorough study of liquids unloading in the future.

OP-19-58 Comment: The comment details a number of additional requirements that they request be added to the reporting requirements for liquids unloading events.

OP-19-58 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff is looking for basic information without burdening owners or operators with additional scientific data that they may not be able to gather. Staff plans to monitor this provision and data closely, and may determine a need for ARB to conduct a dedicated, more thorough study of liquids unloading in the future.

Well Casing Vents

OP-10-68 Comment: The comment recommends using existing MRR data to quantify emissions from well casing vents. The commenter is also concerned with the lack of emissions and costs estimates of well casing vents in the economic analysis.

OP-10-68 Agency Response: ARB staff made no changes in response to this comment. The intent of this provision is to gather well-specific data, aiding staff in

designing potential requirements for well casing vents in the future. This approach is required for a different purpose than estimating emissions using broad based emission factors, which may under or overestimate actual emissions. Staff accounted for the costs of performing emission measurements in the economic analysis published in the Staff Report.

OP-13-33 Comment: This comment requests clarification for applicability of section 95668(h) to specify that the provision refers to production well casing vents only.

OP-13-33 Agency Response: ARB staff made no changes in response to this comment. The intent of this provision is to require the measurement of emissions from all well casing vents, including wells associated with natural gas storage facilities. This requirement is necessary in order to quantify emissions from these sources. ARB will evaluate the measurement data on an ongoing basis and may determine that future emission controls for well casing vents are necessary. Well casing vents are not subject to LDAR.

T-13-5 Comment: The comment states that casing vapor was a recent addition and requires more discussion.

T-13-5 Agency Response: Well casing vent measurement and reporting was in the 45-day version of the oil and gas regulation, published in July 2016 where staff initially solicitied public comment, and was subsequently updated in the 15-day version published in February 2017. The requirements will provide ARB with sufficient information to initially evaluate these components and determine if future studies are necessary.

Comments Received After The 15-day Regulatory Notice

F-11-5 Comment: The comment suggests adding the word “normally” to section 95688(g)(1) to indicate that the well casing vents ARB is seeking to control are ones normally open to the atmosphere.

F-11-5 Agency Response: The intent of the provision is to measure vents that are open to the atmosphere throughout the calendar year, or may be found in the open position by an ARB or local air district inspector during a routine inspection. Currently, ARB staff have no discernable way of determining what is considered “normal operation” with respect to a well casing vent. However, they do not consider momentarily opening a vent to perform maintenance as a vent that is considered as “open to the atmosphere.” Staff will monitor this provision throughout implementation to determine if future modifications to the language are necessary.

Idle Wells

OP-16-8 Comment: The comment states that while idle oil and gas wells can be a significant source of emissions, they are not currently included in the GHG inventories and not addressed under the regulation.

B-3-1 Comment: The comment requests clarification on whether or not wells that are not in service or "idle" are subject to the provisions in the regulation, and also states that regulating these wells will be challenging and was not considered in the cost estimates.

T-3-2 Comment: The comment states that idle wells are an issue that will require a lot of work.

The consolidated response below addresses the above comments: OP-16-8, B-3-1, and T-3-2

Agency Response: ARB staff modified the regulation to include a revised definition for "well" which was developed in consultation with DOGGR. The new definition incorporates idle wells which are considered equivalent to other types of wells covered by the regulation, and only excludes observation wells and wells that are properly abandoned. This modification ensures that wells that may contain liquid or pressurized gases are subject to LDAR, because those wells have the potential to create emissions. In addition to the definition change, staff also revised the economic analysis to account for idle wells that were not included in the previous equipment inventory. This modification was made to account for the additional LDAR costs associated with inspecting idle wells.

Natural Gas Underground Storage Facility Monitoring

Underground Storage – General

OP-17-6 Comment: The Commenter asserts that provisions related to storage monitoring in the rule did not undergo an extensive public process before submittal to the Board.

B-10-2 Comment: The Commenter asserts that provisions related to storage monitoring in the rule did not undergo as extensive a public process as did some other provisions of the regulation, and asserts that they should be excluded from the rule until further process can be conducted. Commenter notes that coordination with DOGGR is particularly important to avoid duplicative regulatory requirements. Commenter also notes that a 200-foot radius well-head monitoring requirement conflicts with draft DOGGR regulations, and should be reduced to 100 feet.

T-9-1 Comment: The comment requests additional time to "flesh out" the storage monitoring provision of the regulation.

T-9-4 Comment: The commenter would like ARB to work with industry on the storage monitoring provisions, stating that there are more than clarifications that need work.

T-11-2 Comment: The comment requests more time and discussion with staff on the storage requirements.

The consolidated response below addresses the above comments: OP-17-6, B-10-2, T-9-1, T-9-4, and T-11-2

Agency Response: Staff agrees that it is important to coordinate state regulations when feasible, and have done so here. Although the provisions were not developed as early as some other provisions, ARB staff still issued the provisions related to storage monitoring for a full 45-day comment period, and have issued modifications for a subsequent 15-day comment period. Staff has also taken numerous meetings with affected entities and other stakeholders to discuss the provisions. ARB has worked closely with DOGGR as both agencies have developed their regulatory program to avoid any potential conflicts. ARB and DOGGR have a respectful and effective working relationship and frequently collaborate – for instance to review monitoring plans for certain well stimulation treatments. Staff reviewed the rule, consulted with DOGGR, and believes the final rule does not create conflicts.

The 200 foot radius monitoring provision has been removed and replaced with other requirements, even though staff does not believe it was in conflict with DOGGR's regulation, as ARB's regulation can be more stringent.

OP-13-1 Comment: The comment suggests that ARB is acting too soon, in the face of the Aliso Canyon catastrophe, to issue monitoring requirements for underground gas storage facilities. Instead, it recommends using industry consensus standards.

OP-13-1 Agency Response: ARB staff made no changes to the provision in response to the above recommendation. ARB staff updated the natural gas underground storage facility provisions based on knowledge of the Aliso Canyon well blowout as well as requirements set forth in Senate Bill 887. These requirements included specific monitoring, record keeping, and reporting requirements for the facilities as specified in the regulation. Staff reviewed other State and federal standards pertaining to natural gas pipelines, including natural gas pipeline safety, and integrated all those aspects as much as possible. Ultimately, staff concluded that many of the industry consensus standards, on their own, did not fulfill the requirements under Senate Bill (SB) 887. For example, this provision requires continuous ambient air monitoring and optical gas imaging if a large leak occurs as required by SB 887.

OP-13-2 Comment: The comment details the potential plans for the U.S. EPA developing standards for oil and gas facilities, including underground storage facilities, in early 2017, suggesting that ARB use that rulemaking instead of its own.

OP-13-2 Agency Response: ARB staff made no changes to the provision in response to the above recommendation. There were several reasons for acting. Most importantly, as the Aliso Canyon leak made clear, and as SB 887 further underlined, there was a pressing need for environmental regulations finding and controlling methane leaks from these facilities. ARB has sufficient authority, and an obligation, to act upon its own well-researched record. Moreover, the federal rulemaking has been

conducted out of phase with this rulemaking, and now appears to be stalled. The timing of U.S. EPA's federal Information Collection Request initially made responses due very late in this regulatory process. More recently, U.S. EPA withdrew the Request. Although ARB believes federal rulemaking should continue, as a practical matter, progress appears to have slowed and a rulemaking may not emerge for some time. It is important that the state act in the interim to address these environmental risks.

OP-13-3 Comment: The comment details evidence that trade associations developed consensus standards prior to the Aliso Canyon catastrophe, and that those associations are still hoping to use those standards in lieu of the oil and gas regulation.

OP-14-6 Comment: The comment details the lengthy process by which INGAA developed the "ANSI-accredited" standards recommended by the PIPES act, and then suggests the public would be better served if ARB abandons the oil and gas methane regulation, incorporating less stringent ANSI-accredited standards.

OP-17-34 Comment: The comment summarizes some new federal efforts to develop standards for underground natural gas facilities and existing oil and gas facilities, stating that ARB rely on these initiatives instead of the storage monitoring regulation.

The consolidated response below addresses the above comments: OP-13-3, OP-14-6, and OP-17-34

Agency Response: ARB staff made no changes to the provision in response to the above recommendations. Staff reviewed all available information pertaining to gas storage, including information supplied by operators by these facilities as well as other information including best management practices. However, this regulation is based on requirements set forth in California Senate Bill 887, which includes specific monitoring requirements such as continuous ambient air monitoring and optical gas imaging in the case of a large ongoing leak. Further, as Response 13-2, incorporated here by reference, makes clear, the federal rulemakings have been slowed by the new Administration, leaving a pressing need for the state to continue to act.

OP-13-4 Comment: The comment urges ARB to make the Regulation consistent with DOGGR's Requirements for Underground Storage Projects draft regulation.

OP-13-4 Agency Response: ARB staff coordinated with the Department of Oil, Gas, and Geothermal Resources (DOGGR) and revised the natural gas underground storage monitoring requirements to work in concert with DOGGR's regulations. The provision was clarified to state that the requirements set forth by DOGGR transfer to ARB as soon as equipment is operational. This modification provides clear direction and prevents the need for facilities to report to two different agencies.

OP-13-17 Comment: The comment details changes that would be requested in the event that ARB move forward with the underground storage monitoring requirements. Specifically, the comment specifies that only one of the three items listed in section

95668(i)(1)(A)-(C) be required, instead of two of the three options, thus creating flexibility in implementation of the regulation.

OP-13-17 Agency Response: The provision has been modified for clarity but still requires monitoring for both ambient air concentrations and well head leaks. The two provisions serve two different purposes to ensure leaks at the wellhead are caught early and the ambient air will provide assurance that any other leaks are detected early and provide data on emissions, these goals are also outlined in the Staff Report on page 54. Senate Bill 887 also requires specific monitoring, record keeping, and reporting requirements for the facilities as specified in the regulation.

B-8-3 Comment: The comment supports ARB and details the potential hazards of known and unknown emissions from underground natural gas storage facilities. The comment also mentions concern over oily residue found in parks near Aliso Canyon and questions if there is an impact to groundwater.

B-8-4 Comment: The comment raises concerns about underground storage safety generally and calls into question how the public can know if an underground gas reservoir is leaking into the air or water, before it reaches the surface.

The consolidated response below addresses the above comments: B-8-3, B-8-4

Agency Response: The monitoring provision includes requirements to find leaks early and have those leaks fixed in a timely manner. Additionally, section 95668(h)(5)(A)(5) says the ambient data needs to be reported to ARB annually for publication on ARB's web-site, while section 95668(h)(5)(C) includes a provision for public posting of optical gas imaging data, which ARB can obtain upon request. Lastly, DOGGR is working on underground natural gas storage regulations, with provisions for monitoring the subsurface including well integrity.

Comments Received After The 15-day Regulatory Notice

F-9-9 Comment: The comment requests that ARB consider the cost of the monitoring plan, and suggests that the measure would not reduce emissions or prevent leaks. In addition, the comment notes that DOGGR has implemented wellhead monitoring requirements to detect wellhead leaks. The comment also requests that ARB staff harmonize underground gas storage monitoring requirements with those of SB 887, which are less prescriptive. In particular, the comment requests that the provision consider the need for upwind monitors or more than one downwind monitor.

F-9-9 Agency Response: The underground storage monitoring provision is necessarily comprehensive to ensure leaks are found early. As stated in the Staff Report, emission reductions are expected but are not quantified due to the uncertain nature of large leak events. Costs were considered as noted in the Staff report and 15 day regulatory package. Please see the 15-day regulatory package for more information on costs for this provision. Staff also believe the requirements are

consistent with SB 887 and still allow flexibility while ensuring minimum requirements are met.

The monitoring plan provision was designed to provide facilities with flexibility. Unlike other provisions that provide a high degree of specificity, staff only specified minimum standards in order to provide additional flexibility. The minimum gas concentration standard for those sensors is required to ensure that the data obtained by the system is accurate and uniform across all facilities. Staff intends to work closely with each facility owner or operator to tailor a plan that may be unique for each facility. This includes the number of downwind sensors necessary to comply with the intent of the regulation to adequately monitor the ambient air at the facility. The upwind sensor is required to indicate that a downwind alarm condition is a result of emissions occurring at the facility. This requirement was added to ensure that other sources of methane from outside of the facility boundary are accurately quantified so that the owner or operator can quickly determine if an alarm condition is a result of a condition at the facility.

F-9-10 Comment: The comment requests additional flexibility for ambient monitors, including raising the minimum measurement capability to 2 ppmv.

F-9-10 Agency Response: The minimum 250 ppb standard is required to ensure that the instruments used for performing ambient air monitoring are capable of measuring ambient concentrations of methane accurately. In particular, the 2 ppmv is the typical ambient background concentration of methane so the 250 ppb accuracy standard is required to ensure the instruments can detect to that 2 ppmv level accurately. ARB staff is aware of several instruments that can achieve this minimum equipment standard, and staff can share that information if requested.

F-9-11 Comment: The comment asks for justification regarding the leak thresholds for regulatory notification, claiming these are small leaks.

F-9-15 Comment: This comment reiterates comment F-9-11.

F-14-5 Comment: The comment recommends allowing an operator to verify the severity of a leak before requiring notification

The consolidated response below addresses the above responses: F-9-11, F-9-15, F-14-5

Agency Response: Method 21 provides a simple metric used for classifying leaks and determining compliance with standards, and is not necessarily used for quantifying emissions. Because the intent of this provision is to monitor the wellheads for the early detection of leaks including a blowout, the leak thresholds specified are appropriate, and that ARB, DOGGR, and local air district notification is the appropriate response if these standards are exceeded. The leak thresholds specified for daily or continuous monitoring and require agency notification are those which staff classify as leaks with high or medium leak concentrations. These include leaks of 50,000 ppmv or greater, or medium size leaks of 10,000 ppmv that persist

for more than 5 continuous calendar days, which denote a persistent problem that may turn in to a larger leak or potential blowout. These leak concentrations represent the maximum and high leak thresholds that are specified in the regulation which are used to denote the severity of a leak from a component. Because the intent of this provision is to monitor the wellheads for the early detection of a blowout, the leak thresholds specified for this provision are the appropriate measurement standards, and that ARB, DOGGR, and local air district notification is the appropriate response if these standards are exceeded.

F-9-14 Comment: The comment requests that ARB repeal 95668(i)(5)(B)(5) so that a well blowout is not considered a violation of the rule, incentivizing operators to avoid blowouts.

F-9-14 Agency Response: Staff declines to remove this provision, because well blow-outs are dangerous, high emission events that imperil the integrity of emissions reductions, and risk public health. It is appropriate to make clear that a well blow-out, like the Aliso Canyon catastrophe, will be appropriately penalized.

F-14-3 Comment: The comment requests that the minimum 250 ppb equipment standard be struck from the regulation language to provide greater flexibility when performing upwind and downwind air monitoring.

F-14-3 Agency Response: The minimum 250 ppb standard is a design specification for instruments that measure ambient levels of methane contained in the ambient air. This should not be confused with the leak concentrations found from component leaks, such as leaks measured with the use of Method 21. The 250 ppb equipment standards is required to ensure that the instrument is capable of measuring ambient concentrations of methane accurately, and the standard is based on ambient methane data obtained from the well incident blowout that occurred at the Aliso Canyon facility. Staff is aware of several instruments that can achieve the specified minimum standard, and ARB has several of the instruments currently operating in the field. The instruments themselves do not need to be specially designed for use at natural gas storage facility, even though they are perfectly suited for that type of application. Please also see Response F-9-10.

Underground Storage Monitoring – Standards

OP-7-5 Comment: Part 3 of 3 The comment requests the Natural Gas Underground Storage Facility Well Monitoring Requirements be modified to consider the possibility of baseline exceedance of 10 percent due to naturally occurring methane sources, such as rice fields, and not due to gas leaking from storage facilities. The commenter urges establishing a “proper baseline and exceedance” level to ensure that reportable measurements are from the storage facility and no other methane sources.

OP-7-5 Agency Response: Part 3 of 3 ARB staff has revised this provision. The baseline is now based on actual measurement data at the facility.

Comments Received After The 15-day Regulatory Notice

F-9-12 Comment: The comment requests clarification for implementation of notifications.

F-9-12 Agency Response: The language is clear as written. To use the example in the comment, a single leak occurring at a wellhead for six calendar days most likely represents a leak that has been attempted to be repaired six times but has not resulted in a successful repair. In this particular case, ARB staff would view the incident as a single leak at a wellhead that exceeds 10,000 ppmv for more than 5 consecutive calendar days and agency notification is required to ensure that all parties are aware of a potential problem at a wellhead assembly.

Underground Storage Monitoring – Technology and Cost

OP-13-5 Comment: The comment states that there are technological limitations to using OGI for continuous monitoring in the regulatory provision. Additionally, the comment states that economic costs for the provision should be considered as well.

OP-13-6 Comment: The comment states that the continuous monitoring cost estimate is based on using OGI cameras, and other technology that are not available for continuous monitoring.

OP-13-7 Comment: The comment states that the technology does not exist, to meet the requirements of the continuous well monitoring portion of the monitoring plan provision.

OP-13-10 Comment: The comment argues that variability in OGI is not suitable for continuous monitoring, baseline establishment, or measuring quantitative change, and that technological advances are needed before any method can be deployed in a cost-effective and accurate manner. For these reasons, ARB should eliminate section95668(i) from the regulation.

OP-14-3 Comment: The comment states ambient and wellhead monitoring is not yet technologically feasible.

OP-17-3 Comment: The comment recommends removing the storage facility monitoring requirements provision because there are no projected emissions reduction benefits and there is a high projected cost for monitoring.

OP-17-21 Comment: The comment states that ARB staff did not include convincing evidence that automated monitoring of underground storage areas is possible, echoing what the commenter believes is the view of the U.S. Department of Energy, that the technology to continuously monitor the areas is lacking.

OP-17-22 Comment: The comment states that OGI is not appropriate for continuous monitoring or quantifying leak rates, and in fact, there is no current technology that is appropriate for such an application.

OP-17-25 Comment: This comment is a duplicate of OP-13-10.

OP-17-26 Comment: The comment states that technological limitations dictate that continuous monitoring provision should be revised.

T-10-4 Comment: The commenter believes that the technology represented has not been proven to meet the requirements for storage monitoring.

The consolidated response below addresses the above comments: OP-13-5, OP-13-6, OP-13-7, OP-13-10, OP-14-3, OP-17-3, OP-17-21, OP-17-22, OP-17-25, OP-17-26, and T-10-4

Agency Response: ARB believes that technology is available to meet the requirements of the regulation, including both the wellhead monitoring and the continuous ambient air monitoring. As stated in the Staff Report, cameras using OGI technology or devices using ultrasonic monitors are examples of possible technology that may be used to comply with the regulation. The regulation does not prescribe specific technology, but the provision is achievable since there are multiple technologies that can be utilized in this fashion. Other technologies are anticipated to be developed further in the future and costs are likely to decrease.

Because the equipment that ARB anticipates being used to perform continuous well monitoring is expected to be largely automated, this will require a low amount of labor to function properly. The false positives suggested by commenters should not occur if the baseline is chosen properly. Changes have been made to the development of the baseline and false positives should be limited.

Although the monitoring plan for underground storage areas does not include a reduction in emissions, the object is to prevent unintentional leaks at storage facilities that can have a great amount of emissions, such as the Aliso Canyon catastrophe. It is also likely to reduce emissions as other leaks are found and repaired quicker in the course of this daily monitoring.

Staff would like to note that there are two different parts of the provisions: ambient air monitoring and well head monitoring. Commenters appear to be confusing the requirements particularly for alarm and baseline issues. The baseline is relevant only for the ambient air monitoring and the technology can accommodate that provision. Through discussions with technology manufacturers, staff identified several different types of proven well-head monitoring instruments that are immediately available and have been demonstrated at oil and gas facilities. Staff has identified fixed mounted OGI and audible monitoring systems that can be used to fulfill this requirement. These technologies are in addition to FTIR, RMLD, and other types of methane concentration measurement instruments that have the ability to be mounted at a fixed location for continuous monitoring.

Although staff identified fixed-mounted OGI and audible monitoring systems that can be used to detect leaks, a secondary instrument would be needed to quantify a methane leak once a leak has been identified. Staff discussed extensively with stakeholders and the commenter even provided a potential technology. The regulatory text was updated to clarify requirements and appears in the 15-day language.

Comments Received After The 15-day Regulatory Notice

F-8-7 Comment: The comment suggests that additional daily or continuous leak screening at the wellheads is not necessary because the facility will already be performing continuous ambient methane monitoring at the facility

F-8-7 Agency Response: The purpose of daily or continuous leak screening at each well head is required for the early detection of a well blowout, and to determine the location of a leak. The ambient air monitoring system provides less of a precise measurement, and cannot pinpoint a leak source directly. Together, these two provisions were designed to provide full coverage monitoring of the facility, and to provide data to identify the location of a leak source in conjunction with the ambient methane conditions, which may affect the local air quality conditions.

F-8-8 Comment: This comment suggests that the term "leak" is unclear, and that Method 21 measurements should only be required for measuring leaks that exceed the emissions threshold.

F-8-8 Agency Response: The definition of "leak" describes the unintentional release of emissions at a rate that exceeds the thresholds specified in the regulation. Section 95668(h)(5)(B)3 clarifies that any leak detected by a means other than Method 21 must be measured within 24 hours. Alternative types of leak detection could include those detected by audio or visual detection or leaks discovered with the use of OGI or continuous monitoring instruments. Each leak must be measured with the use of Method 21 in order to determine if the leak exceeds the minimum threshold. The intent of the daily or continuous leak screening provision is to monitor the wellheads for the possibility of a blowout. This requires monitoring the wells at least once per day in order to detect a possible malfunction as soon as possible. Monitoring once per week would defeat the intent of this provision, and could result in a malfunction that could go up to six days undetected and possibly result in a blowout.

F-9-32 Comment: The comment recommended a clarification to exempt personnel in remote locations from the requirement of a daily visit for the sole purpose of inspection (thus adding to the GHG emissions by traveling).

F-9-32 Agency Response: This comment reiterates comment 10-123. Please see response to 10-123 in the EA RTC, (https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasrtc.pdf).

F-9-33 Comment: The comment recommends clarifying language to extend the leak measurement deadline from 24 hours, to, "the end of next normal business day."

F-9-34 Comment: The comment recommends clarifying language to exempt personnel from working on a holiday or weekend in the event a leak was discovered on a Friday.

The consolidated response below addresses the above comments: F-9-33, F-9-34

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. As staff stated in a previous response. The 24 hour window provides sufficient time to perform a leak concentration measurement as demonstrated in current air district programs, and staff has included a provision that allows a delay of testing until the next normal business day for leaks discovered on weekends or holidays.

Baseline

OP-13-9 Comment: The comment asserts that establishing a baseline would require months or years of monitoring in order to understand variability and uncertainty.

OP-17-24 Comment: This comment is a duplicate of OP-13-9.

The consolidated response below addresses the above comments: OP-13-9, OP-17-24

Agency Response: After reading stakeholder comments and holding additional meetings, ARB staff opted to remove the 10% of baseline standard, replacing it with a quantity “four times the baseline” and revised the regulation to provide a facility with 12 months to determine the baseline. These changes are designed to provide sufficient time to adequately determine baseline conditions for each facility and establish a standard that will not result in false alarms. The new language appears in the 15-day regulatory language.

Comments Received After The 15-day Regulatory Notice

F-7-2 Comment: The comment requests clarification on how to determine baseline monitoring criteria and alarm conditions for underground gas storage facilities.

F-7-2 Agency Response: The regulation specifies that upwind and downwind sensors are required at each facility, and defines how alarm conditions are determined. These modifications were developed because of requirements set forth in Senate Bill 887 as well as through discussions with the ARB Monitoring and Laboratory Division and natural gas storage facility stakeholders. The regulation specifies that baseline conditions are determined by monitoring the facility for a 12 month period to determine the ambient concentrations of methane in the atmosphere through various seasons. Section 95668(h)(5)(A)7 makes it clear that the alarm condition is based upon a reading from the downwind sensor, when the sensor detects methane at concentrations at four times the baseline condition. ARB staff believes it is clear that the 12 month baseline specified in section 95668(h)(5)(A)6 is determined using the downwind concentrations. Regardless, the review and approval of monitoring plans will make this clear to facilities. The downwind sensor readings will likely include emissions that occur because of compliant operations at the facility, such as trace emissions that fall below other regulation standards. The upwind sensor is required to detect other sources of methane that are not a result of methane found at the facility in order to determine if

the alarm was triggered as result of emissions occurring at the facility or if it is a result of other surrounding sources.

F-8-6 Comment: The comment requests that ARB allow the adjustment of baseline levels to account for local conditions adjusting the trigger multiples accordingly.

F-8-6 Agency Response: ARB staff revised the facility baseline measurement provision, circulated with during the 15-day comment period. This allows each facility to collect data over the course of a full calendar year before determining the baseline emissions and alarm threshold. This approach was chosen for the reasons described in the comment. Staff understands that the local conditions may be variable, and that data may change throughout the year based on seasonal conditions. Therefore, we have also included a provision that allows each facility to request to make modifications to their baseline in the event that local conditions change over time.

F-9-42 Comment: The comment points out that the provision for baseline conditions does not take into account any time weighted averages, whether the source is inside or outside the monitored facility, and states that facilities should only report alarms that are confirmed to be from the facility and not an outside source. This comment reiterates comments OP-7-5 Part 3 of 3, F-7-2, and F-8-6.

F-9-42 Agency Response: See response to comments OP-7-5 Part 3 of 3, F-7-2, and F-8-6, above.

Economic Issues for Monitoring

OP-13-8 Comment: The comment states that the equipment needed to perform the continuous well monitoring requires much more labor than what is shown in the cost estimate.

OP-17-5 Comment: The comment states that the economic analysis underestimates the cost of implementing the provision for storage facility monitoring, adding that the technology to provide continuous monitoring is not proven.

OP-17-23 Comment: This comment is a duplicate of OP-13-8.

OP-17-33 Comment: The comment states that ARB staff did not give a full accounting of assumptions used in the economic analysis, essentially rendering them unreliable and invalid.

OP-17-42 Comment: The comment states that ARB staff underestimated the cost of implementation for underground well monitoring.

The consolidated response below addresses the above comments: OP-13-8, OP-17-5, OP-17-23, OP-17-33, and OP-17-42

Agency Response: Staff included a revised estimate for the monitoring equipment, based on feedback and conversations with both SoCalGas and the Monitoring and Laboratory Division (MLD) at ARB. Although the cost has been revised upwards, the total estimated cost is still significantly less than estimates given by some commenters. This estimate is can be found in Attachment 2 of the 15-day regulatory package

OP-17-19 Comment: The comment requests that ARB staff include flexibility in the storage well monitoring provision, to address technology capabilities. Additionally, the comment contains a request for staff to correct the assumptions in the economic analysis, as analysis indicated zero gas savings, and therefore is not justified.

OP-17-19 Agency Response: Significant changes were made in the regulation and cost analysis, after stakeholder input and feedback, and both were made available in the 15 day comment package.

OP-17-37 Comment: The comment requests that ARB allow flexibility to start with manual monitoring and add continuous monitoring in the future.

OP-17-37 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The regulation specifies continuous ambient air monitoring and either daily or continuous monitoring at the wellheads. If an operator chooses to do manual, daily wellhead monitoring, the continuous ambient monitoring still has to be done, so there can not be a transition to continuous ambient air monitoring; it has to be in place from the start. Although either one of the requirements does provide some coverage for monitoring emissions at a facility, the individual provisions by themselves do not reflect the intent of the regulation or comply with the ambient air monitoring requirements set forth in Senate Bill 887.

B-12-1 Comment: The comment details the company's new technology that could have detected multiple gases and quantified the concentration of all gases during the Aliso Canyon catastrophe in real time, noting that in the future, 24/7 monitoring is possible.

T-4-1 Comment: The comment states that optical gas imaging technology is very accessible for detecting leaks at early stages.

T-7-2 Comment: The comment repeats B-1-2, stating that their company's product is a cost effective leak detector for compressor packings and that it is capable of monitoring24 hours a day.

The consolidated response below addresses the above comments: B-12-1, T-4-1, and T-7-2

Agency Response: ARB staff appreciates the willingness of companies to develop new technologies that can identify methane emissions and work within the confines of this regulation, to the betterment of the public good.

F-9-21 Comment: The comment compares the commenter's cost estimates for continuous monitoring (ambient), with ARB's, noting differences in assumptions and results. The two main cost differences noted are that (1) ARB assumes only two total monitors for ambient monitoring and SoCal states that any additional monitors will increase costs by 50% and (2) costs do not include costs for infrastructure.

F-9-21 Agency Response: As noted in the 15 day regulatory package, the assumption of two ambient monitoring stations was arrived at through discussion with ARB's Monitoring and Laboratory Division, which operates similar ambient monitoring equipment throughout the state. Although it is possible that a facility may need to install an additional downwind sensor in order to adequately perform monitoring, we did not foresee this as a common problem for most facilities. Therefore, we did not include additional costs for additional sensors in our cost estimates. The cost estimate of these systems includes shelter, power installation, and site preparation based on ARB's Monitoring and Laboratory Division's experience installing ambient air monitors. Additionally, the ambient monitoring sites are not expected to be remote as suggested by the commenter but are expected to be on the facility property and can take advantage of existing infrastructure and can be located on sites in areas where that infrastructure is available.

F-9-22 Comment: The comment compares the commenter's cost estimates for continuous monitoring (wellhead), with ARB's, noting differences in assumptions and results. The main differences noted are that ARB underestimates the number of sites that will employ manual monitoring due to the state of technology and that continuous monitoring does not account for infrastructure costs.

F-9-22 Agency Response: Due to stakeholder feedback, ARB modified the estimate for manual inspections of wellheads relating to the monitoring plan for the portion that would require manual inspections. ARB believes this portion to be about 10% based on conversations with vendors of automated monitoring equipment for one of the scenarios. ARB disagrees about the prevalence of manual monitoring in the future, and believes that most facilities will choose to use an automated monitoring system due to factors such as cost. Development of this technology is ongoing, but ARB believes this is feasible with OGI cameras, ultrasonic monitors, well sensors or other technology that may become available. The assumption that 10% of the wells would need to be monitored manually takes into account the estimated portion where an automated system could not be implemented due to availability of power, and issues of accessibility.

Underground Storage Monitoring – Radius

OP-7-2 Comment: The comment suggests there are obstacles for underground storage facilities to attain the daily screening at a radius of 200 feet surrounding the wellhead. Those obstacles include a wildlife habitat, agricultural fields, and an irrigation canal. The comment also points out that DOGGR's Emergency Regulation requires daily

screening to a radius of 100 feet surrounding the wellhead. The comment further requests adjusting the screening frequency to weekly due to the costs and associated benefits.

OP-7-3 Comment: The comment notes that the 200 foot monitoring radius would typically extend beyond the property owned. The commenter therefore requests ARB staff reduce the monitoring requirement to 100 feet. The comment further notes that continuous monitoring technology is not cost effective.

OP-7-5 Comment: Part 2 of 3 - The comment reiterates earlier comments, recommending changing the 200 foot radius requirement to a 100 foot radius.

OP-7-7 Comment: The comment reiterates comment 7-5, parts 2 and 3, regarding the 200 foot radius and possible baseline exceedances due to naturally occurring methane sources.

OP-16-7 Comment: The comment directs ARB staff, before regulating the monitoring of underground storage wells, to identify all wells with a single-barrier and no surrounding cement, and direct them to be inspected, and be taken out of service immediately if weaknesses are discovered. Additionally, the commenter calls for safety measures to be added to underground storage wells.

The consolidated response below addresses the above comments: OP-7-2, OP-7-3, OP-7-5 (Part 2 of 3), OP-7-7, and OP-16-7

Agency Response: Based on stakeholder comments and further input, ARB staff removed the provision requiring continuous monitoring of a 200-foot radius around the facility while adding ambient air monitoring provisions. Staff believe the continuity of daily leak detection and continuous ambient air monitoring will provide the same or more stringent controls, especially in combination with downhole well monitoring requirements in DOGGR's permanent regulation.

These requirements pertain to all natural gas facilities regardless of how they were constructed. The Department of Conservation is primarily responsible for well construction standards; staff continues to work closely with them to design requirements that can be used for the early detection of leaks. The operation of storage sites and well cosntruction isgoverned by a combination of the CPUC and DOGGR and is outside of the jurisdiction of ARB. DOGGR has developed emergency regulations and is working on final regulations for underground storage wells.

Underground Storage – Monitoring Plan

OP-17-20 Comment: The comment states that the rule text is not clear on the montoring requirements and refers to detailed comments on the economic analysis outlined in comments OP-17-27 through OP-17-33. The comment also notes that there are technological issues with the continuous monitoring and outlines those in OP-17-21 through OP-17-26. .

OP-17-20 Agency Response: ARB Staff made no updates to the provision based upon the above recommendations. The regulation is clear on which monitoring is required.

Please refer to responses OP-17-21 through OP-17-33 for responses to the economic and technology comments.

OP-7-4 Comment: The comment requests additional time to comply with the monitoring provisions of the regulation, specifically, set the implementation deadline of the monitoring plan one year from the date of ARB approval. The comment notes that six months is not adequate for incorporating continuous air monitoring into their electronic (SCADA) system.

OP-19-18 Comment: The comment summarizes the monitoring provision and requestsclarification on the 24-hour limit for reporting new leaks to ARB.

The consolidated response below addresses the above comments: OP-7-4, OP-19-18

Agency Response: The implementation date for the storage provisions in the Oil and Gas regulation provides adequate time for facilities to purchase, install, and test monitoring equipment. The equipment is needed to identify leaks early and fix them before they become a larger environmental and safety and public health concern. In addition, facilities should already be conducting daily leak monitoring under DOGGR's regulations. The continuous ambient air monitoring can be implemented before it is fully integrated into the SCADA system but would still be capable of meeting the requirements outlined in the regulation.

Staff have considered all air district regulations as well as ongoing federal rulemaking. ARB believes the standards are more stringent and necessary to avoid large leaks and minimize emissions. In addition 887 requires ARB to develop standards for monitoring at underground storage facilities including both ambient air monitoring and well head monitoring.

Further, staff is aware of many types of proven continuous monitoring instruments, which are immediately available for use at facilities as demonstrated by technology manufacturers at oil and gas facilities. In the event that a facility does not wish to implement a continuous monitoring technology, staff included flexibility in the provision to use the daily inspection option. Senate Bill 887 requirements include specific monitoring, record keeping, and reporting requirements for the facilities as specified in the regulation.

The 24-hour alert provision was clarified and noticed in the 15-day regulatory language, so that ARB is required to be notified during the timeframe beginning when the leak alarm was signaled and ending 24-hours later.

OP-17-40 Comment: The comment alleges that ARB's regulation is forcing the technology and that implementation challenges extend far beyond the technology availability; the establishment of baseline and monitoring plan is more symbolic of a data-gathering research program, and staff should acknowledge these shortcomings if ARB chooses to implement the provisions as specified.

OP-17-40 Agency Response: Changes were made to clarify the storage monitoring provisions and revise the 10% change in baseline to a four times change in the 15 day package. Given the changes to the requirements, the process for establishing baseline conditions is clearer and therefore the baseline establishment is acheiveablein the time period. Additionally, it is important to monitor these facilities to ensure leaks are caught early and that agencies and the public are notified of significant leaks. The monitoring plan allows flexibility within the parameters outlined in the provision.

OP-17-41 Comment: The comment stresses the need for flexibility in monitoring and implementation, in order to ensure that the program does not implement criteria that is not well supported and unproven. The commenter requests a staged approach that leaves the development of a performance standard in an unspecified out-year.

OP-17-41 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The monitoring provision was modified to incorporate 12 months of continuous monitoring data to enable a facility to develop a site-specific emission profile. The regulation was also modified to enable a facility to apply for a request to alter their baseline monitoring conditions, which is intended to also provide additional flexibility. This allows for an appropriate performance metric and a staged approach is not necessary. It is important for agencies and the public to be informed of any significant leaks in the near term.

Comments Received After The 15-day Regulatory Notice

F-9-13 Comment: The comment requests more time to revise the monitoring plan if ARB disapproves the plan, and requests automatic approval is ARB does not respond in a specific amount of time.

F-9-13 Agency Response: ARB staff designed this requirement to ensure that each facility completes the development of an individual monitoring plan as quickly as possible. This also requires diligence on the part of staff to ensure that the monitoring plans are reviewed as quickly as possible, thus ensuring that the plans are fully approved as quickly as possible. Staff are available to work with storage providers in development of the monitoring plans to ensure the process moves as smoothly as possible.

Leak Detection and Repair

LDAR – General

OP-15-12 Comment: The comment recommends tighter leak standards and vapor control for any facility within 1500 feet of a residence, regardless of production volume or emission threshold and suggests that it would be prudent to prohibit operations near residents.

OP-15-12 Agency Response: ARB staff made no changes in response to this comment. The regulation was designed to control all oil and gas facilities regardless of location or proximity to a local residence. Each of the standards was based on the potential to emit fugitive or vented methane that can jeopardize public health or the environment. This regulation is focused on methane but Staff is dedicated to ensuring adequate protection to the public in close proximity to these sources and are working on a program to gather additional information from communities in oil and gas regions. It is the policy of ARB to review regulations periodically or when new information is presented.

OP-17-50 Comment: The comment includes two quotes from the ARB EA suggesting that the majority of all methane emissions would be controlled anyway, this oil and gas regulation notwithstanding, casting doubt on the viability of any LDAR program.

OP-17-50 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The Economic Analysis states that capital costs associated with large equipment repairs would have occurred regardless of LDAR. This statement means that some faulty equipment would be replaced regardless of LDAR. In addition, LDAR may catch the faulty equipment much earlier than without the program thus resulting in emission reductions. The LDAR provision is primarily designed to detect leaks from pipe flanges, fittings, and components. Because of this, the emissions associated with LDAR are based upon average emission factors for those components that are averaged using test results from multiple components. In order to accurately account for emissions that occur in oil and gas operations, staff also accounted for a fraction of the component population that emits methane and non-methane hydrocarbon gases in excess of the average emission factors, also referred to super-emitters. This is intended to account for components that leak at rates that exceed the average emission factors in order to provide a more accurate depiction of statewide emissions. Larger emissions does not necessarily translate to larger repairs, as noted above. The super emitter factors are for all components noted earlier including flanges, fittings, etc.

The current LDAR regulatory language reflects a combination of the best practices for oil and gas operations and feasible implementation schedules given the time necessary for districts to develop programs and issue any necessary permits and for industry to purchase and install equipment.

OP-17-54 Comment: Part 2 of 2 - The comment requests that audio-visual inspections occur once per working day, with an exception for holidays and weekends.

OP-17-54 Agency Response: Part 2 of 2 - ARB staff made no changes in response to this comment. This provision states that facilities that are monitored every day shall be inspected each day; otherwise, they must be inspected each week. The intent of this provision is to account for facilities that are not visited daily and account for weekends and holidays. For leaks that discovered, there is also an allowance that accounts for weekends and holidays specified in section 95669(f)(1).

B-10-11 Comment: The comment points out that there are multiple repair requirements including section95669(n), which requires the replacement of components that require five repair actions within a 12 month period. Based on this section and the other repair requirements, the commenter requests that the number of allowable leaks at a facility, in provision 95669(o), is stricken.

B-10-11 Agency Response: ARB staff made no changes in response to this comment. The intent of this provision to require the replacement of equipment that is clearly defective. The problem with defective equipment is that it may only remain sealed immediately after a repair and then continue to leak for the majority of the calendar year. This is commonly found when operators apply grease to a component to complete a temporary repair to an otherwise worn out or defective component. This is important but does not negate the need for a limited number of leaks at the facility as a whole at a given time. Please also see the consolidated reponse to OP-13-19, OP-13-20, OP-13-21, OP-14-4 part 2 of 5, B-10-8, B-10-9 as it refers to the allowable leak threshold.

B-11-9 Comment: The comment requests that ARB not allow exemptions for distribution pipelines not owned by the operator of a crude oil production facility, as those pipelines can be a significant source of methane emissions.

B-11-9 Agency Response: ARB staff made no changes to the provision based on the above recommendation. The exemption applies to production field owners or operators that purchase natural gas from a third party entity. In these cases, the third party entity is responsible for testing and repairing distribution pipeline components. Emissions from transmission and distribution pipelines are being addressed by the CPUC and ARB through the SB 1371 process.

Comments Received After The 15-day Regulatory Notice

F-8-9 Comment: The comment suggests that for storage facilities the LDAR provision is duplicative or redundant when considering that daily monitoring is required at the wellheads and continuous ambient air monitoring.

F-8-9 Agency Response: Each of the different monitoring provisions required for natural gas storage facilities is designed to achieve a different purpose. The ambient methane monitoring requirement is intended to provide an indicator of a large leak or blowout at the facility, and to provide air quality information to government agencies and the public. The daily or continuous wellhead leak monitoring requirement is a more narrowly focused of type of measurement, and is designed to pinpoint a blowout or large leak at the well head assemblies. The LDAR provision specified in section 95669 is intended to cover all other equipment at the facility such as separator and tank systems, natural gas compressors, and other piping systems or components. Taken together, each of these provisions are not redundant, but provide full coverage of the facilities with different intended purposes.

F-9-6 Comment: The comment requests ARB to evaluate leak data to determine if thresholds and repair timeframes should be adjusted and suggests removing the 2020 allowable leak threshold and repair time and instead include a commit for ARB to evaluate the leak data.

F-9-18 Comment: The comment refers to tables that show average leak rates by type of component for 1,000, 10,000, and 50,000 ppmv values and states that defining repair schedules based on those screening value and number of allowable leaks "do not withstand scrutiny" because the emission averages are not what the commenter considers "large".

The consolidated response below addresses the above comments: F-9-6, F-9-18

Agency Response: The LDAR requirements were based on extensive experience by California's local air pollution districts using the U.S. EPA Method 21 test method in conjunction with individual local air district standards. The minimum and maximum leak thresholds specified in the regulation are the same standards that have been successfully implemented in the South Coast, Santa Barbara, Ventura, and San Joaquin Valley Air Pollution Control Districts. Based on the extensive experience by the air districts, as well as experience from a number of oil and gas facilities located throughout California, the standards are achievable, and that they are the appropriate standards to be used in order to harmonize with the local air requirements to the maximum extent possible.

The values presented in the tables generally show order of magnitude differences between the concentration readings and average emission rates as would be expected. Added up across millions of components, these are significant leaks that need to be fixed. In addition, these factors also do not necessarily account for super emitters as there were limited samples in each binned category. Staff believe the ppmv thresholds are appropriate on a scientific basis and based on district experience.

Using EPA's "Protocol for Equipment Leaks Emission Estimates" EPA-453/R-95-017, LDAR reductions with a 10,000 ppm threshold are approximately 67% with quarterly inspection and with a 1,000 ppm threshold, reductions are 80% with quarterly inspection. These are significant reductions from defined concentration level thresholds.

F-9-35 Comment: The comment proposed to add language so that the language for inaccessible or unsafe monitoring of components is consistent with MRR reporting requirements by allowing the use of optical gas imaging in place of Method 21

F-9-35 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The inaccessible or unsafe to monitor provision was modeled after current local air district rules and is considered common industry practice. The feedback staff received from districts and industry was that annual inspections provide the owner or operator with adequate time to schedule the components to be taken out for service in order to avoid a safety hazard. The use of Optical Gas Imaging is not considered appropriate for determining compliance with

the regulation due to its lack of ability to quantify emissions, which is necessary to determine compliance with the LDAR standards.

F-9-37 Comment: The comment suggests language to delay repairs in the event that a blowdown is necessary and potential conflicts this may create with a CPUC requirement to bundle work wherever possible to prevent multiple blowdowns and potentially significant GHG emissions from venting.

F-9-37 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Aside from the delay of repair provisions added to the regulation, instances of repairs that could result in a need to blow down equipment or piping systems should be avoided. In almost all cases where safety would be a concern, the delay of repair provisions and critical component provisions should allow for work to be delayed and bundled. In any rare cases where this is not the case, the components could be documented and scheduled for later repairs by way of enforcement discretion. Each incident will be evaluated on a case-by-case basis. Staff plans to monitor this provision closely throughout implementation of the regulation, and may determine future modifications are needed to address this issue.

F-11-6 Comment: The comment recommends clarifying language for section 95669(b)(2) to indicate that the components for which this is applicable are used exclusively for crude oil production, instead of all crude oil operations.

F-11-6 Agency Response: ARB staff made no changes to the provision in response to the above feedback. The language is understood to apply to crude oil production components. The term “component,” includes components used in conjunction with production.

F-11-7 Comment: The comment recommends excluding pipes from the quarterly Method 21 inspections.

F-11-7 Agency Response: Method 21 can be used to measure leaks from any point source, including cracks or a break in pipes, by placing the probe directly on the leak source. This term and the test method are necessary to quantify emissions from cracks in pipes that may be found during a routine inspection. Although staff does not expect owners or operators to routinely measure all pipes at their facility using Method 21, the test method and the reference to “pipes” must be available because leaks in pipes may be discovered by sight, smell, or sound, or may be located with the use of an OGI instrument.

F-11-8 Comment: The comment recommends that ARB codify the intent to periodically review emerging LDAR technologies.

F-11-8 Agency Response: ARB staff intends to continue to evaluate all types of emerging technologies that are equivalent to US EPA Reference Method 21. As stated in the comment, staff already included a provision that allows the use OGI instruments in order to provide owners or operators with flexibility and to further evaluate the use of an alternative technology. The regulation serves as a document for specifying the technologies that are approved for use at the current time. The regulation is not intended to specify tasks or emerging technologies that ARB may conduct in the future. As ARB evaluates and possibly approves other equivalent Method 21 technologies, staff may add those technologies into future versions of the regulation.

F-11-9 Comment: The comment recommends for ARB staff to review leak data reported under the LDAR program, further requesting that staff evaluate the potential for a step-down to annual provision in the future.

F-11-9 Agency Response: ARB staff made no changes in response to this comment. Staff understands the nature of this comment, are committed to monitoring the quarterly inspection requirement, and may determine that future modifications are necessary. Staff plans to accomplish this by reviewing LDAR submitted to ARB as part of annual reporting and evaluating feedback from inspectors and facility operators. Staff plans to monitor this aspect closely throughout implementation of the regulation and will determine if future modifications are justified and necessary.

F-12-3 Comment: This comment was a summary of F-11-6 thru F-11-9.

F-12-3 Agency Response: Please see responses to F-11-6, F-11-7, F-11-8, and F-11-9, above.

LDAR – Leak Threshold

OP-10-70 Comment: The comment recommends an exemption for components with low methane concentrations not expected to exceed the leak thresholds due to low concentrations of methane.

OP-10-70 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff already included language that makes allowances for components with a low potential to emit methane within the regulation exemptions section. In some cases, it may be possible for small leaks with low concentrations of methane to emit small quantities of methane emissions. However, large leaks from these same components are possible, and may result in significant emissions. Additionally, to implement the exemption detailed in comments, regular gas analysis testing would be required as gas stream compositions can change, resulting in additional testing and compliance verification.

OP-17-9 Comment: Part 2 of 2 The comment encourages ARB to adopt a leak definition of 10,000 ppmv since most emissions may result from components with screening values greater than 10,000 ppmv and that the small additional increment is not worth lowering the limit to 1,000 ppmv.

OP-17-67 Comment: The comment states that biases exist in Method 21 concentration measurements for different component types, and therefore, a single Method 21 concentration leak threshold should not apply for all component types. Other concerns include that over 98 percent of gas leak mass emissions are from leaks from components with Method 21 screening values equal to or greater than 10,000 ppmv.

OP-17-68 Comment: The comment states that the vast majority of oil and gas leak emissions are from components with Method 21 screening values greater than or equal to 10,000 ppmv, and that there would be incremental emission reductions associated with a lower screen value leak definition, e.g., 1,000 ppmv.

OP-17-69 Comment: The cost effectiveness of reductions from 1,000 ppmv and 10,000 ppmv should be broken out to compare the relative effectiveness of the two leak threshold values.

OP-10-78 Comment: The comment requests ARB staff to provide the amount of leaks over 50,000 ppmv that contribute to the annual emissions estimate provided in Tables 1 and 3 in section 95669 of the regulation.

The consolidated response below addresses the above comments: OP-17-9 Part 2 of 2, OP-17-67, OP-17-68, OP-17-69, and OP-10-78

Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff based the emission estimate on leaks above 10,000 ppm and below 10,000 ppm. Of the leaks above 10,000, it is assumed that some may be over 50,000 or more. Overall, leaks over 10,000 are estimated to represent about 3% of the total leaks, but are responsible for the majority of emissions based on the emission methodology.

Although most emissions may come from larger ppm values, the expense for this provisions is really for implementing the leak detection not repairing leaks. Once leaks have been detected, the repair is generally straightforward and would be simple tightening, adjustment, lubrication, or other repairs or the repair would have occurred anyway though potentially at a later time (EDF). Thus, the lower threshold does not add cost but does add emission reductions. In addition, this threshold is consistent with many district programs so programs are more compatible.

The values provided by WSPA are not appropriate because they are for areas with an already implemented LDAR program.

The audio/visual inspection is in California's local air districts and is well established. Inspections that are more stringent are necessary to implement an effective leak prevention program, reducing emissions from all types of facilities. Emissions from these components may occur from the effects of weathering when bolts may naturally loosen or when components wear out. Therefore, these requirements are necessary to eliminate methane emissions from components such as valves, flanges, and fittings.

Two different minimum leak threshold standards are required under this regulation: beginning January 1, 2018, the minimum leak threshold is 10,000 ppmv and beginning January 1, 2020, the minimum leak threshold is 1,000 ppmv. The minimum leak threshold reduction between the 2018 and 2020 calendar years are intended to provide owners or operators with time to repair any large leaks found at their facilities. The 10,000 ppmv minimum leak threshold is higher than similar leak thresholds used by local air districts in major oil and gas producing regions. The lower leak threshold, 1,000 ppmv, resembles leak thresholds currently used by local air districts. US EPA used a 500ppm threshold in their most recent NSPS OOOOa, which applies only to pressure relief devices in gas/vapor service and closed vent systems, control devices, valves, and connectors in gas/vapor and in light liquid service.

OP-10-79 Comment: The comment implies that full implementation of the regulation may not guarantee that there will be no leaks over 50,000 ppmv after 2020, and that the provision is unreasonable and unrealistic.

OP-10-135 Comment: The comment is a strikeout of section 95669(o)(4), which states that after January 1st 2020, no leak shall exceed a concentration level greater than or equal to 50,000 ppmv.

B-10-10 Comment: The comment states that the highest concentration measurement does not necessarily correlate to a high emission leak, and requests that ARB staff remove the provision that leaks of 50,000 ppmv or greater are in violation.

The consolidated response below addresses the above comments: OP-10-79, OP-10-135 and B-10-10

Agency Response: ARB staff made no changes in response to this comment. This language is consistent with the intent of the regulation and is designed to ensure that large leaks that exceed the specification are avoided. The presence of a leak measured at a concentration above 50,000 ppm is an indication of a major leak. This threshold is identical to that used by local air districts at oil and gas facilities and has served as a reliable indicator of major leaks. The local air districts have reported that this provision is an essential part of a LDAR program that helps ensure the programs are implemented as intended. A 50,000 ppm leak is also a safety concern in some instances. Volumetric measurement provides additional information to quantify the volume of the gas that is leaking, but this information is not necessary to define a leak that presents a major source of emissions.

OP-15-2 Comment: The comment recommends tightening the leak standards to that of the Bay Area Air Quality management District (BAAQMD), for pumps, compressors, pressure relief devices and other leaking components, and to reduce the repair time to 7 days.

OP-15-3 Comment: The comment states that the applicable oil and gas facilities should be readily able to meet the leak standards, since oil refineries within the BAAQMD—which are more complex, process the same chemicals, and have more valves, connectors, and seals—must meet more stringent standards.

OP-15-4 Comment: The comment acknowledges that ARB staff explains the justification for the choice of leak standards, but still urges staff to tighten it.

OP-15-5 Comment: The comment summarizes an extensive recommendation for a stricter leak standard, citing BAAQMD's rule as a guideline.

The consolidated response below addresses the above comments: OP-15-2, OP-15-3, OP-15-4, and OP-15-5

Agency Response: ARB staff made no changes to the provision based upon the above recommendations. Staff considered a number of different emission thresholds when designing the LDAR provision. The 1,000 ppmv threshold is considered by ARB and most local air districts to be sufficiently stringent to ensure that components are maintained in a leak-free or near leak-free status. By reducing the threshold lower to 100 or 500 pmmv threshold, staff did not see a significant increase in emission benefits as part of the analysis. However, the burden of testing was reported by districts and stakeholders to be much greater at the lower threshold values, which could have resulted in greater costs.

Comments Received After The 15-day Regulatory Notice

F-4-3 Comment: The comment provides data that supports the claim that ARB's minimum leak thresholds are effective in reducing the size and number of leaks.

F-4-3 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Staff appreciates the feedback throughout the regulatory development process.

F-9-4 Comment: The comment requests that the LDAR provision take a moment to consider the limitations of Method 21, and adopt a leak definition with the concentration measurement of 10,000 ppmv. The commenter states that a 10,000ppmv standard would result in emission reductions commensurate with ARB's estimates since most leaks are above 10,000 ppmv and that many concentration measurements have minimum leak detections of 4,000 ppm and are unreliable.

F-9-4 Agency Response: The LDAR requirements are based on extensive experience obtained by California's local air pollution districts using the U.S. EPA Method 21 test method in conjunction with individual local air district standards. This provided ARB with a wealth of information that ARB used to design the LDAR provision. ARB's approach to LDAR is to harmonize with the existing policies implemented by the local air districts as much as possible, and to follow a provision that is clear, accurate, and verifiable by districts as well as individual owners or operators. As staff explained throughout the public workshop process, Method 21 provides a simple metric used to quantify and classify leaks, and is not necessarily intended to be used for quantifying emissions. There are several instruments available for performing Method 21 measurements, and some instruments can measure lower leak concentrations than others. Staff is aware of several instruments that can reliably measure the 1,000 ppmv leak threshold accurately, and

staff can provide a list of instrument manufacturers. Please also see responses to comment F-9-6 and F-9-18 for more information on effectiveness of thresholds.

F-9-5 Comment: The comment recommends ARB staff change to a leak concentration threshold of 10,000 ppm and that 50,000 ppmv is not a very large leak.

F-9-17 Comment: The comment recommends a leak concentration threshold of 10,000 ppm.

The consolidated response below addresses the above comments: F-9-5, F-9-17

Agency Response: The ARB test report added to the rulemaking materials was performed with the purposes of comparing Method 21 instruments and to develop a correlation equation model. This instrument evaluation provided ARB with data about several types of instruments that can be used to perform Method 21 as specified in the regulation. The measurement portion of study was designed to measure a set of predetermined components, which were decided upon prior to beginning the field work. The field testing was not a random sample of components, nor did it account for the number of leaks discovered at each facility. Therefore, the data does not represent emission factors from all components found in the oil and gas sector. As staff explained throughout the workshop process, Method 21 provides a metric used for classifying leaks and determining compliance with standards, and is not necessarily used for quantifying emissions. While staff agree that a leak with a low concentration may result in fewer emissions than a leak with a large concentration, the purpose of LDAR is to provide a set of uniform standards and repair timeframes for maintaining components at a facility. The intent of the LDAR provision is to harmonize with the standards adopted by the local air districts as much as possible, and to utilize the same US EPA Method 21 test method that provides for accurate and reliable data that can be verified by districts as well as individual owners or operators. Please also see consolidated reponse to OP 10-135 et al.

F-3-4 Comment: The comment requests clarification to state that leaks repaired within the timeframes do not constitute a violation. In addition, CIPA requests clarification that the reference to the 4th quarter of each calendar year only pertains to number of leaks discovered.

F-8-10 Comment: This comment is concerned with leaks discovered during the 4th quarter inspection period being automatically considered a violation of the provision, and that leaks discovered during other periods are not considered automatic violations.

F-9-3 Comment: Commenter argues that it is ARB's intent, as described in the 15-day notice, to "provide operators with the ability to find and repair leaks throughout the calendar year without a penalty which is consistent with the intent of the regulation." Commenter argues, however, that Section 95669(o)(5) "undercuts" this intention by, according to commenter, making leaks found in the 4th quarter of each calendar year during an operator inspection violations of the regulation.

F-14-1 Comment: The comment states that thresholds should not be set on a concentration basis and refers to an ARB contractor study. This comment suggests that leaks discovered during the 4th quarter inspection period are considered an automatic violation of the provision, and that leaks discovered during other periods are not considered automatic violations. The comment also recommends that ARB staff allow operators two years post-implementation to gather sufficient data on the number of leaks and trends on their systems, so that ARB can then set reasonable benchmarks for future improvement.

F-9-40 Comment: The comment recommends deleting section 95669(o)(5), as it implies that all leaks can be prevented.

The consolidated response below addresses the above comments: F-3-4, F-8-10, F-9-3, F-14-1, and F-9-40

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. Staff understands that due to the nature of mechanical systems, leaks will intermittently occur at random times throughout a calendar year. This is why it is important to inspections to occur often. It is also the reason why the LDAR provision allows for a certain number of leaks each calendar quarter, so that owners or operators are not penalized unfairly for a certain number of allowable leaks and leaks that fall below the minimum leak threshold.

It is ARB's intention to incentivize operators to find and repair leaks throughout the year. The language in the 15-day amendments to section 95669(o)(5) is not intended to, and does not, undercut this intention. Instead, it must be read in the context of ARB's clear statements in the notice and in the context of the larger section. That provision in fact provides that leaks found during operator inspections are not violations if they are repaired within specified timeframes. The reference to different treatment during the fourth quarterly inspection is explained by the section as a whole, and is intended only to establish that this operator-flexibility provision does not waive the allowable leak limits calculated in 4th quarter. The intent of this section is that leaks discovered during an operator-conducted inspection that exceed the allowable number of leaks in Tables 1 and 3, but that are repaired within the timeframes specified within this subarticle, do not constitute a violation. This provision does not constitute an automatic violation.

The LDAR requirements are based on extensive experience obtained by California's local air pollution districts using U.S. EPA Method 21 in conjunction with individual local district standards. This provides a wealth of information, which ARB was able to use to design the LDAR provision. Staff's approach to LDAR is to harmonize with the existing policies implemented by the local air districts as much as possible, and to follow a provision that is clear, accurate, and verifiable by districts as well as individual owners or operators. Method 21 provides a simple metric that can used to quantify and classify leaks, and is not necessarily intended to be used explicitly for quantifying emissions. During the Sage study referenced in the comment, the technician spent considerable time at each individual leak source in order to perform multiple measurements and gather gas samples that required additional laboratory analysis. That particular work required considerable time and expense that exceeded the cost of Method 21 testing. The intent of this provision is to provide a

safe and reliable metric that can be used for quantifying leaks from components, and a means for determining compliance with the leak repair timeframes.

ST-10-3 Comment: The comment states concern of automatic violations for leaks measured above the allowable thresholds, adding that Method 21 is a poor predictor of methane volume.

ST-10-3 Agency Response: ARB staff made no changes based upon the received comment. Leaks found during operator conducted inspections are not violations if they are repaired within the specified timeframes. Please see response to F-3-4. Method 21 is an accurate and reliable test method which has been used by local air districts at oil and gas facilities for several decades. When instruments are calibrated and used in accordance with the Method, the measurements are highly accurate and repeatable. Although not intended to quantify the mass of emissions directly, Method 21 does provide for performing repeatable leak concentration measurements, which is a metric used to determine the severity of a leak. Based on a number of comments received on this topic, ARB staff plans to monitor all received test data, and monitor this provision closely throughout the first years of implementation to determine if future modifications to the regulation are necessary.

LDAR – Component Count

OP-10-81 Comment: The comment cites that some repairs may need speciality equipment and recommends an extended repair timeframe based upon the number of components inspected. For instance, an extension for a fraction of the total components. .

OP-10-81 Agency Response: Based on stakeholder feedback, staff revised the LDAR repair timeframes to incorporate a delay of repair provision. This provision was intended to provide additional time to make repairs in the event that parts or equipment required to make the repairs are on order. The owner or operator must be able to provide proof that the parts or equipment is on order.

OP-13-19 Comment: The comment requests that ARB staff lighten several LDAR standards to remove population counts and performance-based metrics, using only annual survey frequency. Additionally, the comment recommends not requiring training for OGI surveyors, simplify the method for identifying critical components, and allowing extra time for repair. The comment mentions that the requirements differ from some recent federal regulatory requirements.

OP-13-20 Comment: The comment expresses several reasons why the regulation should not include component counts in the LDAR provision, including that the U.S. EPA did not use them in their recent OOOO rulemaking. It also goes on to state that while the commenter believes Method 21 is technically inadequate, it is the most economical factor for use in LDAR programs. Regardless, the comment recommends ARB staff delete the component count criteria from the regulation.

OP-13-21 Comment: The commenter states that setting punitive performance criteria on the maximum number of leaks would result in non-compliance for operators actually achieving the objective of the LDAR provision, to detect and repair leaks.

OP-14-4 Comment: Part 2 of 5 The comment states that the performance criteria limiting the number of leaks based on component counts should be eliminated from the regulation.

B-10-8 Comment: The comment details the difficulties of leak prediction for the company, and states they have little faith in the emission reduction benefit of a specified number of allowable leaks based on component counts, stating that most components would have to be replaced prior to their service life to ensure the requirements are met.

B-10-9 Comment: The comment states that the component count leak criteria is counter to the LDAR program to detect and repair leaks on an on-going basis.

The consolidated response below addresses the above comments: OP-13-19, OP-13-20, OP-13-21, OP-14-4 part 2 of 5, B-10-8, B-10-9

Agency Response: ARB staff revised the LDAR provision based on stakeholder feedback, to include a new delay of repair provision to extend the repair timeframe under certain conditions. No other changes were made in response to this comment.

The LDAR requirements are designed to implement enforceable standards that can be used by ARB, oil and gas companies, and local air districts. The component count provision is included to provide a metric that determines the number of allowable leaks at each facility. By itself, the component count approach does not reduce emissions. However, when combined with an allowable number of leaks per number of components inspected, it then becomes a useful compliance standard. Facilities with more components are allowed to have more leaks than smaller facilities yet remain in compliance. Staff based their decision on the requirement to perform quarterly inspections on the latest scientific information available and on feedback from local air districts. At a minimum, Level II thermography training or equivalent is required to operate an OGI instrument. This ensures that ARB, local air district inspectors, and facility operators are using the cameras with the same amount of minimum training. This is especially important because there is no standard test procedure for using these instruments.

Finally, the critical component provision is a necessary requirement of this regulation. This provision provides for special components that are not subject to the same repair or inspection frequency as other components, because taking those components out of service could jeopardize a facility operation. In order to ensure adequate enforcement of this provision, all critical components must be pre-approved by ARB in order to prevent unnecessary repairs or violations with the regulation.

Comments Received After The 15-day Regulatory Notice

F-9-28 Comment: The comment requests clarification for LDAR inspection requirements, adding "the aboveground components of" wells to the provision.

F-9-29 Comment: The comment requests clarification for LDAR inspection requirements, adding "the aboveground components of" wells to the provision.

The consolidated response below addresses the above comments: F-9-28, F-9-29

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. The intent of the regulation is that it applies to above ground components, with the exception of wells because wells have a well casing that extends below the earth's surface. In some instances, leaks in a well casing that occur below the surface migrate up the casing to place where it is detected on the surface. Local air district inspectors have identified this problem before. The intent of the regulation is to identify and repair all leaking components, and staff are aware of instances where severe leaks have resulted from problems with a well casing, which may have been avoided if leak detected as part of a routine inspection.

F-9-30 Comment: The comment requests the addition of clarifying language to ensure components with no ability to produce emissions, such as those that do not contain natural gas,are not subject to the regulation.

F-9-31 Comment: The comment requests the addition of clarifying language to ensure compressed gas cylinders are not subject to the regulation.

The consolidated response below addresses the above comments: F-9-30, F-9-31

Agency Response: ARB staff made no changes in response to these comments. Staff believe the intent of the regulation is clear and understood by most readers to only apply to components with the potential to emit natural gas emissions. Because natural gas and compressed air systems look similar, and can often be found in close proximity, staff has created an exemption for components that use compressed air. The components suggested in the comment are different enough from other components that inspectors and facilities will understand that it is not necessary to inspect these components. However, staff will monitor this provision throughout implementation of the regulation and determine if future modifications are necessary.

F-9-38 Comment: The comment recommends deleting Table 1 and Table 3 in the Regulation, because the commenter believes that with the removal of the provision for step-down inspection frequency the tables are not relevant.

F-9-39 Comment: The comment recommends deleting section 95669(o)(1) and section 95669(o)(2), provisions limiting the number of leaks,

The consolidated response below addresses comments F-9-38, F-9-39

Agency Response: The comments are related to 14-4 Part 2 of 5, et al. Though the step-down provision was removed, there remains an LDAR provision based on component counts. Please see response to 14-4 Part 2 of 5, et al.

LDAR – Step-Down/Frequency

OP-3-2 Comment: Comment directs staff to eliminate step-down to yearly inspection frequency for LDAR.

OP-4-2 Comment: The comment request that ARB staff remove the step-down provision in the LDAR section of the regulation.

OP-5-4 Comment: The comment discusses the nature and size of leaks, and states that most leaks are not "super-emitters", but that fixing as many leaks as possible is usually an economic benefit to the operator. It supports the regulation but requests a removal of the LDAR step-down provision.

OP-6-2 Comment: The comment requests that ARB staff remove the LDAR step-down to yearly monitoring.

OP-8-3 Comment: The comment urges tightening the standards to align with best practices in the oil refinery industry, as well as removing the step-down provision relaxing the LDAR inspection schedule.

OP-9-2 Comment: The comment directs ARB staff to require operators to regularly find and fix leaks, removing the step-down from quarterly to annual inspections.

OP-10-76 Comment: The commenter believes that operators who can demonstrate leak rates below the threshold set in the Regulation within the first quarter or using data from existing LDAR programs, should be allowed to continue with annual inspections. The comment argues that increasing to quarterly inspections should be required only after inspecting a leak exceeding the threshold.

OP-11-2 Comment: The comment recommends that ARB remove the annual step-down in monitoring, keeping it at quarterly intervals.

OP-13-23 Comment: The comment states that less-than-quarterly audio-visual inspections are sufficient to identify the most significant leaks, and that due to the apparent lack of published documentation by ARB staff to disprove this notion, requests an annual leak survey, for transmission stations with more regular AV inspections.

OP-14-4 Comment: Part 3 of 5 – The commenter suggests revising the requirements related to survey frequency, claiming they are unnecessary and unworkable.

OP-15-7 Comment: The comment requests that ARB remove the annual inspection step-down.

OP-16-3 Comment: The comment requests that the LDAR step-down to annual monitoring be eliminated.

OP-17-58 Comment: The comment states that more reliable data is needed before implementing a DI&M (LDAR) program since the "Update of Fugitive Equipment Leak Emission Factors" 2014 report by Canadian Association of Petroleum Producers, does not specify a leak detection survey frequency. Additionally, the comment believes an annual survey frequency, using a leak definition based on a Method 21 screening value of 10,000 ppmv, is adequate.

OP-19-6 Comment: The comment requests that the LDAR step-down to annual monitoring be eliminated.

OP-19-7 Comment: The comment provides a wealth of evidence indicating that leaks are a significant source of methane emissions and urges staff to remove the LDAR quarterly step-down provision.

OP-19-8 Comment: ARB's quarterly inspection requirement is both reasonable and necessary since, currently, five major oil and natural gas producing states require quarterly monitoring at oil and gas facilities:

- U.S. EPA's NSPS (compressor stations)
- Colorado (mid-size)
- Pennsylvania
- Ohio
- Wyoming
- Utah

OP-19-9 Comment: ARB's analysis shows that quarterly instrument inspections are highly cost effective, which is supported by data from other organizations, companies, and states:

- ICF
- Rebellion
- Colorado
- U.S. EPA
- EDF
- Noble and Anadarko
- Jonah Energy

OP-19-11 Comment: The comment urges staff to remove the quarterly step-down provision, as frequent inspections are important to reducing emissions.

OP-19-12 Comment: The comment further urges staff to remove the quarterly step-down provisions, stating that it creates a perverse incentive by rewarding operators for failing to identify leaks.

OP-19-13 Comment: The comment gives information on a recent air quality study in Fort Worth, Texas, which states that no high-emitting sites had more than 3 percent of their components leaking.

OP-19-14, Comment: The comment provides data indicating that significant emissions can occur at sites with few measured leaks, therefore, the LDAR frequency step-down should be removed.

OP-19-15 Comment: ARB needs to finalize a flat quarterly inspection requirement. U.S. EPA's recently finalized inspection requirements for well sites and compressor stations, as well as testimony from Encana, support the need for frequent inspections over time.

B-2-2 Comment: The comment disagrees with a step-down to reduce inspection frequency.

B-2-10 Comment: The comment opposes the proposal to reduce frequency of inspections based on operators finding no leaks or only low-level leaks.

B-4-10 Comment: The comment asks staff not to remove the annual step-down provision in the LDAR program.

B-5-1 Comment: Remove quarterly step-down..

B-6-1 Comment: Remove quarterly step-down.

B-7-1 Comment: Remove quarterly step-down.

B-8-1 Comment: Remove quarterly step-down.

B-11-2 Comment: Remove quarterly step-down.

B-11-10 Comment: Remove quarterly step-down.

T-5-2 Comment: The comment supports the removal of the step-down provision.

T-5-3 Comment: The comment supports quarterly monitoring, stating that it is cost effective.

T-6-2 Comment: The comment supports removing the LDAR step-down provision, stating that neither the percent nor the number of leaking components is an accurate predictor of a facility's emissions performance.

T-8-1 Comment: The comment does not support allowing a step-down, stating that any lax rules are unacceptable.

T-14-1 Comment: The comment states concern with the LDAR step-down provisions, stating that it would significantly increase cost on the heavy oil side, especially for a small company.

T-15-2 Comment: The comment supports removing the step down provision, as it would not provide incentive to find leaks.

T-19-2 Comment: Remove quarterly step-down.

T-20-1 Comment: The comment urges ARB to remove the step-down to include tight schedules for regular inspections, stating that California must have the strongest methane standard possible to mitigate emissions and health impacts.

T-21-1 Comment: The comment supports removing the step-down provision, which would create a perverse incentive to avoid finding and reporting leaks.

T-22-1 Comment: The comment supports removing the step-down provision, which would create a perverse incentive to avoid finding and reporting leaks.

T-23-1 Comment: The comment supports requiring quarterly LDAR inspections, which is a straightforward and cost-effective way to reduce oil and gas methane emissions.

T-24-3 Comment: The comment supports quarterly leak monitoring.

T-24-4 Comment: The comment suggests quarterly LDAR inspections are needed at minimum or other possible monitoring solutions.

T-25-2 Comment: The comment supports removing the step-down provision and requiring quarterly leak inspections, which is consistent with U.S. EPA requirements.

T-27-1 Comment: The comment supports the removal of the step-down provision, to get leaks fixed quickly.

T-29-7 Comment: The commenter does not support removing the step-down provision.

T-30-2 Comment: The comment does not support a step-down provision for leak inspection, stating that it would incentivize less rigorous inspections.

The consolidated response below addresses the above comments: OP-3-2, OP-4-2, OP-5-4, OP-6-2, OP-8-3, OP-9-2, OP-10-76, OP-11-2, OP-13-23, OP-14-4 Part 3 of 5, OP-15-7, OP-16-3, OP-17-58, OP-19-6, OP-19-7, OP-19-8, OP-19-9, OP-19-11, OP-19-12, OP-19-13, OP-19-14, OP-19-15, B-2-2, B-2-10, B-4-1, B-5-1, B-6-1, B-7-1, B-8-1, B-11-2, B-11-10, T-5-2, T-5-3, T-6-2, T-8-1, T-14-1, T-15-2, T-19-2, T-20-1, T-21-1, T-22-1, T-23-1, T-24-3, T-24-4, T-25-2, T-27-1, T-29-7, T-30-2

Agency Response: Based upon the received comments, ARB staff modified the regulation to remove the ability for operators to revert to annual testing once five consecutive quarters of leak inspections demonstrated compliance with all of the provisions specified for LDAR. This provision was modified based on information that show that leaks can occur at any time throughout the calendar year, and that some of these leaks can be a significant source of emissions, as documented in the Staff Report. A study released after the 45 day package, and included in the 15 day package, 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. Based on a number of comments received on this topic, ARB staff plans to monitor all received test data, and monitor this provision closely throughout the first years of implementation to determine if future modifications to the regulation are necessary.

OP-17-56 Comment: The comment claims that the references ARB staff used to justify the quarterly inspections for LDAR is a circular reference and there is no evidence of actual data supporting these claims.

OP-17-57 Comment: The comment claims that EPA and CAQCC did not provide data or rationale for published emissions reductions under the quarterly LDAR program.

OP-17-59 Comment: The comment claims more accurate data indicates that diminished emissions reductions are achieved for leak monitoring more frequent than annual.

The consolidated response below addresses the above comments: OP-17-56, OP-17-57, and OP-17-59

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. Staff appreciates the research presented along with the comment, which was obtained from several different studies. The LDAR provision in the regulation is primarily based on decades of experience obtained by several local air pollution districts that perform inspections in the most populous oil and gas fields in California. Local district experience shows that these programs are highly effective in reducing emissions from components, and that facilities that comply with quarterly inspection requirements tend to have fewer leaks and therefore fewer violations each year. When developing the emissions inventory for this source category, staff also reviewed a number of studies to determine emissions and emissions savings from these programs. Using EPA's "Protocol for Equipment Leaks Emission Estimates" EPA-453/R-95-017, LDAR reductions with a 10,000 ppm threshold are approximately 67% with quarterly inspection and with a 1,000 ppm threshold, reductions are 80% with quarterly inspection. These are significant reductions from defined concentration level thresholds. Staff concluded that inspection frequency is key factor in reducing emissions from components, and determined that quarterly inspections are necessary in order to mitigate emissions and to ensure that an effective LDAR policy is implemented. Based on a number of comments received on this topic, ARB staff plans to monitor all received test data, and monitor this provision closely throughout the first years of implementation to determine if future modifications to the regulation are necessary.

The comment states that the references used to support the quarterly inspections is circular and does not evidence actual data. The reference ARB used, however, refers to a long string of documents, which in turn eventually point to two documents that collected supporting data. These are: 1) Protocol for Equipment Leaks Emission Estimates EPA-453/R-95-017. November 1995.; and 2) National Emission Standards for Hazardous Air Pollutants for Source Categories; Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry and Seven Other Processes. Subpart H--Equipment Leaks. Federal Register. Vol. 57, No. 252, pp 62765-62785. Washington, DC. Office of the Federal Register. December 31, 1992. Upon review of the two documents with supporting data, ARB

determined that those data and those documents do not change the factors ARB used or the conclusions ARB reached, but rather further support ARB's analysis. See also the combined response to: OP-3-2 et al.

Comments Received After The 15-day Regulatory Notice

F-4-1 Comment: The comment supports the removal of the LDAR step-down provision, providing costs information supporting ARB's analysis of the cost effectiveness determination of the provision.

F-4-2 Comment: The comment adds further evidence in support of quarterly LDAR inspections.

The consolidated response below addresses the above comments: F-4-1, F-4-2

Agency Response: ARB staff appreciates the stakeholder support .

SB-4-6 Comment: The comment urges ARB to reconsider re-incorporating the "step-down" provisions.

SB-4-6 Agency Response: ARB acknowledges that this comment was submitted after the 15-day changes were made, however staff maintains the original justification (please see response to 3-2 et al.).

ST-5-3 Comment: The comment supports the removal of the step-down provision, requiring quarterly inspections.

ST-6-2 Comment: The comment states support of removing the step-down provision, requiring ongoing quarterly monitoring and correction of leaks.

ST-8-4 and ST-9-4 Comments: These comments urge ARB to reinstate the step-down provision, and encourage ARB staff to evaluate the data generated from the LDAR program to reconsider adjusting the frequency of inspections at a later date.

ST-11-3 Comment: The comment states support of requiring quarterly inspections.

ST-12-1 Comment: The comment states support of removing the step-down provision for inspections.

The consolidated response below addresses the above comments: OP-3-2

Agency Response: Please see response OP-3-2 et al.

LDAR – Repair Timeline/Critical Components

OP-10-66 Comment: The comment recommends allowing 60 days for vapor recovery downtime, for maintenance, instead of the 30 allowed in the regulation.

OP-10-66 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The 30 calendar days provides sufficient time to repair a defective vapor collection system, and that an equipment downtime that exceeds this repair time period can create significant uncontrolled emissions. The regulation does provide for up to 14 additional calendar days per calendar year to make repairs to these systems. However, the ARB Executive Officer must be notified and approve this extended repair timeframe so that staff can properly track emissions from these sources and properly enforce the requirements.

OP-10-71 Comment: The comment requests at least 120 working days - or until the next scheduled workover – to make repairs on leaking underground well casings, which is reasonable, more realistic, and may be more effective in reducing emissions.

OP-10-72 Comment: The comment requests that well casing leaks be allowed a longer repair timeline than given in the regulation.

The consolidated response below addresses the above comments: OP-10-71, OP-10-72

Agency Response: Based upon the received comments, ARB staff modified the regulation to incorporate a delay of repair provision to allow an operator to extend the normal repair timeframe in the event that the operator can show that parts or equipment which are required to make the necessary repairs are on order. This provision is intended to accommodate equipment such as a workover rig to make repairs to a well casing.

OP-10-77 Comment: The comment recommends adding language to section 95669 allowing inaccessible or unsafe components to be inspected only at the next regular process shutdown, instead of once per year.

OP-10-77 Agency Response: ARB staff made no changes in response to this comment. The intent of the regulation is to ensure that unsafe to monitor components are inspected at least once each calendar year at a minimum. This requirement is necessary to ensure that components do not leak for long extended periods that can also create a safety hazard at a facility.

OP-10-82 Comment: The comment takes issue with the provision in the regulation that all critical components are pre-approved by ARB staff by January 1, 2018 or within 180 days from installation, stating that the administrative timeline is prohibitive.

OP-10-83 Comment: The comment states that facility engineers and APCD inspectors are better qualified to determine which components are critical and ARB should not be making that determination. The comment further offers additional validation of critical components by professional engineer's evaluation.

The consolidated response below addresses the above comments: OP-10-82, OP-10-83

Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Critical components must be pre-defined to assist with enforcement inspections. It would lead to an unenforceable provision to allow critical components to be determined by the regulated entity at any time.

OP-10-84 Comment: The comment suggests for ARB to allow non-ARB staff – "knowledgeable operators or a professional engineer" – to designate critical components without ARB's approval.

OP-10-84 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff anticipates working closely with engineering staff to pre-define critical components.

OP-10-85 Comment: The comment describes a labor-intensive critical component inventory and tagging process that, for new facilities, could be considered unreasonable. The commenter describes a less-intensive manner of tagging that could add flexibility to the provision by streamlining the process.

OP-17-71 Comment: The comment states that requirements for critical component tagging are impractical and unsafe. The comment suggests revising the requirement to require tagging only on the last critical component on each inlet and outlet stream.

The consolidated response below addresses the above comments: OP-10-85, OP-17-71

Agency Response: Based upon the received comments, ARB staff modified the regulation to provide operators with two different ways to identify a critical component or critical process units. This provision is necessary so that inspectors can properly identify these components while performing field inspections. Critical components or process units may be identified by using tags to identify individual components, or provide a drawing or schematic that identifies the components or process units, and then provide the drawing or schematic to inspectors during inspections.

OP-13-25 Comment: The comment states the importance of delaying repairs to natural gas facilities, and that the "critical components" provision offered by ARB staff should be deleted due to unnecessary bureaucracy and burden of tagging each separate component.

OP-13-25 Agency Response: Based on the received comment, ARB staff modified the regulation to incorporate new delay of repair for utilities that are required to meet the demands of end users and the public and to provide a safe and reliable natural gas system. ARB staff made no changes in response to the critical components comment. This provision is necessary to allow a facility to properly identify components that cannot be readily taken out service without causing possible safety concerns.

OP-10-131 Comment: The comment is a repeated edit striking out "approved by the ARB Executive Officer" and replacing it with "identified." This edit is made in section 95668(d)(4)(F).

OP-10-132 Comment: The comment is a repeated edit striking out "approved by the ARB Executive Officer" and replacing it with "identified." This edit is made in section 95668(e)(9).

OP-10-136 Comment: The comment is a repeated edit striking out "approved by the ARB Executive Officer" and replacing it with "identified." This edit is made in section 95670(a).

OP-10-137 Comment: The comment is a strikeout of section 95670(f) regarding ARB approval for critical components.

The consolidated response below addresses the above comments: OP-10-131, OP-10-132, OP-10-136, and OP-10-137

Agency Response: ARB staff made no changes to the provision based upon the above comments The intent of the regulation is for all critical components to be pre-approved by ARB prior to performing enforcement inspections. This language reflects the intent of the critical component provision and ensures that ARB can properly monitor and track such components.

This section also provides ARB with the authority to evaluate and approve or disapprove requests for critical components or critical process units. It is necessary to ensure that the components are properly tracked and identified prior to enforcement inspections because these components are allowed special provisions for delaying repairs for up to 12 months from the date of initial inspection.

OP-13-26 Comment: The comment suggests changing the "critical component" provisions to allow flexibility when unique circumstances arise. ARB should allow repairs to be delayed until the next scheduled shutdown to avoid additional emissions from blowdowns. The comment further suggests operators retain records of any delays in repair, which ARB or the local air district can inspect to ensure compliance.

OP-17-11 Comment: Commenter observes that CPUC-regulated utilities may not always be able to make required repairs on a particular timeline, given the need for CPUC approval for some activities. The commenter asks that ARB take these and other (unidentified) practical considerations into account, for instance by exempting "Essential Public Services" from the rulemaking. Alternatively, commenters ask that

ARB allow greater flexibility with regard to leak repair timelines to consider such constraints.

OP-17-73 Comment: The commenter requests that natural gas utilities under the jurisdiction of California Public Utilities Commission (CPUC) be granted an exemption from the critical units provision based on being a utility and essential public service, citing SB 1371, which addresses both environmental and operational and safety concerns.

T-10-3 Comment: The comment suggests staff modify the critical component definition and repair delay provision similar to EPA's Quad O(a) or Colorado's regulation to meet the needs of the commenter and ensure they can serve their customers safely and reliably.

T-11-4 Comment: The commenter asks for "delay provisions" to allow for flexibility, since a complex system needs more than "one-size-fits-all" repair requirements.

The consolidated response below addresses the above comments: OP-13-26, OP-17-11, OP-17-73, T-10-3, and T-11-4

Agency Response: Based on comments received, staff modified the regulation to incorporate new delay of repair provisions for instances where parts or equipment must be ordered, or in cases where the utility can provide evidence that the system cannot be repaired for reliability reasons. These delay of repair provisions are distinct from the provision covering repair of critical components. The critical components repair provision is intended to cover known system components or process units that cannot be immediately taken out service. This provides several different ways that a facility can meet the compliance obligation of the regulation, in addition to enforcement discretion. The delay of repair provision for a natural gas utility was developed to specifically address instances where underground gas storage facilities or natural gas compressor stations may be required to supply gas without interfering with the reliability of such systems.

OP-13-27 Comment: The statement requests that ARB staff revert the language from the version noticed in the 45-day comment period, to prior language that allows 12 months repair time instead of 180 calendar days, which is the current language.

OP-14-4 Comment: Part 5 of 5 The commenter suggests revising the delay of repair provision, stating the support of INGAA's comments regarding said provision.

The consolidated response below addresses the above comments: OP-13-27, OP-14-4 part 5 of 5

Agency Response: Staff modified the provision to allow for extended repair timelines in certain circumstances, including when gas system reliability requires some delays. Based on discussions with industry, staff understands that components needing to undergo blowdown constitutes a safety consideration, and should be covered under critical components. These modifications sufficiently address commenters' concerns, while ensuring that leaking methane is addressed in a timely fashion.

The critical components provision provides up to 12 months to make repairs on certain pre-approved components that jeopardize the safety or reliability of systems. This is the same timeframe used in local air district rules. This approach achieves a similar delay or repair as required by EPA on OOOO.

While the text stated the 12 month timeline, Table 2 and Table 4 inadvertently stated 180 days. This error was corrected and noticed in the 15-day regulatory package.

OP-13-28 Comment: The comment lists several reasons why the 12-month deadline for delay of repair imposed by the regulation is too restrictive, including that it may lead to disruptions in service.

OP-13-28 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The one year timeframe is based on extensive experience by local air districts implementing similar LDAR rules, and is intended to provide adequate time for a facility to plan, order parts, and make repairs.

B-10-5 Comment: The comment requests variance provisions to allow operators to delay needed repairs, which is more reasonable and will help achieve emission reduction goals.

B-10-5 Agency Response: Based on the received comment, ARB staff made several changes to the individual provisions to provide additional time and flexibility for repairing equipment. Components that may require a gas blowdown in order to make the necessary repairs should be avoided. Instead, those particular components could be documented and scheduled for later repairs by way the critical component provisions. Staff plans to monitor this provision closely throughout implementation of the regulation, and may determine future modifications are needed to address this particular issue.

T-11-3 Comment: The comment supports the critical component exemptions regarding leak repair timeline, however states that an aggressive repair timeline for non-critical components may lead to blowdowns, resulting in greater emissions than leaving a leak for a long period of time.

T-11-3 Agency Response: ARB staff made no updates to the provision based upon the above recommendation. Aside from the delay of repair provisions added to the regulation, instances of repairs that could result in a need to blow down equipment or piping systems should be avoided. In these cases, the components could be documented and scheduled for later repairs by way of the critical component provision.

OP-10-86 Comment: The commenter points out an unintentional contradiction between repair times listed in section 95669, tables 2 and 4.

OP-10-87 Comment: The commenter included the suggested language to fix the typo listed in 10-87.

The consolidated response below addresses the above comments: OP-10-86, OP-10-87

Agency Response: ARB staff made the changes suggested above, to correct the tables by changing the repair time for critical components from 180 calendar days to 12 months in the tables and text.

OP-10-88 Comment: The comment recommends language to add flexibility for compliance by allowing a 15-day grace period to non-leaking open-ended lines, while adhering to sections 95669(h) and (i) for those open-ended lines found to be leaking.

OP-10-88 Agency Response: Based on the received comment, ARB staff modified the regulation to clarify the requirements for open-ended lines. The revisions specify requirements for lines that are not capped or sealed, and requirements for lines are capped or sealed. These changes reflect the intent of the regulation and provide greater clarity of the requirements.

OP-10-89 Comment: The comment recommends adding language to section 95672, adding clarification for reporting timeframes, as well as flexibility by way of extending reporting times.

OP-10-89 Agency Response: Based upon the received comment, ARB staff modified the regulation to state that annual reports are required by July 1st of the following calendar year. This modification addresses the issues raised in the comment.

OP-15-8 Comment: The comment requests the removal of the year-long extension for the repair of leaking critical components, stating that oil and gas production and processing operations can shut down and start up relatively quickly.

OP-16-4 Comment: The comment requests that the critical component exemption only apply in cases where shutdown of an entire operation would not curtail the leak.

OP-17-72 Comment: The comment directs ARB staff to revise the provision, allowing a 12-month repair timeframe for critical components.

The consolidated response below addresses the above comments: OP-15-8, OP-16-4, and OP-17-72

Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The repair timeframe was based on local air district experience with oil and gas operations. The repair turn-around time is within 12 months from initial inspection, which means the component may not require 12 months to repair. Staff fully expects enforcement to closely monitor facilities with leaking critical components to ensure they are repaired in the quickest timeframe possible.

B-10-6 Comment: The comment requests the regulation allow system or facility level exemptions, instead of the critical component provisions, which are onerous and may require shutting down, resulting in greater emissions and would affect the safety and reliability of the natural gas system.

B-10-7 Comment: The comment continues an argument for a facility-level critical component status, suggesting standard repairs that can be conducted without interrupting service on the LDAR schedule.

The consolidated response below addresses the above comments: B-10-6, B-10-7

Agency Response: ARB staff made no changes in response to this comment. The critical component designation has been designed to address safety and reliability aspects, in addition to preventing unnecessary emissions due to shutting down a critical process unit. This exemption is equipment-based in nature, as opposed to an entire facility, because individual components can be repaired without affecting other parts of a facility. We have also included an additional delay-of-repair provision for a gas service utility that has been temporarily classified as critical to reliable gas system operation.

OP-21-28 Comment: The comment requests ARB to triple the amount of time to quantify a leak, to 72 hours, to avoid unnecessary expense on the part of the operator.

OP-21-28 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The requirement to measure leaks that cannot be repaired within 24 hours provides as much as 48 hours from the time of initial detection to perform an emissions measurement. This requirement is necessary to quantify the emissions as soon as possible and accurately determine the severity of the leak so that repairs can be made accordingly. This requirement is the same or similar to existing local air district audio-visual programs that have been successfully implemented within major oil and gas producing regions.

OP-21-29 Comment: The comment states that the provision considers an operator to be in violation when the results of a self-inspection indicate an exceedance of the requirements. The comment recommends that this condition be eliminated from the regulation and made consistent with SCAQMD's rule, which only results in a violation during a district inspection.

OP-21-29 Agency Response: Based on the received comment, ARB staff modified the LDAR provision to specify that leaks discovered during an operator conducted inspections for the first three calendar quarters will not result in a violation. Further, leaks discovered by an operator during the fourth quarter inspection of each calendar do not automatically result in a violation, and will not result in a violation if they are repaired with the specified timeframes. These modifications are intended to provide facilities with time to find, repair, and report self-detected leaks without cause for penalty. However, leaks that are determined to be out of compliance with the standards and are identified by ARB or a local air district as part of routine audit inspection could result in a violation.

OP-21-30 Comment: The comment states that the shut-down of critical components resulting in emissions greater than the emissions measured from the component is unreasonable. This is because shutting down a critical process may not cause additional emissions but instead cause production to be curtailed. Therefore the comment recommends criteria for a critical component to be a threshold for revenue that would be lost if the critical component must be shut down to make repairs.

OP-21-30 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. This exemption is not intended to be revenue based in nature, but is intended to reduce emissions from certain equipment as well as address safety and reliability aspects. We have designed this provision to allow critical components up to 12 months to make the necessary repairs which is intended to provide a facility with adequate time to perform a shutdown and make the necessary repairs.

T-13-4 Comment: The comment states that 30 days is too short for repairing critical components, especially for compressors.

T-13-4 Agency Response: Based on the submitted comment, ARB staff modified the regulation to provide a delay of repair provision for instances where parts or equipment required to make repairs are not readily available and have to be ordered. This requires the owner or operator to provide proof that the equipment is on order, and provides additional time to wait for the equipment to arrive in order to make repairs.

Comments Received After The 15-day Regulatory Notice

F-7-4 Comment: The comment requests that the repair timeframe for instruments should be consistent to specify either the date of calibration or the discovery of a malfunction.

F-7-4 Agency Response: Staff believes the language is understood by most readers and that defective instrumentation is addressed in the regulation. The intent of this provision is to require the replacement of a defective instrument within 14 calendar days from the date of calibration or the discovery of a malfunction. However, in the event that a facility is in doubt or has questions as to the intent of this language, we advise the facility to contact ARB to seek further clarification.

F-9-16 Comment: The comment gives a scenario where driving to the location of the leak will create more GHG emissions than the leak itself, and then requests additional flexibility, allowing a minimum of 10 business days, for repair adding additional time for venting.

F-9-16 Agency Response: This comment reiterates comment OP-10-123. ARB staff acknowledges that this comment was submitted during the 15 day changes

comment period, however, maintains the justification (see response to OP-10-123 in the EA RTC, https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasrtc.pdf).

F-9-26 Comment: The comment recommends replacing the word “may” with the word “shall” to indicate that ARB will automatically grant a delay of repair in all cases.

F-9-27 Comment: The comment recommends replacing the word “may” with the word “shall” to indicate that ARB will automatically grant a delay of repair in all cases.

The consolidated response below addresses the above comments: F-9-26, F-9-27

Agency Response: ARB staff made no changes to the provision, based upon the above recommendations. The intent of the regulation is to provide a time extension for situations that have been verified by the ARB Executive Officer, and is not intended to provide an automatic time extension. This will ensure that inspectors are aware that a delay of repair has been issued and so they will not issue a violation for repairs that exceed the required repair timeframes. Although staff does not foresee a case where a valid request for a delay of repair will not be granted, we still believe approval is necessary for the reasons mentioned.

F-9-36 Comment: The comment suggests adding the word “scheduled” before “shutdown” in section 95669(h)(3) and section 95669(i)(4) regarding repair of critical components provisions.

F-9-36 Agency Response: ARB staff made no changes in response to this comment. The regulation states that critical components shall be repaired by the end of the “next process shutdown” inferring the same meaning as scheduled and which is consistent with the terminology found in Tables 2 and 4.

F-14-4 Comment: The comment requests a repair delay for ambient air monitoring sensors.

F-14-4 Agency Response: ARB staff understands the concern that some sensors used to perform ambient air monitoring may require additional time for repairs. This may be a result of needing to send certain specialized instruments in to a manufacturer for calibrations. Staff also understands that some instrument manufacturers provide instruments as part of a loan program, so that a facility can continue to be monitored while the instrument is at the factor for repairs. Staff will monitor this requirement contained in the regulation throughout implementation, and staff may find it necessary to add a delay of repair provision to this section in future revisions of the regulation.

F-14-7 Comment: This comment is background to F-14-8.

F-14-8 Comment: The comment requests a provision allowing a delay of repair for instances other than equipment orders or reliability. The commenter contends that without the provision, the resultant emissions from repair would be greater than the emissions from the leak itself.

The consolidated response below addresses the above comments: F-14-7, F-14-8

Agency Response: Please see response to B-10-5, above.

F-14-9 Comment: The comment requests clarification on which agency owns implementation and reporting between CPUC's Leak Abatement OIR and SB 1371.

F-14-9 Agency Response: ARB staff made no changes to the provision based upon the above comment. The requirements set forth in the regulation are required by ARB to determine compliance and ensure that the regulation is implemented as intended. Therefore, implementation and reporting is handled by ARB or the local air district if a Memorandum of Understanding between the agencies is established. The ARB and CPUC have been close contact regarding the regulation requirements, and we will work to harmonize the requirements as much as possible, including sharing information or data submitted in reports when the same information is required by both agencies.

F-14-12 Comment: The comment recommends adding the word "planned" to the LDAR provision for repairing critical components during the required timeframe.

F-14-12 Agency Response: The term "scheduled" has been included in Table 2 and Table 4 to specify the intent of the regulation. Staff understands that this same term could also be included in other places within section 95669 to provide greater clarity. However, the intent of the provision is clear as currently written and specified in Tables 2 and 4, which specifies that critical components and critical process that require repairs shall be repaired during the next scheduled process shutdown or within 12 months, whichever is sooner.

ST-4-2 Comment: The comment recommends including guidance to the local air districts regarding leaks found in the fourth quarter not being considered violations, so long as they are repaired on time.

ST-10-2 Comment: The comment states appreciation of Staff for clarifying the issue of leaks reported by operators in the fourth quarter and would like to see the clarification in the FSOR and guidance to the air districts.

The consolidated response below addresses the above comments: ST-4-2 and ST-10-2

Agency Response: ARB staff is including clarification by way of this Final Statement of Reasons Document. Please see response to F-3-4. We will also continue to work directly with local air districts and facilities throughout the implementation process to answer questions and provide guidance.

LDAR – Technology/Optical Gas Imaging/Method 21

OP-5-2 Comment: The commenter believes that ARB does not take into consideration the commercialization of new technologies, which would dramatically reduce the cost and enhance the ability of industry to detect and measure methane leaks. The commenter also believes that the Regulation should provide a process to validate and certify new commercial technologies as meeting Regulation requirements, like U.S. EPA and BLM have for their new rules.

OP-5-3 Comment: The comment includes a lengthy explanation of Method 21 and states that optical gas imaging (OGI) detects leaks faster, more often, and in harder-to-reach areas. The caveat is that while OGI may be a superior technology, the regulation requires Method 21 to be used in all cases, so the addition of OGI will be cost-prohibitive and redundant. Finally, the comment suggests that the regulation not forgo the benefits of OGI and other currently-available technologies, by requiring that all leaks – regardless of size – be repaired in 14 days (similar to the Colorado rule).

OP-5-5 Comment: The comment recommends the same leak inspection frequency as enacted in the state of Colorado, citing that past performance is not a good predictor of future outcomes. Additionally, the comment requests clarification on the meaning of section 95669(o), for purposes of enforcement protocol (prohibiting the number of leaks may incentive operators to hide the excessive leak and avoid leak repair).

OP-12-1 through OP-12-7 and OP-12-10 through OP-12-11 Comment: The comments suggest that operating a frequent OGI program is reasonable, consistent and economical, because it increases the profitability of the operator. The comment also believes that OGI should be adopted as an alternative to Method 21 for leak detection.

OP-16-9 Comment: The comment echoes the concerns of other letters, regarding the accuracy of the methane measurement devices used for leak detection. It goes on to direct ARB staff to revise the regulation to ensure that known devices with accuracy issues are barred from use, and requiring evidence that any device used to detect leaks is operating within original equipment manufacturer (OEM) specifications, and calibration.

OP-17-9 Comment: Part 1 of 2 - The comment states that Method 21 does not provide an accurate or effective approach to categorizing leaks, establishing repair thresholds and schedules, or determining regulatory compliance.

OP-17-60 Comment: The comment describes the limitations of Method 21, urging ARB staff to adopt a leak concentration standard of 10,000 ppmv.

OP-17-61 Comment: The comment argues that the sample flow rate during leak concentrations as specified in the regulation could possible differ by a factor of 30, based upon differing measurements.

OP-17-62 Comment: The comment shares concerns on whether current methane detection instruments can demonstrate compliance with the 1,000 ppmv leak standard based on concentration measurement accuracy.

OP-17-63 Comment: The comment raises concerns with the overlapping mid-point range for Method 21 instruments. Specifically that the range in which the two detectors overlap, is very uncertain due to oscillation of the instrument between the two detectors. The comment goes on to direct ARB staff to avoid making the 5% Method 21 leak concentration an “actionable threshold” due to the high uncertainty with those readings.

OP-17-64 Comment: The comment cites section 7.1.2 of Method 21, which requires that calibration of leak detection instruments are performed with a sample of an equivalent concentration to the applicable leak definition. It goes on to describe an entirely different method of calibration, used by some leak surveyors, finally directing ARB to make clear that calibrations for instruments used in Method 21 leak detection instruments must be in accordance with Method 21 standards.

OP-17-65 Comment: The comment notes the uncertainty of Method 21 instruments in terms of detecting different gas species and responses of the two internal detectors, stating that Method 21 instruments have an extremely poor leak concentration/leak rate correlation.

OP-17-66 Comment: The comment concerns itself with describing the process of detecting leaks using Method 21, and then criticizing the apparent uncertainly of the instrument used.

OP-17-70 Comment: The comment reiterates their data showing weaknesses in Method 21, directing ARB staff to instead adopt a gas leak concentration measurement of 10,000 ppmv.

OP-19-10 Comment: The comment describes the ever-evolving landscape of methane detection devices, and encourages ARB staff to provide operators with the flexibility to seek approval for alternative methods of complying with LDAR requirements, provided that they are at least as effective as methods prescribed in the regulation.

OP-19-16 Comment: Comment asserts that ARB should require all leaks above 500ppm be repaired upon rule implementation, which is consistent with U.S. EPA, Colorado, and Pennsylvania and reflects what is technically feasible.

B-10-3 Comment: The comment contains background for B-10-4, below.

B-10-4 Comment: The comment contends that Method 21 is not an accurate procedure for measuring volume-based leak rates and requests ARB to add high-flow sampler devices to confirm high concentrations measured prior to initiating leak repairs.

T-6-3 Comment: This comment repeats comment 19-16, urging for a lower leak threshold of 500ppm.

T-11-5 Comment: The commenter believes a volume-based measurement would be better than a concentration-based measurement system, which Method 21 is, for measuring leak rates.

The consolidated response below addresses the above comments: OP-5-2, OP-5-3, OP-5-5, OP-12-1, OP-12-2, OP-12-3, OP-12-4, OP-12-5, OP-12-6, OP-12-7, OP-12-10, OP-12-11 OP-16-9, OP-17-9 Part 1 of 2, OP-17-60, OP-17-61, OP-17-62, OP-17-63, OP-17-64, OP-17-65, OP-17-66, OP-17-70, OP-19-10, OP-19-16, B-10-3, B-10-4, T-6-3, and T-11-5

Agency Response: ARB staff made no changes to the provision based upon the above recommendations. The LDAR requirement is based upon leak concentration when performed in accordance with U.S. EPA Method 21. This provides a repeatable means for finding and quantifying leaks of hydrocarbon gases at all types of oil and natural gas facilities. The method is currently being used by local, State, and federal agencies, as well as a number of oil and gas facility operators. This method was chosen for its widespread acceptance and to provide seamless integration with existing federal and local air district rules.

Staff's analysis of Method 21 instruments show that several instruments are available for quantifying leaks as low as 500 ppmv total hydrocarbons in some particular situations, but it is more commonly used for measuring leaks with a concentration of 1,000 ppmv as specified in the regulation. The regulation has been designed to apply repair timeframes and penalties to leaks of various magnitudes, which is consistent with current local air district rules.

The sample flow rates specified in Method 21 are designed to accommodate instrument variation. This requires each instrument to be calibrated according to the designed flow rate. Therefore, even if two different instruments draw sample gas at two different flow rates, the reported results will be the same. Therefore, ARB will offer no additional guidance beyond what is already specified in Method 21, a document that is incorporated into the regulation by reference.

Although not intended to quantify mass emissions, Method 21 does provide for performing leak concentration measurements, which is a metric used to determine the severity of a leak. The leak thresholds are intended to cover the vast majority of leaks discovered at crude oil and natural gas facilities, and the maximum allowable leak concentration is designed around the most commonly used Method 21 instruments, which can provide for a maximum leak concentration measurement of 50,000 ppmv without the need of additional equipment. Note: Staff specifically disallowed the use of photoionization detectors due to their inability to consistently measure methane.

Due to the widespread use of OGI technology, staff included a provision allowing for use of the instruments to aid in leak screening surveys between the quarterly inspections. However, any leaks discovered with an OGI instrument must be measured with the use of Method 21 in order to quantify the total hydrocarbon concentration, which is used to determine compliance with the standards and determine the repair timeframe. This OGI provision was added to provide inspectors and operators with additional flexibility. Because there is no currently adopted test method for OGI instruments, staff has specified the minimum amount of training that is required, and have not based any of the compliance standards upon measurements obtained by these instruments.

ARB staff has also been in close contact with a number of instrument manufacturers, some of which have been developing newer instruments or newer types of technologies

to speed up testing or provide for automated measurements. Throughout implementation of the regulation, staff plans to continue working with instrument manufacturers and perform studies to evaluate the effectiveness of these newer instruments or technologies, and to determine how they compare with Method 21. Given the results of these studies, staff may find a need to make future modifications to the regulation to allow for the use of these instruments.

OP-12-9 Comment: The comment suggests ARB institute a comprehensive equipment performance verification method, such as the NECL method proposed in the Draft Technical Support Document Appendices, Optical Gas Imaging Protocol (40 CFR Part 60, Appendix K). This would ensure that the equipment is capable of imaging methane or other hydrocarbon gases at a flow rate that aligns with ARB's goals. Furthermore, the method could be certified by the manufacturer, reducing the burden on industry.

OP-12-9 Agency Response: ARB staff made no changes in response to this comment. Staff understands the nature of this comment and believe that a standardized test method for the proper use of OGI instruments would be useful. The test method should include a set of instrument specifications for performing the method properly. However, ARB is not the appropriate agency for performing equipment verifications or approving instruments.

OP-13-24 Comment: The comment states that the addition of the OGI language, specifically calling for a technician with "minimum level II thermographer or equivalent training" in the draft regulation which was released for 45-day public comment, should be eliminated as it creates an unnecessary expense without demonstrable value.

OP-14-4 Comment: Part 4 of 5 The commenter suggests revising the requirements related to operator training, claiming they are unnecessary and unworkable.

B-2-11 Comment: The comment supports the use of OGI instruments and appreciates ARB's requirement for certified Thermographer training.

The consolidated response below addresses the above comments: OP-13-24, OP-14-4 Part 4 of 5, B-2-11

Agency Response: Throughout staff's discussions with instrument manufacturers and industry, ARB staff concluded that there is a strong agreement that Thermographer training is required in order to read the images gathered with the use of OGI technology, and that there are no currently approved protocols or test procedures for the use of this technology. In order to accommodate the OGI technology, a minimum amount of training is required (e.g., Level II Thermography or equivalent) to ensure that oil and gas operators, contractors, and inspectors are using the devices consistantly .

T-27-5 Comment: The comment suggests incorporating NASA and JPL drones for monitoring methane, especially for facilities near communities.

T-27-5 Agency Response: ARB staff made no changes in response to this comment. The intent of the regulation is to provide emission standards for equipment and test procedures for determining compliance with those particular standards. Staff agrees that additional types of equipment used to perform specialized monitoring play an important role in determining areawide emissions. ARB has invested substantial resources into these efforts, including contracting with specialized researchers as well purchasing specialized test equipment that ARB intends to use for community monitoring projects and performing special investigations where needed.

Comments Received After The 15-day Regulatory Notice

F-2-1 Comment: The comment requests for ARB staff to add flexibility into the regulation by allowing alternative compliance pathways beyond Method 21.

F-2-2 Comment: The comment urges ARB to adopt a version of the regulation with more flexibility for testing.

The consolidated response below addresses the above comments: F-2-1, F-2-2

Agency Response: The intent of the Method 21 test requirement is to base the regulation on quantifiable and enforceable emission standards for equipment. This approach provides owner and operators of facilities, as well as ARB and air district inspectors, with the ability to use the same types of instruments and emission standards to adequately enforce the reuirements. Staff appreciates the comment and looks forward to evaluating other types of measurement technologies that can achieve the same intended purpose. In order to provide some flexibility within the current regulation, staff has included a provision that allows for the use of OGI instruments. This approach allows for the use of alternative technologies while still maintaining a standards-based approach for enforcing the requirements.

EPA has chosen an approach to allow for the use of OGI technology, and staff has included a provision that allows for the use of OGI technology in lieu of Method 21 measurements at some facilities. However, Method 21 provides measurement data, which is vital to implementing a reliable enforcement standard that can be understood by both inspectors and the affected industry. Staff understands that the approach used by EPA in the latest NSPS OOOO is slightly different from ARB's approach. However, we received significant feedback stating that OGI technology could be complicated and costly to implement and that it provides no type of emission measurement that could be used to verify compliance with the standards. Staff does not view ARB's approach as less stringent than the latest EPA. Instead, staff views Method 21 as equivalent if not more stringent, because in addition to quantifying emission concentrations, Method 21 can is used to consistently measure very low leak concentrations that may not be detected by OGI instruments at current time.

F-9-19 Comment: The comment states that Method 21 is too uncertain to be used as the sole basis for leak repair thresholds, also requesting the leak definition increased to 10,000 ppmv.

F-9-19 Agency Response: This comment reiterates comments 17-9, 17-60, and 17-70. ARB staff acknowledges that this comment was submitted during the 15 day changes comment period, however, maintains the justification (see response to 5-2, et al.).

SB-1-1 Comment: The comment states that the Regulation takes an inflexible and prescriptive approach to monitoring leaks, resulting in greater expense to industry and worse environmental outcomes.

SB-1-2 Comment: The comment urges ARB to allow industry to use methods and technologies that are demonstrated to be as effective as the prescribed leak detection methods—such as the commenter's innovations—allowing for alternative compliance pathways. This would encourage advancing technology, reduce cost, and improve environmental outcomes.

The consolidated response below addresses the above comments: SB-1-1and SB-1-2

Agency Response: Please see response OP-5-2 et al. Although staff received comments on the same topic, again, we stand by the original reasoning not to make changes to this provision.

ST-4-3 Comment: The comment states concern with using Method 21 for characterizing leaks, stating that it could lead to a considerable amount of time and resources spent repairing leaks of negligible size. The comment urges ARB to work with operators to identify better tools and methodologies to characterize leaks in order to incorporate them in the regulation as amendments.

ST-4-3 Agency Response: ARB staff made no changes based upon the received comment. ARB staff worked closely with local air districts and facility owners and operators to settle upon a reliable and repeatable test procedure for use in the regulation, and ultimately decided upon the use of Method 21. We believe Method 21 is the quickest way to characterize leaks for use in determining compliance with the leak thresholds. The leak thresholds are based on existing local air district leak detection and repair requirements. We plan to follow the development of leak detection equipment, and we will monitor this provision closely throughout implementation of the regulation and will determine if future modifications to the requirements are necessary.

LDAR – Cost

OP-9-14 Comment: The comment suggests that the costs of monitoring and detection, repair and replacement in this rulemaking are reasonable.

OP-14-1 Comment: The comment details support of INGAA's letter, and states that the regulation will result in unnecessary costs and burdens that would increase utility costs.

OP-10-4 Comment: The comment suggests that this regulation will result in additional LDAR inspections. The commenter states that the cost will be significantly higher than ARB estimates, and competent contractors cannot be found.

The consolidated response below addresses the above comments: OP-9-14, OP-14-1. OP-10-4

Agency Response: ARB staff appreciates all stakeholder commentary during the public process, because it helps to refine and improve the regulation. Additionally, staff completed an in-depth economic analysis, and finds that the costs of this regulation are outweighed by the advantages to reducing methane.

The benefits of the Regulation include the avoided damages, including changes in net agricultural productivity, energy system costs, human health, and ocean acidification, that will occur in the absence of methane mitigation. These benefits can be monetized using the Social Cost of Methane (SC-CH_4). The SC-CH_4 was developed and peer-reviewed by climate and atmospheric experts consistent with the methodology and modeling underlying the Interagency Working Group (IWG) Social Cost of Carbon (SC-CO_2).[2]

The SC-CH_4 has been incorporated into the analysis of regulatory actions for U.S. federal agencies since 2012, including the Regulatory Impact Analysis for the New Source Performance Standards for the Oil and Gas Industry.[3] The consideration of the SC-CH_4 is consistent with existing Executive Orders including 12866 and the OMB Circular A-4 of September 1,7 2003, and reflects the best available science in the estimation of the socio-economic impacts of greenhouse gases.[4]

The use of SC-CH_4 is also consistent with the requirements of AB 197 to consider the societal costs of emissions of greenhouse gases.

T-29-6 Comment: The comment expresses concern that the LDAR provisions create two sets of inspections, programs, and record-keeping requirements, as the local air district has its own LDAR requirements.

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[2] More information on the SC-CH4 is available at: http://www.tandfonline.com/doi/abs/10.1080/14693062.2014.912981 and https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/august_2016_sc_ch4_sc_n2o_addendum_final_8_26_16.pdf.

[3] Additional information available at: http://www.epa.gov/ttn/ecas/regdata/RIAs/oil_natural_gas_final_neshap_nsps_ria.pdf, http://www.epa.gov/otaq/climate/documents/420r12016.pdf, https://www3.epa.gov/airquality/oilandgas/may2016/nspsria.pdf, and https://www3.epa.gov/ttn/ecas/docs/ria/landfills_ria_final-eg-nsps_2016-07.pdf.

[4] Executive Order 12866 is available at: https://www.reginfo.gov/public/jsp/Utilities/EO_12866.pdf and OMB circular A-4 is available at: https://www.transportation.gov/sites/dot.gov/files/docs/OMB%20Circular%20No.%20A-4.pdf.

T-29-6 Agency Response: ARB staff made no changes to the provision based upon the above comment. The LDAR requirement is designed to measure emissions at facilities that are not subject to a local air district inspection and maintenance program. Although this results in two different programs, the regulation only applies to equipment that is not covered under a local air district rule.

OP-13-22 Comment: The comment suggests that ARB did not provide any basis for the LDAR provision, thus the performance criteria in the provision is also unsubstantiated. The comment goes on to formally request the removal of "allowable number of leaks" from the performance criteria.

OP-17-7 Comment: The comment states that annual LDAR is more cost-effective than quarterly, and will still meet emissions targets.

OP-17-8 Comment: The comment states that the need for quarterly LDAR is not justified, and that EPA Method 21 measurement has a high degree of uncertainty.

OP-17-32 Comment: The comment points out alleged inconsistencies in ARB's economic analysis of storage monitoring costs.

OP-17-47 Comment: Part 2 of 2 - The comment states that ARB staff overestimated the cost-effectiveness of the LDAR provision by a factor of three.

OP-17-48 Comment: The comment provides data, stating that annual LDAR is expected to exceed the target of estimated emission reductions, at an acceptable cost-effectiveness.

OP-17-49 Comment: The comment states that ARB staff made a number of miscalculations and incorrect assumptions throughout the economic analysis, which lead to severely underestimated cost per metric ton of CO_2e emissions reductions for the LDAR provision.

OP-17-55 Comment: The comment suggests that ARB staff did not adequately justify the quarterly LDAR requirement with source materials: effectively, that the source materials cited are unsubstantiated. Additionally, the comment states that the daily audio-visual leak screenings should dispense of the need for the quarterly LDAR requirement, to discover and abate large leaks.

The consolidated response below addresses the above comments: OP-13-22, OP-17-7, OP-17-8, OP-17-32, OP-17-47 Part 2 of 2, OP-17-48, OP-17-49, and OP-17-55

Agency Response: No changes were made to the LDAR provision, based on the above recommendations. Discussions with stakeholders led staff to revise the calculation for cost and emissions for the LDAR provision. The cost for the LDAR provision went up by almost 30% due to: 1) the cost of inspecting idle wells, which, although already covered under the regulation, was not included in the Staff Report Economic Analysis; and 2) using a higher, stakeholder-supplied cost for recordkeeping and reporting. The emission reductions and annual cost savings from gas saved both went down less than 20%, due to correcting the reductions based on the methane content of the gas saved. The cost

per MT of CO2e reduced increased accordingly due to the cost and emission reduction changes just described. The updated information can be found in Attachment 2 of the 15-day notice.

The allowable number of leaks provision is consistent with LDAR rules from local districts. Data of expected components were obtained from ARB's 2009 Oil and Gas Industry survey. Emission factors were obtained from the 1999 CAPCOA Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities.

The values provided by WSPA are not appropriate because they are for areas with an already implemented LDAR program.

Although annual LDAR inspections are more cost effective, this would not achieve the maximum reductions. Quarterly inspections are still cost effective, and are in line with inspection frequencies of other regulations.

Data cited by EPA has shown that more frequent inspections correlate to a greater emission reduction (ICF 2014; EPA 1995). Using EPA's "Protocol for Equipment Leaks Emission Estimates" EPA-453/R-95-017, LDAR reductions with a 10,000 ppm threshold are 42% with an annual inspection but 67% with quarterly. With a 1,000 ppm threshold, reductions are 64% with an annual inspection but 80% with quarterly.

The cost of the manual inspections was changed due to stakeholder comments. The updated cost for manual inspections reflects the recommendations by stakeholders and is included in ARB's estimate.

The cost estimate provided by stakeholders for the overall cost includes a per hour cost which was much higher than what contractors that perform this work told ARB. In addition, the ICF report, which is the basis for this per hour cost, assumes the facilities will have their own LDAR inspection program, and ARB assumes that this will be done through contractors. Additionally, the ICF report from the stakeholders includes administrative costs, which the stakeholder treats as separate. These factors greatly inflate the cost estimate of the stakeholder. For more information on costs and emission estimates, please see response OP-10-69

Comments Received After The 15-day Regulatory Notice

F-9-20 Comment: The comment compares the commenter's cost estimates for the LDAR program with ARB's, noting difference in assumptions and results.

F-9-20 Agency: ARB assumed that contractors would be hired to perform the LDAR inspections, and based the estimate on conversations with contractors that perform this type of work. The ICF report, which is what the higher hourly cost is based on, assumes that the facilities would inspect the components themselves, and incur costs associated with developing their own LDAR program, including equipment, training, and management. The ICF estimate also includes support staff and a single inspector, and is based on an analysis done by Colorado for their own LDAR rule. In addition, the 20 year GWP is the value that is used in other parts of ARB's Oil and Gas rule, and best represents the impact in the near future.

SB-4-1 Comment: The comment urges staff to weigh the environmental benefits of the LDAR provisions with the implementation costs, noting that the oil and gas industry is an economic pillar in Kern County, employing approximately 45,000 people, and that any burden placed on that industry would significantly lower the quality of life for Kern County constituents.

SB-4-2 Comment: The comment urges staff to weigh the environmental benefits of the LDAR provisions with the implementation costs, to ensure there is a strong correlation between inspections and methane emission reductions.

SB-4-5 Comment: The comment reiterates comment SB-4-2.

SB-4-9 Comment: The comment reiterates comment SB-4-2

The consolidated comment below addresses the above comments: SB-4-1, SB-4-2, SB-4-5, and SB-4-9

Agency Response: Please see response to Comment OP-13-22 et al. Although staff received comments on the same topic, again, we stand by the original reasoning not to make changes to this provision.

Gauge Tanks

OP-10-2 Comment: The comment points out that gauge tank requirements were published in the 45-day regulatory language, but not in drafts prior to the start of the official comment period. The commenter extends concerns about an apparent last-minute addition and a lack of feasibility studies and economic analysis.

OP-10-22 Comment: Part 1 of 3 - The comment articulates concern regarding the inclusion of gauge tanks in section 95668(a)(6) without having been workshopped, stating that the source was added with no cost-effectiveness analysis, as required in the economics analysis

OP-10-22 Comment: Part 3 of 3 - The comment articulates concern regarding the inclusion of gauge tanks in section 95668(a)(6) without having been workshopped, stating that the source was added with no cost-effectiveness analysis and without the environmental analysis required under the California Environmental Quality Act (CEQA).

OP-10-23 Comment: The comment shows WSPA calculations stating that the total emissions from all gauge tanks are approximately 28 MT CH4 per year, representing less than 0.36 percent of the expected emissions reductions for the source category of gauge tanks.

OP-10-24 Comment: Part 1 of 2 - The comment states that ARB's economics analysis does not take into account the cost to control emissions from gauge tanks with the use of a vapor collection system required by section 95668(a)(6).

OP-10-26 Comment: The commenter recommends that ARB remove gauge tanks from the regulation.

OP-10-96 Comment: The comment details concern that gauge tanks were included after the last draft, which the commenter reviewed, citing that ARB does not have evidence supporting the regulation of gauge tanks.

OP-10-97 Comment: The commenter asserts that gauge tanks were included in the regulation without proper analysis, and that the regulation as proposed is unduly burdensome because it does not produce substantial emissions reductions relative to its costs.

OP-10-98 Comment: The commenter recommends that ARB remove the gauge tanks provision from the regulation.

OP-10-99 Comment: The comment states that ARB staff did not consider the cost of controlling gauge tanks, in the Economic Analysis for the regulation. It goes on to state that combining the high cost and minimal benefit, it is a very costly provision.

OP-10-100 Comment: The comment states details regarding the excessive cost but minimal benefit of controlling methane emissions from gauge tanks.

OP-10-101 Comment: The comment requests that ARB complete a new economic analysis for the regulation, if staff does not remove gauge tanks from the regulation.

B-4-13 Comment: The comment states that gauge tanks were added to the regulation effectively “at the last minute.”

B-4-14 Comment: The commenter argues that the stakeholder process was bypassed with regard to gauge tank provisions, and that these provisions be removed. Commenter asserts that ARB should demonstrate that there are viable compliance options associated with new vapor recovery requirements for these tanks before promulgating them.

T-13-2 Comment: The comment wishes to discuss, with ARB staff, the addition of gauge tanks in the Regulation, stating that gauge tanks have very low emissions, especially in heavy oil fields.

T-29-4 Comment: The commenter is concerned with the “last-minute” addition of a small source of emissions, gauge tanks, in the Regulation, stating that the source category is not included in the environmental assessment, economic analysis, or SRIA.

The consolidated response below addresses the above comments: OP-10-2, OP-10-22 Part 1 of 3, OP-10-23, OP-10-24 Part 1 of 2, OP-10-26, OP-10-96, OP-10-97, OP-10-98, OP-10-99, OP-10-100, OP-10-101, B-4-13, B-4-14, T-13-2, T-29-4

Agency Response: ARB staff is required by the California Administrative Procedure Act to notice all regulatory items during a 45-day comment period, which, for the Oil and Gas regulation including the gauge-tanks provision, began June 3, 2016 and ended July 18, 2016. ARB staff issued modifications for a subsequent 15-day comment period as well. Additionally, staff held numerous meetings with affected entities and other stakeholders to discuss the provisions. Please also see response to comment OP-10-25 in the EA RTC, https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasrtc.pdf).

After reviewing submitted comments and other data, staff opted to exempt small gauge tanks under 100 bbl in size, from the requirements of the regulation due to then negligible emissions. Gauge tanks over 100 bbl in size would still be subject to the provisions of the regulation, and be required to install a device such as an automatic well tester. Moreover, staff have ensured that vapor recovery devices work appropriately for all tanks covered by the regulation as modified, and has documented these conclusions in the materials supporting this regulation (Chapter V. Technical Assessment of the Staff Report). ARB estimates the cost of this device to be minimal and not affect the overall cost, particularly because there do not seem to be any non-small gauge tanks (Reference Oil and Gas Journal, 10/2000).

Vapor Collection Systems and Vapor Control Devices

OP-10-60 Comment: The comment states that the requirement that gas be collected and sent to an existing fuel gas, sales gas, or underground injection well is impractical in the event that a system reaches its maximum capability and offers suggested text modifications.

OP-10-61 Comment: The comment recommends specific language modifications reflecting comment OP-10-60.

The consolidated response below addresses the above comments: OP-10-60, OP-10-61

Agency Response: ARB staff made changes to remove the term “existing” from sales gas system, fuel gas system, and gas disposal well to enable the installation of new systems. In the event that a facility cannot utilize any of these new or existing systems, the excess vapor must be controlled with equipment that complies with the requirements specified in section 95671. The tiered approach is necessary to limit or eliminate impacts on criteria air pollutants. In adopting regulations to effectuate AB 32, ARB is required, to the extent feasible, to ensure that activities undertaken pursuant to the regulations “complement, and do not interfere with, efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions.” (Health and Safety Code, section 38562(b)(4)). The provisions of this section help to ensure that greenhouse gas control efforts complement, and do not interfere with, efforts to achieve criteria pollutant and toxic air contaminant objections as well.

OP-10-62 Comment: The comment suggests removing the provision in section 95668(c)(4)(B)2 that prevents the use of supplemental fuel gas in vapor control devices.

OP-10-62 Agency Response: ARB staff made no changes in response to this comment. This provision is required in order to comply with the intent of the regulation, to lower GHG emissions. In the case described above, burning supplemental fuel gas would result in additional emissions of GHGs and NO_x, which are formed because of combustion in an incinerator.

OP-15-10 Comment: The comment encourages the adoption of best available vapor capture and control, at 99 percent control efficiency, and discourages the use of combustion devices such as flares, especially near communities.

OP-15-10 Agency Response: ARB staff made no changes in response to this comment. The requirement to achieve at least 95% control efficiency is intended to allow for the use of existing control equipment that is currently being operated under a local air district permit. In some cases, these devices operate with efficiencies above 95% control efficiency in order to ensure that they meet the local district permit requirements.

OP-21-18 Comment: The comment recommends that collected vapors are allowed to be directed to existing or new sales gas, fuel gas, or gas disposal systems that comply with federal, state, and local requirements.

OP-21-18 Agency Response: Based upon the received comment, ARB staff modified the regulation to remove the term “existing” from each of the different types of systems that gas may be sent to. Staff carefully considered the various aspects associated with this modification and determined that this change reflects the intent of the regulation.

OP-21-19 Comment: The comment suggests that the provision could be updated by allowing collected vapors unable to be directed into a sales gas or disposal system, be directed to a vapor control device (e.g. flaring).

OP-21-19 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. In cases where no sales gas, fuel gas, or underground injection well is available, the only option left is to incinerate the collected vapors. The intent of the regulation is that any incremental increase in the destruction of vapors is done so with the use of a non-combustion system or using a low-NOX incinerator. Allowing for the use of an existing high-NOx emitting device such as a flare is not consistent with the intent of the regulation. In adopting regulations to effect AB 32, ARB is required, to the extent feasible, to ensure that activities undertaken pursuant to the regulations “complement, and do not interfere with, efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions.” (Health and Safety Code, section 38562(b)(4)). The provisions of this section help to ensure that greenhouse gas control efforts complement, and do not interfere with, efforts to achieve criteria pollutant and toxic air contaminant objections as well.

OP-21-20 Comment: The comment attempts to strengthen the provision so that vapor control system downtime does not count toward the 30 calendar days allowed if the equipment served is not operating (has zero throughput).

OP-21-20 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The regulation does not apply to systems that are not producing, processing, or storing crude oil or natural gas. Therefore, such systems are

not required to comply with the requirements nor is a vapor control device necessary, which eliminates any need for this scenario to count against the 30 calendar day limit.

Comments Received After The 15-day Regulatory Notice

F-9-7 Comment: The comment recommends revising the vapor collection provision for reciprocating natural gas compressors due to safety concerns. Particularly when air may be entrained in the gas stream.

F-9-7 Agency Response: Vapor collection systems are not required to control emissions from reciprocating natural gas compressors. This compliance option was added because some facilities are already controlling compressors emissions using this option and new facilities may wish to control emissions in the same manner. The intent of the provision is not to create a safety hazard by controlling emissions from small, single source of emissions, but to provide flexibility for systems that may be controlling multiple types of equipment using one vapor collection systems. Most facilities will opt for maintaining compressors in compliance with the flow rate standards by changing out worn out rod packings when they emit emissions near the maximum allowable emission standard.

F-9-8 Comment: The comment requests a repair delay option to address technical and safety issues.

F-9-41 Comment: The comment reiterates comment F-9-8. The comment recommends repair delay language to reduce potential conflict with other sections of the regulation.

The consolidated response below addresses the above comments: F-9-8, F-9-41

Agency Response: Because separator and tank systems have the potential to vent large amounts of emissions in a relatively short timeframe, this provision is unlike other delay of repair provisions in the regulation; it was designed to minimize the amount of time that a separator and tank system are allowed to vent emissions. Additionally, the regulation provides flexibility in Section 95671 so that owners or operators can make repairs to a vapor control device each year.

The provision specifically allows a vapor control device to be removed from service for up to 30 calendar days, and allows up to 14 additional days to make repairs with ARB Executive Officer approval. In addition to this delay of repair provision, staff has also included a provision that allows a temporary vapor control device to be used while the primary device is repaired so it will not count towards the number of days that the primary unit is removed of service.

ST-10-4 Comment: The comment states concern of safety risks and feasibility issues with the vapor recovery requirements for compressors and limited viable technology options for the storage monitoring requirements.

ST-10-4 Agency Response: ARB staff made no changes based upon the received comment. The regulation provides for several different ways to control emissions from compressors, but does not require the use of a vapor collection system. Compressors can be measured by way of a leak concentration or flow rate measurement, depending on the location and use the compressor, and then seals can be replaced when they exceed the maximum allowable emission rate. ARB staff has identified a number of commercially available monitoring instruments that can be used to perform monitoring at natural gas storage facilities and can provide a list of this equipment upon request.

Fire-related safety concerns related to vapor recovery systems are noted. The claimed fire risks are associated with gathering and processing allegedly oxygen-rich vapors. It is not ARB's intent that owners or operators install equipment that may jeopardize worker safety or create an unsafe situation. Though staff has determined that the regulation would not substantially increase fire or explosion risk, established safety measures would help ensure any such risks are less-than-significant. For example, Subchapters 14 and 15 of the California Department of Industrial Relations regulations also include petroleum safety related requirements (see California Code of Regulations, Title 8, sections 6500 et seq.). These regulations require a range of safety-related measures, including: fire-fighting equipment to be available and maintained in serviceable conditions, written plans to ensure the safe and orderly evacuation of employees, safety measures for flammable waste gases and vapors, and various prohibitions on ignition sources.

Flaring

OP-16-6 Comment: The comment directs ARB to set a hard limit on the amount of flaring allowed at each type of operation.

OP-16-6 Agency Response: ARB staff made no changes in response to this comment. ARB's analysis did not show an expected increase in the number of flares installed in California, but there is potential for overall increased gas combustion . The regulation is designed to limit, or even reduce, NOx emissions that may occur as a result of increased gas combustion by requiring the use of non-combustion or low-NOx combustion technology, and replacing high-emitting NOx flares with the use of this technology in the event that additional incineration is required.

OP-10-46 Comment: The comment states that due to the restrictions in the regulation, the only safe option for dealing with emissions from circulation tanks is flaring, which is problematic due to restrictions on flaring such as permitting, location, safety risk, and quality of captured vapors.

OP-10-46 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation t. The regulation has been modified to thoroughly list all of the components of a technology assessment that must be completed by owners or operators of circulation tanks to determine the technical feasibility of controlling emissions from these sources. The intent of this provision is to provide a

thorough, technical review of all possible methods used for controlling emissions from circulation tanks, including technologies that may not require the use of a flare or incinerator. As specified in the regulation, we plan to work closely with the owners or operators during their studies, and once the technology assessment is completed, the ARB Executive Officer will make a determination on the requirement that all circulation tanks be controlled for emissions using a vapor collection system.

T-1-1 Comment: The comment points out that flaring is an area of concern within the San Joaquin Valley and needs to be considered.

T-1-1 Agency Response: ARB staff made no changes in response to this comment. Staff's analysis and the intent of the regulation is not produce any additional NOx emissions that result from additional flaring, and that NOx emissions be limited or even reduced in the San Joaquin Valley. This is accomplished by requiring the use of non-combustion or low-NOx combustion technology, and replacing high-emitting NOx flares withlow-NOx technology in the event that additional incineration is required. The Staff Report and Resolution also commit to continue working with San Joaquin Valley on this issue.

B-4-12 Comment: The comment states that flares may not be a reasonable method of compliance, due to stringent flare rules.

B-4-12 Agency Response: ARB staff agrees that flaring is not the only option for compliance to the rule; and is actually the last compliance option available before shutting in the well. Please see section 95671 for a complete listing of compliance options under this regulation. As noted in the Staff Report, ARB does not foresee new flares but does recognize potential for increased gas combustion. The regulation requires the use of non-combustion technology or low-NOx incinerators in cases where additional gas must be incerated. We estimated that overall this will result in slight NOx emission reduction within the valley in cases where high emitting flares are replaced with the cleaner technology. Staff have worked closely with the San Joaquin Valley Air Pollution Control District on this issue and will continue to do so.

Recordkeeping and Reporting

Recordkeeping and Reporting – Deadline

OP-21-35 Comment: The comment makes a case for a "more reasonable" reporting deadline, just in case there are equipment changes close to the end of the year. The comment suggests changing the reporting deadline from January 1st to March 1st of the year following the reporting year.

OP-21-35 Agency Response: ARB staff made no changes in response to this comment. The intent of this provision is to provide up to one year from the year in which changes to the facility occur. If changes occur late in a calendar year, as mentioned in the submitted comment, the facility has until January 1 of the following

calendar year to submit the required information. Therefore, there is no rush at the end of a calendar year, and it is not necessary to modify the regulation to provide for three extra months to report information.

Comments Received After The 15-day Regulatory Notice

F-11-12 Comment: The comment recommends clarifying language for the reporting requirements.

F-12-4 Comment: (summary of F-11-12)

The consolidated response below addresses the above comments: F-11-12, F-12-4

Agency Response: The intent of this provision is for owners or operators to report a full year of data one time each calendar year. Section 95673(a) specifies that test data is required to be reported to ARB by July 1st of each calendar year unless otherwise specified. Section 95673(a)(1) is the only exception to this requirement, as flash data must be reported within 90 days of performing the testing. Because a year's worth of data will not be available on July 1, 2018, with the exception of flash analysis test data, staff expects the first set of data to be reported as early as January 1, 2019 but by no later than July 1, 2019.

Recordkeeping and Reporting – Enforcement

OP-17-14 Comment: The comment recommends deleting section 95674(f) regarding falsification of information, as it is duplicative of section 95674(g) and unreasonably harsh by not considering intent or willfulness.

OP-17-14 Agency Response: ARB staff made no updates to the provision in response to this comment. Accurate information is the foundation of regulatory compliance. Accordingly, it is appropriate to make clear that submitting inaccurate information violates this regulation. ARB already operates several strict liability reporting requirements of this type, and staff find that this approach is effective in producing accurate information, and is appropriate here. ARB has discretion to vary enforcement responses to a given violation in light of relevant circumstances, including whether information was falsified willfully or knowingly.

OP-17-15 Comment: The commenter asserts that parties who submit inaccurate information should be allowed to "cure" their behavior before enforcement authority is activated.

OP-17-15 Agency Response: ARB staff made no changes in response to this comment. Although entities that self-report inaccurate information, and correct it, may be deemed to have committed a less serious violation of the regulation than those who do not, all else being equal, this matter is better handled in individual enforcement cases than through a difficult to implement and unnecessary regulatory modification.

Comments Received After The 15-day Regulatory Notice

F-14-2 Comment: The comment assumes that the reporting of inaccurate information triggers a violation of the regulation.

F-14-2 Agency Response: The enforcement provisions specified in the regulation provide the ARB Executive Officer with a mechanism for issuing penalties but the Executive Officer retains enforcement discretion. That discretion allows ARB to consider the relative seriousness of violations of this provision. However, inaccurate information can violate this provision, which is appropriate given the high importance of accurate information to implementation and enforcement to protect public health and the environment.

Recordkeeping and Reporting – Data Availability

OP-15-13 Comment: The comment requests that ARB publish all reported data from the regulation and CalEnviroScreen, to the legislature, annually.

B-2-5 Comment: The comment urges ARB to make records of underground monitoring systems available to the public.

B-2-12 Comment: The comment requests ARB require operators to maintain records of LDAR inspection for at least 5 years and to make these records available to the public.

B-2-13 Comment: The comment urges ARB to require operators to make reports of leaks and results of inspections available to the public, and to create a publicly accessible web based platform for operators to submit these records.

B-11-6 Comment: The comment lends support to the provision requiring records to be made available to ARB upon request, and recommends that the same records be available publicly.

B-11-7 Comment: The comment requests that ARB develop a new web-based portal to allow stakeholders to review leak data reported by operators.

T-19-3 Comment: The comment reiterates comment 15-13 and requests ARB annual report to the legislature emissions data collected under the regulation.

The consolidated response below addresses the above comments: OP-15-13, B-2-5, B-2-12, B-2-13, B-11-6, B-11-7, and T-19-3

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. The intent of the regulation is to specify enforcement provisions for ARB, local air districts, and facility operators, and the purpose for requiring reported data is to allow ARB to monitor program status. Staff understands that some members of the public are also interested in monitoring the program status, so staff plans to make emissions data publicly available on a regular basis by way of emissions summaries on ARB's web site.

B-11-11 Comment: The comment supports ARB's efforts to compel operators to repair leaks in a timely manner, but recommends that the records of leaks and repairs be made available to the public.

B-11-11 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The intent of the regulation is to provide a means for determining compliance of the standards by ARB, local air districts, and the facility operators. Staff understands that some members of the public are also interested in monitoring the program status, so staff plans to make emissions data publicly available on a regular basis by way of emissions summaries on ARB's website.

B-2-4 Comment: The comment suggests allowing the public to upload monitoring data to augment the remote access monitoring system reporting requirements.

B-2-6 Comment: The comment suggests allowing voluntary, certified third party verification of the LDAR requirements for quicker leak identification and to ease the burden to industry and ARB.

B-2-7 Comment: The comment suggests the addition of a publicly accessible web based portal for record keeping and inspection reports that also allows for upload of OGI footage and accommodates citizen complaints.

B-2-15 Comment: The comment reiterates the suggestion to allow a role for citizen science in implementation of remote access monitoring and the LDAR program.

B-11-5 Comment: The comment requests that all underground monitoring data and OGI data from outside sources and reported to ARB triggers an inspection by state-agency.

The consolidated response below addresses the above comments: B-2-4, B-2-6, B-2-7, B-2-15, B-11-5

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. The intent of the regulation is to provide a means for determining compliance of the standards by ARB, local air districts, and the facility operators and the role of enforcement responsibility lies with ARB and the local districts. Staff also plans to make emissions data publicly available on a regular basis by way of emissions summaries on ARB's web site and plan to make OGI video footage publicly available in the event of a well blowout. Staff appreciates that some members of the public are interested in assisting with monitoring facilities and providing independently collected data and interested in reports and data. However, staff is not able to verify the test methods or data collected by the public. Staff suggests that independently collected data be submitted to ARB or the local districts for verification. Staff may use such information to inform investigations of facilities and other implementation and enforcement decisions, as appropriate.

B-11-3 Comment: The comment urges ARB to engage in community-scale air quality monitoring.

T-30-3 Comment: The comment reiterates comment B-11-3, urging for community scale monitoring.

The consolidated response below addresses the above comments: B-11-3, T-30-3

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. The intent of the regulation is to provide emission standards for equipment as well as test procedures for determining compliance with those standards. Staff agrees that community air monitoring is essential to ensuring adequate protection to the public and communities. ARB is currently in the process of developing significant community air monitoring efforts, and is in the process of procuring specialized test equipment and performing studies in communities throughout California. Staff plans to begin implementing this program in 2017.

T-27-6 Comment: The comment suggests developing an "I smell it" application to allow community members to report leaks.

T-27-6 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Residents can make odor complaints at any time by contacting local air districts or ARB, and some districts have 24-hour emergency hotline phone numbers that allows residents to communicate with inspectors. Staff understands the nature of this comment and agree that providing residents with the greatest access to inspectors is preferable. Staff will consider developing special applications that can be used in addition to phone numbers and email.

Comments Received After The 15-day Regulatory Notice

SB-3-1 Comment: The comment states that a third party verification system for the LDAR provisions can ease the regulatory burden on ARB, local air districts, and industry.

SB-3-2 Comment: The comment suggests involving third-party nongovernmental organizations in implementing LDAR programs.

The consolidated response below addresses the above comments: SB-3-1, SB-3-2

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. Unlike other reporting programs such as MRR or Subpart W, this regulation is verified by ARB or local air districts by way of field inspections and site visits and by reviewing submitted data. This includes reviewing submitted test results from particular equipment and then field-verifying measurements such as those that are required as part of the LDAR provision. Since the regulation will be verified by ARB or the local air districts, staff does not see a need for third-party verification at this time.

SB-3-3 Comment: The comment urges ARB to allowed citizen enforcement of LDAR programs, explaining that technicians performing OGI will have the same certifications

as their industry and government counterparts. The comment further suggests ARB or local air district adopt an agreement with certified third party thermographers, allowing "qualifying complaints" to be electronically submitted, triggering investigations of LDAR violations. Similar arrangements have worked with U.S. EPA enforcement efforts in the Eagle Ford shale region of Texas.

SB-3-4 Comment: The comment reiterates comments SB-3-1, SB-3-2, and SB-3-3.

The consolidated response below addresses the above comments: SB-3-3 and SB-3-4

Agency Response: Please see response to comment B-2-4 et al. Although staff received comments on the same topic, again, we stand by the original reasoning not to make changes to this provision.

Flash Analysis Testing

Flash Analysis Testing – Definitions

OP-2-2 Comment: The comment points out that in order to avoid confusing the gas-to-oil ratio used by producers to quantify the ratio of gas production to oil production from a well, "GOR" in the flash analysis test should be labeled "FGOR" – flash gas-to-oil ratio, expressed in scf/storage tank barrel. This is because some producers do not have reliable metering on the separator, and the reported FGOR emissions will likely be low if not corrected.

OP-2-3 Comment: The comment expresses a correction for "flash gas-to-water ratio", FGWR to correct for otherwise low emissions reported in this field.

The consolidated response below addresses the above comments: OP-2-2, OP-2-3

Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Changing the title of this definition has no impact on the testing or test results and GOR/GWR is industry accepted terminology currently being used by ARB and other agencies.

Flash Analysis Testing – Clarification

OP-2-5 Comment: The comment recommends clarifying the flash analysis test to make it clear to the tester that the pressurized sample should be collected from the separator that is immediately upstream of any storage tank that has potential to vent gas to the atmosphere.

OP-2-5 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Staff agrees with the comment that various types of systems can exist throughout oil and gas production fields, and that special care must be taken to ensure that samples are gathered at a point immediately prior to a tank or vessel where flashing may occur. The test procedure clearly states that samples must be collected from a pressurized separator upstream of a separator or tank where

flashing may occur. Therefore, the test procedure already states what is suggested in the comment.

OP-2-11 Comment: The comment refers to the section of the flash analysis test mentioned in comment 2-5, requesting the removal of the words “steady state”. Additionally, in section 8.16 of the flash analysis procedure, the comment requests the reference to section 12 be corrected to section 10.

OP-2-11 Agency Response: Based on the received comment, ARB staff made changes to remove the words “steady state” and properly reference section numbers in the test procedure.

OP-2-13 Comment: The comment recommends rewriting the flash test procedure to reduce ambiguity and recommends simply referencing the GPA 2103 and 2186 test method for directions on performing the procedure.

OP-2-13 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Staff has determined that Gas Processors Association test methods GPA 2103 and 2186 lack a clear analytical laboratory procedure for conducting a flash analysis procedure or provide clear instructions for gathering different types of samples, including heavy oil samples as found in California. Therefore, the test procedure was written to provide detailed, step-by-step instructions for conducting the analytical laboratory procedures and field sampling methods.

OP-2-18 Comment: The comment recommends corrections for equations 4, 5, and 6, based on prior discussion in the letter.

OP-2-18 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Staff verified that all of the equations and titles are correct.

OP-2-20 Comment: The comment clarifies an earlier comment on the correct calculation of storage tank barrel.

OP-2-20 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The test procedure requires that all volumetric liquid measurements be converted into terms of Stock Tank Barrel (STB) units. Therefore, no additional conversion is necessary. This approach ensures that all units of measurements are standardized.

OP-2-21 Comment: The comment request that ARB staff properly format the equations that appear in the flash analysis procedure, also noting that table 1 in the procedure is incomplete – but does not detail how to complete the table.

OP-2-21 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The equations are acceptably formatted and the list of compounds identified in Table 1 provides a complete listing of all compounds that the laboratories must measure and report.

OP-10-37 Comment: The comment states that the regulation is not clear in its requirements for existing facilities, and recommends language that allows operators to delay compliance to within 24 months of the flash analysis test.

OP-10-37 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The intent of the regulation is clear for both new and existing separator and tank systems. After January 1, 2019, existing separator and tank systems must comply with the emission standards. An existing system, originally operating below the emission threshold, but later discovered to be operating above the allowable emission threshold, must still comply with the vapor collection system requirements. We view this as a special circumstance and will be addressed on a case-by-case basis, and an allowance will be provided to provide sufficient time to permit and install control equipment.

OP-21-41 Comment: The comment requests clarification of the language in the staff report, stipulating that the Flash Analysis Procedure listed in the regulation is the same as the Flash Test Procedure listed in the MRR, but with modifications.

OP-21-41 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The test procedure proposed in the regulation is a modified version of the test procedure used by the MRR program. The revised test procedure was modified to make a significant number of improvements to aid in measurement accuracy, which can be utilitized by both programs. As such, the MRR has also incporated the revised version of the test procedure into its current rulemking package so that both programs will utilize the same procedure

Comments Received After The 15-day Regulatory Notice

F-9-43 Comment: The comment suggests that transferring liquid from a floating piston cylinder to double valve cylinder may compromise the integrity of the sample. The comment suggests that the graphing procedure in sub-section (g) may allow flawed samples to pass the bubble point criteria.

F-9-43 Agency Response: The purpose of transferring liquid from a floating piston cylinder to a double valve cylinder is so the sample can be re-pressurized to perform a bubble point measurement. A floating piston cylinder does not allow the sample to be re-pressurized because the gas used to fill the pre-charge side (i.e., backside) of the cylinder is compressible. During development of Gas Processors Association (GPA) Method 2174, studies found that absorption of hydrocarbon compounds into transfer water were minimal. Therefore, transferring liquid between cylinders using laboratory-grade transfer water will have no impact on the sample being evaluated.

The graphing procedure is used to determine the bubble point pressure of the sample, which should be the same or similar to the sample collection pressure. This method is used to verify sample integrity and ensure that no gas has leaked during transport. The procedure also checks to ensure that the cylinder was completely filled with liquid, and that no gas pockets were introduced into the cylinder while the liquid was collected. Either of these aspects will be detected during the bubble point measurement, which is the intended purpose of this procedure. The process is carried out by recording different pressure readings and then graphing the results as stated in the comment. Included in section 10-3(i) are pass/fail criteria for the recorded measurements. If the actual bubble point pressure in the field is much less or much greater than the actual bubble point measurement performed in the laboratory, it is probable that the sample would fail the pass/fail criteria.

Flash Analysis Testing – Feasibility

OP-2-1 Comment: The comment states that in the flash analysis test procedure, the double valve cylinder is not viable for sampling produced water because the displacement fluid is water or glycol.

OP-2-1 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Staff understands the commenter's choice of not using a double valve cylinder for collecting produced water. However, ARB's studies show that these cylinders can be used to successfully to gather produced water. Care must be taken to properly orient the cylinder and to only use an immiscible fluid. Staff has also included an alternative sampling method that allows the technician to use sample water as a displacement liquid.

OP-2-7 Comment: Referring to comment 2-1, the comment indicates that the commenter's data is in conflict with the flash analysis test, in that double valve and piston cylinders may be used for condensate and there is no significant difference in analytical results, when using either.

OP-2-7 Agency Response: Based upon the received comment, ARB staff modified the regulation to allow for the use of double valve cylinders for collecting samples of condensate. This change was made after several discussions with laboratories that routinely use these cylinders for gathering samples of condensate. However, staff strongly urges the technician to consider the use of these cylinders with condensate, and to carefully note the average API gravity of the liquid.

Flash Analysis Testing – Best Practices

OP-2-6 Comment: The comment recommends annually recertifying thermometers and pressure gages as "best practice" in the flash test procedure; the comment also recommends that the accuracy of the pressure gauge be ±0.1% and the thermometer be ±0.5°F.

OP-2-6 Agency Response: Based upon the received comment, and following discussions with several laboratories, ARB staff modified the regulation to require that all temperature and pressure gauges be calibrated, at least twice per year, and set the pressure gauge accuracy at +/- 0.1%. Accuracy for a full range temperature gauge of +/- 2 degrees F is standard.

OP-2-8 Comment: The comment recommends that a valve be in place on the sample probe, before the thermometer and pressure gauge, when performing the flash analysis test.

OP-2-12 Comment: The comment suggests that 15 psig sampling is not possible without specialized equipment in section 9.1 of the procedure, and requests a correction on figure 3, to include a valve on the sample probe.

The consolidated response below addresses the above comments: OP-2-8, OP-2-12

Agency Response: ARB staff made no updates to the provision, based upon the above recommendations. Staff has determined that it is technically feasible to gather samples at a pressure of less than 15 psig. In the event that liquid will not flow into a sampling cylinder, the technician may need to use a specialized pump or syringe to gather the sample. Regarding the issue of a valve placement, the diagram in the test procedure is only provided as an example sampling train. The sampling technician will evaluate each vessel for sampling and determine if additional valves are necessary to control the flow of liquids.

OP-2-9 Comment: The comment suggests that the published sample rate in the flash analysis test is simply too rapid and likely to cause flashing in the cylinder. The comment goes on to recommend a more reasonable sample rate, to ensure that the sample is not flashed prematurely.

OP-2-9 Agency Response: Based upon the received comment, ARB staff modified the regulation to reduce the maximum sample collection rate to 60 milliliters per minute. Although a faster sampling rate appeared to work in some cases, staff were advised that this rate exceeded common laboratory practices and could result in excess gas within the sample cylinder.

OP-2-10 Comment: The comment recommends filling the sample cylinder to no more than 80% with at least 10% outage allowed for thermal expansion. The comment cites 49 CFR 173.40 regarding outage requirements: Sufficient outage must be provided so that the cylinder will not be liquid full at 55 degrees C (131 degrees F).

OP-2-10 Agency Response: Based upon the received comment, ARB staff modified the regulation to require that outage must be taken in all double valve cylinders. This modification was made to address possible safety concerns when transporting pressurized cylinders and is necessary to perform the bubble point procedure. The

regulation specifies that approximately 20% of the total cylinder volume must be removed as outage to provide some discretion when measuring outage volumes.

OP-2-14 Comment: The comment requests that ARB include performance checks to evaluate and validate pressurized hydrocarbon sampling and analysis. The minimum suggestion is a comparison of bubble point pressure to separator pressure. The commenter will soon publish a study with more methods of evaluation.

OP-2-14 Agency Response: Section 10 of the test procedure specifies that for each day of sampling, the laboratory must gather at least one field duplicate to demonstrate acceptable method precision. In addition, staff has also modified the test procedure to incorporate a Bubble Point procedure along with Pass/Fail criteria for evaluating the samples at the vessel collection pressure. This approach is currently sufficient to verify that the sampling technician and the laboratory are conducting their procedures accurately. Staff agrees that additional quality assurance checks can be helpful, and will evaluate any voluntarily supplied data or information and may make future changes to the test procedure based on newer information.

OP-2-15 Comment: The comment refers to their prior comments 8.10 and 9.7 (in the same letter), stating that the method of heating liquid samples can pose a safety risk.

OP-2-17 Comment: The comment refers to their prior comments 8.8 and 9.7 (in the same letter), stating that the method of heating liquid samples can pose a safety risk.

The consolidated response below addresses the above comments: OP-2-15, OP-2-17

Agency Response: Based on the received comment, ARB staff modified the test procedure to include language pertaining to laboratory safety when pressurized cylinders are heated for analysis. This language can be found in section 10.3 of the Test Procedure.

OP-21-7 Comment: The comment requests clarification for the throughput levels to be averaged over the calendar year.

OP-21-12 Comment: The comment states that operators should have the opportunity to limit throughput for a separator/tank system to ensure annual emissions are less than the 10 MT per year threshold.

OP-21-13 Comment: Comment reiterates comments OP-21-7 and OP-21-12.

The consolidated response below addresses the above comments: OP-21-7, OP-21-12, and OP-21-13

Agency Response: ARB staff made no changes to the provision based upon the above recommendation. An operator may elect to limit throughput in order to limit annual emissions, if it occurs within the same calendar year as testing and is reflected in the annual production figures submitted to the California Division of Oil, Gas, and

Geothermal Resources (DOGGR). The regulation was also modified to state that the throughput value reported to DOOGR is also used to determine the average annual throughput of the tank system.

Flash Analysis Testing – Implementation

OP-19-54 Comment: The comment requests clarification in section 95688(a). Specifically, the method by which the Executive Officer determines whether test results reflect representative results of similar systems. The comment stated also that testing once per 5 years was not frequent enough to determine if emissions increased above the 10 MT per year threshold. Lastly, the comment requests a retesting for any increase in threshold, not only if more than 20 percent.

OP-19-54 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Section 95668(a)(5)(F) is intended to provide ARB with the ability to require additional testing in the event that results do not reflect results of similar systems. Testing over the course of three consecutive calendar years will yield results that are representative of a system, and still represent a cost-effective approach for gathering data. Furhter, the ARB or inspectors have the ability to perform flash testing of any system in order to verify compliance.

The purpose of the increase in throughput (e.g., from 10% to 20%) is intended to account for fluctuations in daily throughput. After receiving stakeholder feedback, staff reevaluated these criteria and determined that a fluctuation of as little as 5 barrels per day could have an impact on a 50 barrel per day system with minor changes to annual emissions. The intent of the regulation is to clearly define systems that are above the standard which will result in the installation of vapor control equipment.

Flash Analysis Testing – References

OP-2-16 Comment: The comment details that the references used for the flash analysis procedure were either incorrect or not current. It then goes on to recommend the correct references.

OP-2-16 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. The test methods mentioned are incorporated by reference into the flash analysis test procedure. Due to the evolving nature of test methods, newer versions may become available as determined by the agency that publishes them. In the case of the test methods mentioned in the comment, ARB staff does not believe that the newer versions of the reference methods add significant modifications that would require a change to the release date of the methods.

OP-2-19 Comment: The comment discusses the most current versions of references that are used in the flash analysis procedure, and alternate references where one of the references used by ARB staff was withdrawn by industry.

OP-2-19 Agency Response: Based on the comment received, ARB staff eliminated and replaced reference methods in the procedure to ensure that only relevant methods are incorporated by reference. This includes elimination of ASTM D-4007-08, ASTM D-3710-95, and 2597-10. Staff also included a new reference to ASTM D-7096-16.

OP-2-22 Comment: The comment states that flash liberation (e.g., flash analysis) is not an ASTM or GPA method, and there is no reference for it. Additionally, the comment requests that all references in the procedure be updated.

OP-2-22 Agency Response: ARB staff made no updates to the provision, based upon the above recommendation. Staff has determined that there are no applicable references available that describe the laboratory flash analysis procedure in significant detail. The laboratory procedure contained in the flash analysis test procedure was developed during ARB field testing in collaboration with laboratories located both inside and outside of California.

Other Regulations

Other Regulations – Authority

OP-16-11 Comment: The comment asserts that ARB is interpreting SB 1371 as preempting its own authority to regulate methane emissions from methane pipelines, but that the proper interpretation of SB 1371 is that ARB has independent authority.

OP-16-11 Agency Response: Staff agrees that ARB has independent authority to regulate methane emissions from these sources, and that SB 1371 recognizes this authority. ARB is sequencing its regulatory efforts while it actively consults with the CPUC on regulations in that area. ARB will continue to evaluate the need for additional ARB regulations, in part based on the CPUC's regulatory decisions.

B-2-8 Comment: The comment encourages ARB to collaborate with local air districts on implementing the LDAR provisions and states that local air districts should maintain the ability to impose more stringent LDAR requirements.

B-11-8 Comment: The comment recommends ARB-air district collaboration on LDAR enforcement and that local air district should maintain the ability to impose additional, stronger LDAR requirements.

The consolidated response below address the above comments: B-2-8, B-11-8

Agency Response: ARB staff made no changes to the provision based upon the above recommendation. ARB collaborated with local air districts to design the LDAR inspection, recordkeeping, and reporting requirements. In the event that a local air district has no LDAR rules, or, if equipment in a district is not covered by local district LDAR rules, the regulatory requirements will apply. Further, the regulation does not prohibit a district from creating more stringent standards. Nor does it supplant existing

district LDAR programs to the degree that they already cover certain sources. This approach was chosen because all districts follow the same or very similar standards.

Other Regulations – Duplicative/Conflicting

OP-17-4 Comment: The commenter asserts that there is a significant risk that ARB's rules will conflict with rules proposed by the Division of Oil, Gas, and Geothermal Resources (DOGGR) with regard to the drilling, operation, maintenance, and abandonment of oil and gas wells.

OP-17-4 Agency Response: ARB has worked closely with DOGGR as both agencies have developed their regulatory programs to avoid potential conflicts. ARB and DOGGR have a respectful and effective working relationship and frequently collaborate, such as reviewing the underground natural gas storage monitoring plans and to review permits for for certain well stimulation treatments. The final rule does not create conflicts.

OP-17-10 Comment: The comment points out that many different agencies are proposing new regulations for the oil and gas sector, and that a poorly coordinated patchwork of regulations could create confusions or unduly increase costs. The commenter urges ARB not to adopt regulations that may result in regulatory conflict or overlap.

T-9-3 Comment: The comment requests ARB ensure strong coordination between all regulating agencies to avoid additional cost without additional benefit.

T-13-1 Comment: The commenter states that it is important to harmonize the Regulation with other existing requirements to avoid duplication, especially with different testing requirements, such as flash analysis.

T-14-2 Comment: The commenter would like to minimize duplicative regulations for industry.

T-28-1 Comment: The comment states concern of the registration process, stating that it should be clear whom—ARB or local air districts—will be running the program.

The consolidated response below addresses the above comments: OP-17-10, T-9-3, T-13-1, T-14-2, and T-28-1

Agency Response: Staff agrees that it is appropriate to avoid regulatory conflicts where possible. However, it may be inevitable for industries to comprehensively address pollution risk, public safety, and other types of production-related apsects as found in the oil and gas sector by way of a single agency program. ARB staff has made significant efforts to ensure that the oil and gas regulation does not produce inappropriate conflicts, and believe the final regulation meets this goal.

OP-14-4 Comment: Part 1 of 5 - The comment states that the regulation should not require more stringent LDAR provisions than the recently adopted New Source Performance Stndards (NSPS 40 CFR Part 60 Subpart OOOOa) from the EPA, for new sources.

OP-14-4 Agency Response: Part 1 of 5 - ARB staff made no changes to the provision based on the above recommendation. California's major oil and gas producing regions have already successfully implemented the LDAR requirements in this regulation. Staff continues to strive for harmonization with those existing requirements because they are effective and attainable, as proven by years of successful implementation. The Regulation addresses existing facilities and equipment where 40 CFR Part 60, Subpart OOOO (Quad O) does not. As noted by the commenter, the Regulation is more restrictive. The differing state requirements are authorized by law and are necessary to achieve additional benefits for human health, public welfare, and the environment, and are justified by these benefits. The Regulation is 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, including U.S. EPA's pending updates to Quad O to include all existing oil and gas facilities (Subpart OOOOa). Moreover, in light of U.S. EPA's recent withdrawal of an Information Collection Request that was intended to support future existing source regulations, such regulations are likely to be delayed at the federal level.

OP-10-1 Comment: The comment recommends that the final regulation be consistent with current federal, state, and local air quality regulations.

OP-17-77 Comment: The comment notes that there are multiple agencies working on regulatory proceedings related to the oil and gas sector and requests that ARB continue working with these agencies as temporal inconsistencies in the ARB's and other agencies' implementation of rules applying to the oil and gas industry could create inefficiencies by requiring affected facility operators to continuously update their practices and compliance procedures. Current agency actions include:

- U.S. EPA Greenhouse Gas Reporting Program
- U.S. EPA Methane Challenge
- U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration Advisory Bulletin
- Senate Bill 1371
- Division of Oil, Gas, and Geothermal Resources Emergency Regulations
- SCAQMD Order for Abatement (Case No. 137-76): Condition 8 – Enhanced Leak Detection and Reporting Well Inspection Program; Condition 10 – Continuous Air Monitoring Plan; and Condition 11 – Public Notification
- Bureau of Land Management/Department of the Interior Proposed Regulations

OP-17-78 Comment: The comment was inadvertently left off of the last bullet point of 17-77.

OP-17-79 Comment: The comment recommends that ARB, DOGGR and other agencies with related regulations should synchronize the timing to enact these regulations so that they are consistent and do not cause unnecessary duplication.

OP-17-80 Comment: The comment states that if ARB's regulations require similar actions to DOGGR's emergency regulations, this could potentially forcing regulated entities to conduct duplicative work at a cost that likely exceed environmental or risk-reduction benefits.

OP-17-82 Comment: The comment details ARB's work with the CPUC in developing requirements pursuant to SB 1371, citing potential overlap as a reason for the board not to adopt this regulation until after phase 1 of the CPUC rulemaking has been completed.

OP-17-84 Comment: The comment states that if all the rulemakings proceed, the result may be challenging for facilitites and even if the regualtions are similar, it is extremely inefficient to require the same information to be reported to different agencies in different formats. Therefore, SoCalGas requests that ARB refrain from pursuing additional regulations and allow the process of other agencies to more fully run their course.

T-29-1 Comment: The comment states concern of possible duplicative requirements, urging consistency with current local, state, and federal air quality regulations.

The consolidated response below addresses the above comments: OP-10-1, OP-17-77, OP-17-78, OP-17-79, OP-17-80, OP-17-82, OP-17-84, and T-29-1

Agency Response: ARB staff made no changes to the provision based upon the above recommendation. ARB staff conducted a thorough review of existing regulations before this rulemaking commenced, thus ensuring that ARB's regulation for Greenhouse Gas Emissions Standards from Crude Oil and Natural Gas Facilities is one of ARB's greenest regulations, with tough but achievable standards. The regulation is consistent with federal, state, and local air quality regulations. For more information on the development of the regulation, please see pages 12-14 in the Staff Report. For more information on related regulations, please see Chapter 1.C. of the Environmental Analysis, Appendix C of the Staff Report.

While ARB and DOGGR are coordinating to synchronize requirements and implementation dates, ARB's oil and gas regulation will replace portions of DOGGR's emergency regulation and this is acknowledged in DOGGR's draft regulation.

Additionally, ARB and CPUC are coordinating to synchronize requirements and implementation dates, to relieve any potential overlap.

Each of the regulations mentioned in the comment were developed independently from one another. This rulemaking was developed with, and refined by meetings and input from local air districts and stakeholders who have already implemented the

aforementioned regulations. Both of the terms section and segment fulfill the same intended purpose in the same equivalent manner.

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. ARB staff carefully reviewed existing and proposed regulations as this Regulation was developed. The Regulation 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 Regulation 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.

- U.S. EPA's several reporting and control programs have been taken into account by ARB's rule, which is generally more comprehensive and rigorous. The federal Clean Air Act provides that states may set more stringent standards, and ARB has done so, while avoiding any conflicts with the federal program. U.S. EPA's Greenhouse Gas Reporting Program (GHGRP) proposed leak detection methodology revisions and confidentiality determinations for petroleum and natural gas systems can be fulfilled without any direction interaction with the ARB program (indeed, much of the GHGRP is incorporated within ARB's own separate Mandatory Reporting Regulation for greenhouse gases. U.S. EPA has also issued New Source Performance Standards (NSPS) for oil and gas sources, for both methane and VOCs. ARB's program does not conflict with these standards, but provides for more stringent coverage and compliance, consistent with the law. U.S. EPA has indicated that existing source standards may be developed (and has called for some revisions to State Implementation Plans) for existing sources. Although the new federal Administration has slowed the progress of several of these programs, ARB staff anticipate that requirements in the Regulation would aid in (and may suffice entirely for) compliance with any federal standards developed.

- The U.S. EPA Methane Challenge is a voluntary program, and therefore is not considered to have conflicting enforceable requirements for reducing emissions from oil and gas facilities. The Methane Challenge provides a mechanism for oil and gas companies to make specific and transparent commitments to reducing methane emissions.[5] Methane Challenge Program partners, or companies volunteering to be part of the Methane Challenge, commit to address one or more emission sources by implementing best management practices, company-wide, in a timeframe not to exceed five years.[6] These best management practices are consistent with U.S. EPA's

[5] https://www.epa.gov/natural-gas-star-program/natural-gas-star-methane-challenge-program

[6] Natural Gas STAR Methane Challenge Program: Onshore Production, Gather and Boosting, Processing, and Transmission and Storage Supplementary Technical Information, updated March 9, 2016

Quad O requirements for new sources, including equipment and emissions reporting.

- The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) Advisory Bulletin is an advisory bulletin and is consistent with DOGGR's emergency regulations, which either do not overlap, or are consistent with the LDAR provisions of the Regulation. The PIPES Act of 2016 ensures that PHMSA finishes out the 2011 Act directives to improve pipeline safety.[7] The PIPES Act of 2016[8] authorizes PHMSA to issue minimum safety standards for underground natural gas storage facilities (Section 12); to issue an emergency order imposing emergency restrictions, prohibitions, and safety measures on owners and operators of gas or hazardous liquid pipeline facilities (Section 16); and to establish the Aliso Canyon Natural Gas Leak Task Force to analyze the cause, response, and impact of the leak and to recommend how to prevent any future leaks (Section 31). In each of these sections, PHMSA is directed to work with State and local agencies. ARB is collaborating with the California Public Utilities Commission (CPUC) regarding transmission and distribution leakage regulations; ARB's own environmental regulation is beyond the direct ambit of PHMSA's work, but ARB has carefully worked with the CPUC, which administers PHSMA programs in California, to ensure consistency.

- DOGGR's emergency regulations are consistent with other relevant authority, and ARB has coordinated this Regulation for consistency with DOGGR's work as well. For instance, the PIPES act of 2016 mandated DOT to establish an Aliso Canyon Task Force to analyze the accident and how federal, state, and local agencies responded to the leak; access the impacts of the leak on health, safety and environment; and recommend steps to prevent future incidents, including whether to continue the Aliso Canyon operations. This will require a lot of interaction and cooperation with DOGGR and potentially influence its future regulations. Both the DOGGR's emergency regulations and draft permanent regulations require gas storage facility operators throughout the state to comply with six new measures:

    - At least a daily inspection of gas storage well heads, using gas leak detection technology such as infrared imaging – this is consistent with section 95668(h)(5)(B), which requires daily or continuous screening of the wellhead assembly with the use of U.S. EPA Reference Method 21, Optical Gas Imaging, or other natural gas leak screening instruments – section 95668(h), natural gas underground storage facility monitoring requirements, was modified to specify that leak detection protocols approved by DOGGR shall remain in effect until an ARB monitoring plan is approved and all monitoring equipment is operational, while at the same

[7] PIPES Act Summary, Transportation & Infrastructure Committee, 2016
[8] Protecting our Infrastructure of Pipelines and Enhancing Safety Act of 2016, Public Law 114-183, June 22, 2016

time, DOGGR's draft permenant regulations state that its monitoring requirements shall cease to apply to an underground gas storage project if the California Air Resources Board approves a monitoring plan under its regulations for that facility. These two requirements were designed with close coordination between the two agencies to prevent overlap or duplicative requirements.

- Require ongoing verification of the mechanical integrity of all gas storage wells – does not overlap with any provisions of the Regulation.
- Require ongoing measurement of annular gas pressure or annular gas flow within wells – does not overlap with any provisions of the Regulation– this is complementary to section 95668(g)(1) which requires annual measurement of the natural gas flow rate from well casing vents open to the atmosphere.
- Require regular testing of all safety valves used in wells – does not overlap with any provisions of the Regulation.
- Establish minimum and maximum pressure limits for each gas storage facility in the state – does not overlap with any provisions of the Regulation.
- Require each storage facility to establish a comprehensive risk management plan that evaluates and prepares for risks at each facility, including corrosion potential of pipes and equipment – does not overlap with any provisions of the Regulation.

- DOGGR is working with ARB to ensure that any regulatory measures it proposes interact well with ARB rules.
- Senate Bill 1371 directs the California Public Utilities Commission (CPUC) to work with ARB to address GHG emissions from commission-regulated gas pipeline facilities that are intrastate transmission and distribution lines. This separate regulatory effort addresses emission sources different from the sources covered in this Regulation. Work under SB 1371 at the CPUC has been carefully tracked by ARB, which is collaborating closely with the CPUC, including in developing recently released lists of best practices for certain transmission and distribution sources. The latest draft of the Best Practices acknowledge this regulation and state that the Best Practice must be consistent with this regulation.
- The SCAQMD Order for Abatement, Case No. 137-76, was issued to SoCalGas in response to the catastrophic release that occurred at the Aliso Canyon natural gas storage facility in late 2015 – early 2016. Order 8 requires SoCalGas to submit, for approval, enhanced leak detection and

reporting well inspection program.[9] This order outlines elements to be included in the inspection program, including monitoring and record keeping of emissions. ARB staff anticipate that requirements in the Regulation would aid in compliance with Order 8. Order 10 requires SoCalGas to provide funding for District staff and/or contractor to develop, staff, and implement a continuous air monitoring plan. Because this plan is independent from any other air monitoring plan being performed by SoCalGas, or in conjunction with any other agency, ARB has no authority in the implementation or enforcement of this order. Order 11 requires SoCalGas to submit, for approval, an Air Quality Notification Plan, to notify the public in the event of a reportable release. Provisions in section 95672(a)(8)-(10) of the Regulation do not overlap with Order 11 as ARB does not require reporting to other public departments. In addition, this is part of an enforcement action for one facility and would be separate from regulatory action.

- The Bureau of Land Management (BLM) has 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). These regulations are consistent with U.S. EPA's NSPS rules and apply to federal sources, new and existing, on federal lands and tribal lands. ARB's Regulation does not apply to tribal lands; it does apply to federal lands. ARB's Regulation is consistent with, and does not interfere with, the BLM rules.

Comments Received After The 15-day Regulatory Notice

SB-4-3 Comment: The comment is opposed to duplicative regulations that increase industry burden without adding environmental protection. The comment goes on to suggest that ARB should not have an LDAR program, as SJVAPCD already has an LDAR program in effect.

SB-4-4 Comment: The comment requests the Board adopt a position in opposition to increased and unnecessary regulation of oil and gas producers.

The consolidated response below addresses the above comments: SB-4-3, and SB-4-4

Agency Response: Please see response to Comment OP-10-1 et al. Although staff received comments on the same topic, again, we stand by the original reasoning not to make changes to this provision.

[9] SCAQMD Order for Abatement, Case 137-76, Southern California Gas Company, Aliso Canyon Storage Facility Findings and Decisions

Implementation

Implementation – Timeline

OP-3-3 Comment: Comment requests the implementation timetable be moved up by a full year.

OP-11-3 Comment: The comment urges ARB to implement the rule as soon as possible with no further delays.

OP-14-2 Comment: The comment requests that ARB staff delay action on underground storage until the investigation into the cause of the Aliso Canyon natural gas leak is complete and the federal minimum standards are established. The comment recommends using pipeline safety consensus standards.

OP-15-6 Comment: The comment states that ARB should drive to implement all standards within two years of adoption, rather than staging the implementation as proposed for the Regulation.

OP-16-2 Comment: The comment urges ARB staff to roll back to the original implementation date of January 2017.

B-5-2 Comment: The comment urges ARB to move up the compliance implementation timeline.

B-6-2 Comment: The comment urges ARB to move up the compliance implementation timeline.

B-7-2 Comment: The comment urges ARB to move up the compliance implementation timeline.

B-8-2 Comment: The comment urges ARB to move up the compliance implementation timeline.

T-21-2 Comment: The comment urges ARB not to delay the implementation timeline by a year, from January 2017 to January 2018.

T-22-2 Comment: The comment urges ARB not to delay the implementation timeline by a year, from January 2017 to January 2018.

T-23-2 Comment: The comment supports a faster implementation timetable.

T-25-3 Comment: The comment urges implementation of the rule as soon as possible.

T-27-2 Comment: The comment supports quick implementation, urging industry to "stop bellyaching" about the implementation period.

T-29-8 Comment: The comment states that the compliance deadlines should be extended to allow time for local air districts to implement and for operators to comply.

The consolidated response below addresses the above comments: OP-3-3, OP-11-3, OP-14-2, OP-15-6, OP-16-2, B-5-2, B-6-2, B-7-2, B-8-2, T-21-2, T-22-2, T-23-2, T-25-3, T-27-2, and T-29-8

Agency Response: ARB staff made no changes in response to the received comments. ARB developed the regulation using approaches that are highly effective at controlling emissions and enforceable by ARB and the local air districts. In order to allow time both for facilities to implement necessary staffing changes and purchases and for the districts and ARB to have trained staff and to permit all equipment, the regulation takes a phase-in approach that is staged to meet all of the various requirements in the quickest and most effective timeframe possible. Beginning January 1, 2018, facilities must start to comply with the requirements. This includes performing testing of equipment that is required to properly size and design emission control systems, as well as registering or permitting equipment with ARB or local air districts. This approach provides a fair, justified, and aggressive implementation strategy when considering the vast numbers of oil and gas equipment located California. Not only is this schedule requiring ample effort on the part of the oil and gas companies, but it also puts considerable strain on ARB and the local air districts. Each of the responsible agencies must staff up and obtain necessary equipment in order to enforce each of the individual provisions at a number of remote facilities.

With respect to LDAR, staff understands that a number of oil and gas facilities must already comply with existing local air district LDAR rules. However, this regulation covers equipment at facilities that have never been subject to LDAR standards. The phase-in approach of the LDAR provisions also creates an aggressive strategy for controlling emissions while understanding the cost impacts and pressure it places on facility operators. Based on local air district experience and stakeholder feedback, staff understands that implementing LDAR at facilities that have never been subject to such standards can result in substantial costs and require substantial lead time to make repair or replace equipment. The regulation was therefore designed to accommodate such issues. During the first two years of implementation, operators are provided with slightly higher leak standards in order to repair the higher emitting leaks first. After the second year of implementation, each facility must comply with the final leaks standards.

OP-10-63 Comment: The comment states that the implementation date should be delayed by one year.

OP-10-63 Agency Response: ARB staff modified the implementation date for which vapor collection systems must be installed to January 1, 2019. This change is consistent with the intent of the regulation, which is intended to require the installation of equipment one year after testing, to provide time for operators to plan, gather necessary permits, purchase and install equipment.

OP-10-65 Comment: The comment recommends altering the compliance date to the date the vapor collection system is required, instead of a calendar date.

OP-10-65 Agency Response: Based on the received comment, ARB staff modified the implementation date for systems that cannot control vapors to January 1, 2019. This change is consistent with the intent regulation, and aligns with the date for when equipment installations or change outs go into effect.

OP-10-80 Comment: The comment recommends revised language to reduce the stringency of the provision by allowing more leaks than the standard recommended by ARB.

OP-10-80 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The leak thresholds have been successfully implemented in several oil and gas producing districts so the leak rate thresholds are achievable using existing equipment and technology. These requirements are necessary to prevent widespread emission losses from equipment, particularly from larger leaks that result in significant emissions. Staff will evaluate data and progress periodically. Please also see consolidate response to comments OP-10-79.

OP-13-18 Comment: The comment specifies a request to extend the implementation deadline in order to comply with the provision of developing a baseline for continuous monitoring. The comment suggests that time and effort will be needed to identify and validate technologies. The comment proposes ARB consider a staged implementation approach that includes design and testing prior to performance objectives. The comment goes on to detail technical challenges including potentially misinforming the public with false alarms if a monitoring program were prematurely implemented.

OP-17-35 Comment: The comment requests that ARB staff add further flexibility into the implementation schedule for underground storage facility monitoring to iron out technical issues associated with additional monitoring.

OP-17-38 Comment: For a variety of reasons, the comment request a longer implementation schedule for underground storage monitoring. These reasons include the effort needed to find and validate technologies to meet the regulatory criteria, as well as the time to develop a baseline monitoring to quantify GHG fugitives from the underground storage facility, and finally time to allow the technology itself, to mature.

OP-17-39 Comment: The comment requests that ARB staff consider a staged approach to implementation for underground storage monitoring. The commenter is asking to monitor without action for one year, then report back to ARB for further studies on what establishes an actionable level of methane fugitive leak, and the ability to judge performance of monitoring, rather than set baseline values at this time.

The consolidated response below addresses the above comments: OP-13-18, OP-17-35, OP-17-38, and OP-17-39

Agency Response: Based on the received comments, ARB staff modified the monitoring provision for underground storage facilities to provide facilities with greater flexibility in choosing instruments as well as the baseline monitoring criteria. This was accomplished by adjusting the equipment specifications to allow for a wider variety of instruments, and by adjusting the monitoring parameters. The revisions now allow facilities to perform 12 months of monitoring to establish specific criteria for each individual facility that is used to determine the facility baseline. The baseline monitoring criteria was also modified to provide a more realistic approach to when an alarm condition is triggered, and provides facilities with the flexibility to request modifications

to the baseline each year. Please also see Reponses OP-13-9, OP-17-22, F-8-6 and F-9-42.

OP-17-81 Comment: The comment urges ARB to "wait and see" how U.S. EPA's NSPS (Subpart OOOOa) existing sources requirements will unfold before promulgating potentially duplicative or conflicting regulations.

OP-17-81 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. It is critical to implement the requirements as soon as possible in order to meet the greenhouse gas reduction goals of the State, as outlined in the Scoping Plan. 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 40 CFR Part 60, Subpart OOOO (Quad O) does not, and is more restrictive. The differing state requirements are authorized by law and are necessary to achieve additional benefits for human health, public welfare, and the environment, and are justified by these benefits. The Regulation is 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, including U.S. EPA's pending updates to Quad O to include all existing oil and gas facilities (Subpart OOOOa). Moreover, in light of U.S. EPA's recent withdrawal of an Information Collection Request that was intended to support future existing source regulations, such regulations are likely to be delayed at the federal level. It would be inappropriate to further defer control of sources in California pending indefinitely delayed federal action.

OP-17-83 Comment: The comment requests ARB to extend phase-in period to ensure that its regulations are implemented in a way that does not duplicate efforts required by other agencies, such as BLM/DOI proposing its regulations to be phased in over several years to allow operators to make the transition more cost-effective.

OP-17-83 Agency Response: ARB staff made no changes in response to the received comment. Staff understands that owners or operators of facilities can be subject to different agency standards, and that the different requirements evolve over time. Throughout development of the regulation, ARB staff worked closely with other state, federal, and local government agencies that regulate oil and gas operations to harmonize the standards and reporting requirements as much as possible. Staff has also designed the regulation with phase-in approach that provides operators with time to comply with the different requirements. This includes testing and reporting requirements only throughout the 2018 calendar year, followed by equipment replacements beginning in 2019. Staff has also provided a step-in approach for LDAR, which provides operators with two years to comply with a higher minimum leak threshold in order to find and repair larger leak sources before complying with the final leak standards. With regard to federal regulations, recent federal actions, including an Executive Order, indicate that federal rules may be further delayed or weakened. It would be inappropriate to further defer control of sources in California pending indefinitely delayed federal action.

OP-19-48 Comment: The comment directs ARB staff to tighten deadlines for flash analysis testing.

OP-19-48 Agency Response: ARB staff made no changes in response to the received comment. The original January 1, 2017 implementation date was changed to January 1, 2018 to reflect changes in the regulatory schedule. As it is currently written, operators of uncontrolled tank system must conduct testing "by" January 1, 2018 in order to demonstrate complaince with the standards. Based on experience performing testing and working with flash analysis laboratories, this will require operators to perform the testing sooner than the effective date specified in order to provide the laboratories with sufficient lead time.

OP-19-49 Comment: The comment recommends that ARB move up the compliance deadline for separator and tank systems.

OP-19-49 Agency Response: ARB staff made no changes in response to the received comment. The final version of the regulation is designed to be phased in over a brief period to ensure all of the requirements are performed in an efficient and reliable manner and to ensure that all of the requirements are enforceable by ARB or the local air districts. Staff has provided facilities with time to plan, purchase, and install vapor collection systems. This will likely include new applications for local air district permits that require time for approval, as well as performing engineering evaluations of the systems, procuring equipment or hiring contractors, and to ultimately install the equipment. The timing of this schedule reflects the intent of the regulation.

OP-19-50 Comment: The comment requests ARB staff to shorten the timing of implementation of controls for new separator and tank systems, stating that emissions are likely highest during the first year of operation.

OP-19-50 Agency Response: ARB staff made no changes in response to the received comment. The regulation is designed to accommodate new separation and tank systems that are installed after the effective date of the regulation. In some cases, new systems may also be subject to local air district rules, as well as the requirements set forth in this regulation. In some instances, this may result in even more stringent control requirements than those specified in the regulation. This regulation has been designed to integrate with the local air district's existing policies as much as possible, and allow time for districts and operators to determine which applicable rules to new equipment. Further, this regulation has been designed to provide adequate lead time for operators to conduct testing and obtain permits as well as purchase and install equipment, so that the regulation can be properly enforced and implemented as intended.

OP-21-16 Comment: The comment suggests the deadline to submit a written report of circulation tank usage and emission control effectiveness be changed from January 1, 2019 to June 1, 2019, in order to include all of calendar year 2018 activity in the report.

OP-21-16 Agency Response: ARB staff made no changes in response to the received comment. ARB worked closely with stakeholders throughout development of the regulation and while developing the January 1, 2019 regulatory deadline for when technical assessment reports must be submitted. This deadline was chosen while considering that initial testing has already been completed by both ARB and stakeholders during the 2016 calendar year, as well as initial discussion with control technology manufacturers. Two additional years to finalize any outstanding testing that needs to be completed, as well as complete all of the other tasks outlined in the technical assessment provision provides sufficient time to complete this requirement.

OP-21-17 Comment: The comment recommends deleting the 2020 requirement that all circulations tanks have compliant vapor control, and reconsider at a later date (based on reported data).

OP-21-17 Agency Response: ARB staff made no changes to the provision based upon the above recommendations. Best available technology equipment is available to control emissions circulation tanks. However, staff did make changes to provide additional time and specific requirements to demonstrate the equipment under actual working conditions. ARB also included a requirement for a technology assessment report to be provided to ARB and the EO can make a determination if the technology is not viable based on the technology assessment report.

B-4-4 Comment: The comment states that various dates and response times in the regulation are shorter than those in existing district rules (the exact differences are not noted in the comment) and that the inconsistencies are problematic and that all timelines should be moved to the longer timeframes denoted in existing district rules.

B-4-4 Agency Response: ARB staff made no changes in response to the received comment. Throughout development of the regulation, staff worked directly with each of the local air districts with affected oil and gas operations to develop the implementation timeframes and regulatory provisions. Different air districts have different timeframes and therefore this rule cannot be consistent with all the timeframes. The timeframes are similar to some air districts and are achievable. The regulation is designed so that only testing requirements are required during the first year of implementation, to provide operators and local air districts with time to obtain permits or register equipment that may be subject to the control provisions. This approach is designed to provide adequate time to install control equipment where necessary, and ensure that ARB or the districts can properly enforcement the various standards.

Comments Received After The 15-day Regulatory Notice

F-1-2 Comment: The comment is supportive of the Oil and Gas GHG regulation, but shows distress because the implementation date is delayed a year.

F-10-2 Comment: The comment raises concerns for the implementation timeline moving back by one calendar year. The comment also requests a well developed implementation plan with the districts

The consolidated response below addresses the above comments: F-1-2 and F-10-2

Throughout development of the regulation, staff worked directly with each of the local air districts with affected oil and gas operations to develop the implementation timeframes and regulatory provisions. Staff will continue to work with the districts on Memorandum of Agreement on implementation. Until those agreements are signed, ARB is prepared to implement and enforce the regulation.

The implementation timeline was not changed from the version presented at the July Board Hearing. Please see responses to OP-3-3, OP-11-3, OP-15-6, OP-16-2, B-5-2, B-6-2, B-7-2, B-8-2, T-21-2, T-22-2, T-23-2, T-25-3, T-27-2, and T-29-8 on implementation timeline.

F-3-1 Comment: The comment requests that ARB add flexibility of compliance into the regulation, in order to lower the overall cost.

F-3-1 Agency Response: ARB staff appreciates the opportunity to work with stakeholders, and appreciate your feedback throughout the regulation development process. In each of the draft versions of the regulation, staff worked to refine the requirements in order to provide flexibility while achieving effective emission reduction goals. It is unclear what, if any, additional flexibility the commenter is discussing.

F-3-3 Comment: The comment requests delaying reporting until July 2019.

F-3-3 Agency Response: Section 95673(a) specifies that test data is required to be reported to ARB by July 1st of each calendar year unless otherwise specified. Section 95673(a)(1) is the only the only exception to this requirement, as flash data must be reported within 90 days of performing the testing. The intent of this provision is for owners or operators to report a full year of data one time each calendar year. Because a year's worth of data will not be available on July 1, 2018, with the exception of flash analysis test data, ARB expects the first set of data to be reported as early as January 1, 2019 but by no later than July 1, 2019.

F-14-6 Comment: The comment recommends including an exemption so that operators do not have to notify if alarms are sounded during planned activity.

F-14-6 Agency Response: Staff already included a provision that allows the owner or operator up to 24 hours to investigate the source of an alarm condition. This could include the result of a planned event that occurred at the facility. In the event that this type of event occurs, the owner or operator can notify ARB, DOGGR, and

the local air district to report the event and report that all equipment is operating normally.

Implementation – Permitting

OP-10-90 Comment: The comment quotes the regulation and is background for OP-10-91 and 10-92.

OP-10-91 Comment: The comment quotes the regulation and is background for OP 10-92. The quoted sections in 10-90 and 10-91 describe that the Oil and Gas regulation and ARB will not participate in or interfere with the permitting process for which local air districts are already responsible and that implementation and enforcement by an air district will not waive any of ARB's authority to implement and enforce the regulation.

OP-10-92 Comment: The comment intimates that ARB intends to implement and enforce the regulation regardless of the efforts of local air districts. The commenter assumes that ARB's role would double the cost and workload of an air district program and asserts it is unnecessary.

OP-10-93 Comment: The comment argues that ARB should remove the portion of Section 95673(a)(3) &(4) that makes clear that both ARB and the air districts may enforce and implement the regulation, arguing that these sections are "duplicative."

The consolidated response below addresses the above comments:OP-10-90, OP-10-91, OP-10-92, and OP-10-93.

Agency Response: ARB staff made no changes in response to this comment. Local air districts are not required to develop new rules that are equivalent, more stringent, or duplicative of those contained in the regulation. However, in the event that a district develops separate rules for oil and gas facilities, the regulation provides the minimum State requirements.

ARB is charged by statute with implementing and enforcing its own regulations. (*See, e.g.*, Health & Safety Code, §§ 38510, 38580). Although ARB may, and is here, working with air districts to further implement and enforce its rules, ARB retains these basic duties. The regulation, as drafted, recognizes these responsibilities. Modifying the regulation consistent with commenter's suggestion would negate ARB's enforcement role, and could lead to inconsistent implementation and enforcement of the rule. However, consistent with commenter's expressed concerns about duplication, ARB intends to enter into Memoranda of Agreement with interested air districts to ensure enforcement is streamlined and effective.

OP-21-11 Comment: The comment recommends updating the compliance date to the date the permit is submitted. Additionally, the comment suggests that operators submit permit applications within 90 days of the date flash analysis indicates a need for vapor recovery systems, relieving the operator the liability of operating out of compliance due to permitting delays.

OP-21-11 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. Staff worked closely with the local air pollution districts to ensure that the implementation timeframes are achievable and that new systems can be approved for permit prior to the implementation dates specified. Owners or operators of uncontrolled systems may elect to perform emissions testing and design systems prior to the implementation dates in order to ensure compliance with the standards.

OP-10-64 Comment: The comment states that already-permitted and already offset equipment or systems operating under the auspices of an Air District and in compliance with the provisions of the regulation should need no further action. Further, the comment states that it is unreasonable of ARB to assume that bringing additional wells online requires that the vapor control systems should be tested or replaced.

OP-10-64 Agency Response: ARB staff made no changes in response to this comment. The intent of the regulation is to prevent an increase in NOx emissions that are created because of flaring. In adopting regulations to effectuate AB 32, ARB is required, to the extent feasible, to ensure that activities undertaken pursuant to the regulations "complement, and do not interfere with, efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions." (Health and Safety Code, § 38562(b)(4)). The provisions of this section help to ensure that greenhouse gas control efforts complement, and do not interfere with, efforts to achieve criteria pollutant and toxic air contaminant objections as well. The requirement only applies to vapor control systems impacted by any additional gas flow due to this regulation. As to the reasonableness of ARB's assumptions, per staff discussions with local air districts, flares are permitted by a local air district to operate at a fuel flow rate, which is required to control vapors from a storage tank or other system. Therefore, any increase in fuel flow rate would require modification to the local air district permit.

OP-21-31 Comment: This comment is background information to OP-21-32 and quotes section 95673(b)(1)(A).

OP-21-32 Comment: The comment requests clarification whether operators will be required to re-permit their facilities, which could impose significant fees.

OP-21-33 Comment: The comment requests assurance that operators will not be in violation if local air districts fail to update permits in a timely manner.

The consolidated response below addresses the above comments: OP-21-31, OP-21-32, and OP-21-33

Agency Response: ARB staff made no changes in response to the received comment. Section 95674 states that for new equipment installed after January 1, 2018, the facility must apply for a permit for that covers the requirements of the regulation. In the case of existing equipment already covered by an existing permit on or after January 1, 2018, the request occurs at the next time of a scheduled update to the existing permit. Therefore, a facility is not required to apply for a new permit for the sole purpose of

complying with the regulation, nor is it required to absorb additional costs associated with issuing a revised permit.

Implementation – Enforcement

OP-9-6 Comment: The comment requests that fines for non-compliance with the regulation be large enough to outweigh the financial benefit of not complying.

OP-9-11 Comment: The comment requests that ARB staff include a requirement that facility operators submit safety plans in advance of the discovery of leaks, and fully remediate leaks, posting bonds to do so, if necessary.

OP-9-13 Comment: The comment appears to recommend that any company that has a leak which makes the public sick, should cover the cost of the doctor, increase the inspection rate to 5 times/year, and pay billions if they do not comply.

OP-17-12 Comment: The comment lends support to the stated objectives of the oil and gas regulation, while also recommending that ARB recognize efforts toward compliance, without penalizing entities for catastrophic events that could not be prevented.

OP-17-13 Comment: The comment points out that penalties could be directed toward further GHG reductions, and also details concern that local air districts might strictly construe the regulation in order to gain penalty funds. To that end, SoCalGas recommends removing the provision, or else allowing offset surrender to make up the difference, instead of monetary penalties.

B-4-2 Comment: The comment makes an argument that the air districts may be unable or unwilling to implement and enforce the oil and gas regulation.

B-4-3 Comment: The comment delineates concern that the lack of clear enforcement authority (in other words, the state or the air district), is of concern, because it could lead to a violation at both levels.

B-4-5 Comment: The comment makes a strong recommendation to resolve the outstanding implementation and enforcement issues via public process.

T-12-1 Comment: The commenter expresses his concern of the possibility of “double jeopardy” in regards to local versus state enforcement of the Regulation and believes that the public and stakeholders should be part of developing MOUs.

T-24-1 Comment: The comment believes that clear enforcement and penalties for noncompliance is missing from the Regulation, and requests that repeat or major offenders should be shut down.

T-24-2 Comment: The comment continues to urge for the shutdown of facilities that fail integrity inspections, as shutdowns are the only effective penalty to get industry to stop emissions.

T-25-4 Comment: The comment states support of efforts to get additional resources to the air districts to enforce the rule.

T-28-2 Comment: The comment states concern of a possible “double jeopardy” in regards to enforcing the regulation.

The consolidated response below addresses the above comments: OP-9-6, OP-9-11, OP-9-13, OP-17-13, B-4-2, B-4-3, B-4-5, T-12-1, T-24-1, T-24-2, T-25-4, and T-28-2

Agency Response: ARB staff made no changes to the provision based on the above recommendations. The Health and Safety Code specifies the limits and scope of fines, for non-compliance with the regulation. Health and Safety Code section 38580 provides that the state board may define and enforce violations of rules issued under AB 32, consistent with the penalty provisions contained in Health and Safety Code, Division 26, Chapter 4 of Part 4 and Chapter 1.5 of Part 5, as well as taking injunctive relief. For more information, see, e.g., section 42400 *et seq.* of the Health and Safety Code. Accordingly, though this rulemaking clearly defines violations, there is no need to further define penalties, which are provided for by statute. The districts also have ample penalty authority contained in their authorizing statutes. The intent of the provision allowing districts to retain fines for non-compliance, is to allow remuneration to the air districts, for providing facility inspections.

Both ARB and the air districts have authority to enforce and implement this regulation, and Memoranda of Agreement between ARB and the air districts will further define how this implementation process will move forward fairly. For air districts that are unable or unwilling to enforce the regulation, ARB enforcement will assume full responsibility. ARB will otherwise work cooperatively with air districts that take on primary responsibility for portions of the regulation. ARB retains the obligation, and authority, to enforce the regulation in these districts as well, and will calibrate enforcement decisions to ensure that the rule is implemented and enforced equitably, avoiding any undue “double jeopardy” in the sense of taking unnecessary enforcement action, while enforcing independently where needed. While true that air districts are not required to be the enforcement authority concerning the oil and gas regulation, they may choose to take on this responsibility. Districts will retain their permitting authority status. ARB will not be a permitting authority.

The regulation is equipment focused and was not intended to force the shutdown of an operation. However, the ARB or a local air district along with other State agencies have the authority to address situations on a case-by-case basis and may take additional action if significant health or safety risks are involved.

B-3-3 Comment: The comment requests clarity on the permitting requirements, because the Staff Report states that local air district permitting is optional while section 95673(b)(1) of the regulation states that new or renewed local permits must ensure compliance with provisions specified in the regulation.

B-3-3 Agency Response:

The regulation is designed to provide local air districts with flexibility for implementing parts of the regulation or the complete regulation in its entirety. The regulation requires the regulated party to include information sufficient to set appropriate terms in a permit and does not place requirements on how the district

implements the application or request, but provides a pathway for implementation if the district implements the regulations. The mechanism used for a district to perform implementation is outlined in a Memorandum of Agreement between ARB and the district. In the event that a district chooses not to implement the regulation, the owner or operator can register the equipment with ARB and will therefore comply with the requirement in section 95674(b)(1)(A). This provision is designed to ensure that all equipment is properly tracked, tested, and monitored in compliance with the regulation standards.

OP-10-138 Comment: The comment is an edit to section 95674(g) striking out "or submitting or producing inaccurate information," stating that it is repetitive of section 95674(f).

OP-10-138 Agency Response: ARB staff made no changes in response to this comment. This language follows the intent of the regulation. Repeating the language in two subsections does not affect the requirement but provides greater clarity to readers.

OP-15-9 Comment: The comment recommends that any leaks or emissions above standards should be a violation with associated penalities harsh enough to discourage lax operations..

OP-15-9 Agency Response: ARB staff made no changes in response to this comment. The enforcement provisions set forth and in line with the Health and Safety code. The Regulation includes the most stringent inspection requirements for oil and gas operations in the nation.

Comments Received After The 15-day Regulatory Notice

F-7-1 Comment: The comment requests clarification regarding whether or not a district is required to update existing equipment permits in the event that they do not choose to implement the regulation.

F-7-1 Agency Response: Please see response B-3-3.

F-9-1 Comment: This comment appears to be concerned that this provision to allow the air districts to retain penalities "creates an incentive for local air districts to strictly construe the regulations" in an unreasonable way. The comment also suggests that this ability passes up an opportunity to invest the penalties in greenhouse gas reductions. The comment suggests language that penalties be used to offset the emissions.

F-9-1 Agency Response: ARB staff did not make any changes based on this comment. To the contrary, local air districts have deep experience in enforcing and implementing leak detection programs, including strict liability programs, judiciously and well. ARB staff has no reason to believe – and commenter provides none – that local air districts will not reasonably use their enforcement discretion, in this instance. To the contrary, allowing districts to retain penalty fees for their own enforcement work is common practice; districts of course retain penalties when enforcing their own rules, and do so when enforcing certain ARB rules (a similar approach is successfully used in ARB's cooperative enforcement of its landfill methane regulation with local air districts). Staff also does not believe the commenter's alternative – waiving not just penalties but liability – if emissions have been offset is appropriate. Liability exists to prevent leaks, not merely to "offset" them. Although there may be room for supplemental environmental projects under defined circumstances, this wholesale relaxation of liability would not support rigorous compliance practices, or concretely protect communities from leaks in the first instance.

F-9-2 Comment: The comment requests that ARB remove the enforcement provision making the submittal of inaccurate information a violation. Additionally, they recommend adding the qualifier "knowingly" at the beginning of the provision to protect reporters from being held in violation for accidental inaccuracies.

F-9-2 Agency Response: The commenter requests that section 95675(f), which imposes strict liability for submitting or producing inaccurate information, be altered to avoid imposing liability for inadvertent errors, either by striking the provision or by modifying it to add a "knowing" intent requirement. The commenter also suggests that liability should be waived if the error is "cured" by submitting accurate information later. Staff declined to make this change. High quality information is critically important to enforcing and implementing this regulation; inaccuracy is therefore a serious problem, whether or not is intentionally submitted. (Indeed, commenter elsewhere focuses on the importance of high quality data for the rule). For this reason, strict liability is already the practice for ARB's Greenhouse Gas reporting programs, and many federal data-gathering programs, and is appropriate here. Agency enforcement discretion is sufficient, when applied consistent with ARB and district enforcement policy, to ensure that consequences for less serious errors lead to appropriately calibrated penalties. For related reasons, the ability to "cure" inaccurate submissions is also not appropriate; data deadlines are imposed to allow for smooth and equitable implementation of the regulation, and accurate information must be submitted on time. Correcting inaccuracies later, though better than allowing them to persist, wastes staff time, can lead to poor implementation decisions, and misinform the public. Staff declines to create an incentive to submit potentially inaccurate information and then, when discovered, cure it only after the fact.

ST-3-1 Comment: The comment requests to maintain the leak threshold at 1,000 ppm, to maintain quarterly leak repair timelines, to prioritize the top 25 percent of

disadvantaged communities—as identified by CalEnviroScreen, and to move forward with the adoption of this rule.

ST-3-1 Agency Response: Staff appreciates support of the regulation. The leak detection frequency step-down provision was removed from the regulation, as reflected in the 15-day changes. Please see the response to T-30-2 et al. for more details. The final leak threshold is maintained at 1,000 ppmv. The regulation implementation schedule applies equally to all facilities throughout California, including facilities near disadvantaged communities as described in the comment. ARB recognizes that disadvantaged communities may have especially pressing needs, and that many oil and gas facilities are near them. Accordingly, our focus on enforcement will functionally address many disadvantaged communities. We welcome citizen science and enforcement concerns from disadvantaged communities and will enhance connections to these communities to be aware of challenges as we work with districts to implement the regulation.

ST-5-2 Comment: The comment urges ARB to prioritize enforcement at facilities near environmental justice communities.

ST-6-3 Comment: The comment encourages ARB to coordinate with the air districts to move forward with implementation, especially for the environmental justice community.

ST-11-2 Comment: The comment recommends prioritizing implementation at facilities close to disadvantaged communities identified in CalEnviroScreen's top 25 percent.

The consolidated comment below addresses the above comments: ST-5-2, ST-6-3, and ST-11-2

Agency Response: Staff appreciates support of the regulation. The regulation implementation schedule applies equally to all facilities throughout California, including facilities near disadvantaged communities as described in the comment. ARB recognizes that disadvantaged communities may have especially pressing needs, and that many oil and gas facilities are near them. Accordingly, our focus on enforcement will functionally address many disadvantaged communities. We welcome citizen science and enforcement concerns from disadvantaged communities and will enhance connections to these communities to be aware of challenges as we work with districts to implement the regulation. ARB staff will continue to work closely with local air districts to finalize MOAs for each district that intends to implement the regulation.

ST-7-6 Comment: The commenter believes that the enforcement provision is lacking a section for penalties and sanctions for violating the provisions and request to see it in the next document.

ST-7-6 Agency Response: ARB staff made no changes in response to the received comment. The Health and Safety Code specifies the limits and scope of fines for

non-compliance with the regulation. Health and Safety Code section 38580 provides that the state board may define and enforce violations of rules issued under AB 32, consistent with the penalty provisions contained in Health and Safety Code, Division 26, Chapter 4 of Part 4 and Chapter 1.5 of Part 5, as well as taking injunctive relief. For more information, see, e.g., section 42400 et seq. of the Health and Safety Code. Accordingly, though this rulemaking clearly defines violations, there is no need to further define penalties, which are provided for by statute.

ST-9-3 Comment: The comment requests that the items included in a letter submitted by commenter be addressed in the FSOR.

ST-9-3 Agency Response: This document, the FSOR, includes responses to all public comments submitted for this Regulation. Comment letters submitted by the California Independent Petroleum Association have been given the following comment letter codes: OG-B-4 and OG-F-3. All items in those letters have been bracketed as “B-4-x” or “F-3-x” and can be found, along with the ARB staff response, by searching the text for “B-4” and “F-3.”

ST-10-5 Comment: The comment requests that ARB staff continue to work on remaining concerns during implementation and possible modification of the rule.

ST-10-5 Agency Response: ARB staff made no changes based upon the received comment. We appreciate your feedback throughout the regulation development process. ARB staff intends to continue working with facility owners and operators and local air districts throughout implementation of the regulation. We may issue additional guidance to clarify issues that may arise during implementation and may determine that future modifications to the regulation are necessary.

Economic Analysis

OP-4-4 Comment: The comment requests that ARB staff ensure that cost estimates take into account the value of reduced pollution from oil and gas industry in communities.

OP-10-13 Comment: The comment states that the cost estimate does not include impacts on each individual operator and does not take into account local factors that may affect cost effectiveness.

OP-10-14 Comment: Part 1 of 2 - The comment requests that the cost analysis include impacts on individual operators in addition to the overall impacts, as well as transparent calculation and unit clarifications for the cost-effectiveness determination.

OP-10-15 Comment: The comment states that the cost effectiveness for the provision is not detailed enough and that ARB staff should clearly demonstrate the economic impacts and cost-effectiveness for each operator and on every unit and

should minimize requirements in cases where there could be a significant economic burden.

OP-10-51 Comment: The comment states that ARB staff underestimated the financial cost to control well stimulation events. The commenter believes that the costs for the technology are underestimated and the analysis should include the costs of permitting, analysis, extra equipment, labor, and other costs.

OP-10-52 Comment: The comment states that the cost-effectiveness calculations performed by ARB staff for the well stimulation provisions are not accurate and will be significant effort for limited emissions.

OP-13-11 Comment: The comment requests ARB staff address alleged errors, omissions and questionable assumptions in the economic analysis for underground storage. The commenter also states that there is an apparent exclusion of environmental benefits. The comment recommends consensus standards in place of the provision.

OP-13-12 Comment: The comment continues to direct staff to possible errors or areas needing improvement in the economic analysis for underground storage, including line-items asking for changes/updates to the economic chapter in the Staff Report. The comment suggests ARB relied solely on cost information from biased sources, does not include costs for operation and maintenance, contingency plans, etc. The comment also mentions underestimating capital and annual cost for some equipment and overestimating the lifetime. The comment refers to comments in comment letter 17, which suggests an underestimate of 3-4 times the true cost.

OP-13-13 Comment: The comment suggests that ARB staff did not consider other associated costs including infrastructure that could be associated with bringing outdated or remote facilities into compliance with section 95668(i).

OP-13-14 Comment: The comment continues to add information about the costs of compliance associated with underground storage monitoring, stating that ARB significantly underestimated the cost of ancillary infrastructure.

OP-13-15 Comment: The comment states that there are arithmetic calculation errors, as well as conflicting cost assumptions, in the economic analysis for underground storage.

OP-13-16 Comment: The comment states that the cost for monitoring equipment is under-estimated because it does not account for transaction costs such as training, installation, and troubleshooting.

OP-17-27 Comment: The comment directs ARB staff to address errors and fix other presumed weaknesses in the economic analysis concerning the cost of implementing the storage monitoring requirements.

OP-17-28 Comment: The comment details specific changes it requests that ARB staff make in the economic analysis including errors and differences with commentor estimates for underground storage. The SoCal estimates are based on monitoring data from the Aliso Canyon incident.

OP-17-29 Comment: The comment states that ARB's economic analysis for underground cost estimate does not account for increases in GHG emissions due to the installation and maintenance of monitoring equipment, and does not include several categories of expenses including operation and maintenance, contingency for undemonstrated technologies and monitoring plan preparation as wella s recordkeeping and management. The comment suggests there would be no decrease through daily monitoring efforts at a storage facility.

OP-17-30 Comment: The comment outlines why the commenter believes ARB cost estimates for ambient air monitoring are underestimated. The reasons include the need for multiple monitoirsfor 360 degree monitoring, notification is the baseline is exceeded by 10%. On-site personnel to adequately investigate each exceedance, underestimate of operation and maintenance costs, enderestimate of the OGI camera cost, overestimate of well groupings possible for a single monitor, overestimate of the lifetime, underestimate of reporting costs, and an inappropriate discount factor. Incosnsitencies, and errors are also outlined.

OP-17-31 Comment: The comment notes a number of potential typos or errors in the economic analysis for underground storage.

T-9-2 Comment: The commenter's cost analysis is three and a half to four times higher compared to ARB staff's cost analysis; the commenter points out the significant difference.

T-10-1 Comment: The comment claims that there were some calculation errors in the Economic Analysis.

T-10-2 Comment: The commenter's economic analysis is four times what ARB staff's economic analysis is for the LDAR portion of the Regulation and recommends staff to prepare a more complete, comprehensive analysis.

T-11-1 Comment: The comment states support of So Cal Gas' economic analysis and concern about cost impacts to customers.

T-28-3 Comment: The comment states the importance of ensuring that the Regulation is technically feasible and cost effective. The comment also states concern for the effect the Regulation will have on the cost of production and potential job loss.

The consolidated response below addresses the above comments: OP-4-4, OP-10-13, OP-10-14 Part 1 of 2, OP-10-15, OP-10-51, OP-10-52, OP-10-53, OP-13-11, OP-13-12, OP-13-13, OP-13-14, OP-13-15, OP-13-16, OP-17-27, OP-17-28, OP-17-29, OP-17-31, T-9-2, T-10-1, T-10-2, T-11-1, T-28-3

Agency Response: Due to the input from various stakeholders, the emissions and cost-estimates have been re-evaluated. Other errors and omissions, typos and weaknesses noted above have also been updated. The new version of the economic analysis was included in the 15-day package of regulatory changes released for comment.

The LDAR cost estimate provided by stakeholders includes a per hour cost which was much higher than what contractors that perform this work told ARB. In addition, the ICF report, which is the basis for this per hour cost, assumes the facilities will have their own LDAR inspection program, and ARB assumes that this will be done through contractors.

Additionally, the ICF report from the stakeholders includes administrative costs, which the stakeholder treats as separate. ARB did revise the estimate for recordkeeping and reporting based on feedback from stakeholders. These factors greatly inflate the cost estimate of the stakeholder. The estimates are included in Attachment 2 of the 15-day regulatory package.

Monitoring plan costs in the regulation were revised based on input from stakeholders. ARB believes that technology is available to meet the requirements of the regulation. For example, OGI cameras, ultrasound monitoring, or well monitoring equipment would fulfill the requirements and would not require some of the expenses associated with manual inspection. Other technologies are anticipated to be developed further in the future and likely to reduce costs. Development of new technology in oil and gas operations is ongoing. ARB expects new technology to continue to be developed, as should occur in a competitive marketplace. The cost estimate for the monitoring plan, including equipment, has been revised, and can be found in Attachment 2 of the 15-day package.

ARB believes the ambient air monitoring cost published in the economic analysis is accurate. A detailed cost breakdown incorporating comments was developed and added to the updated economic analysis. The assumption of two ambient monitoring stations was arrived at through discussion with ARB's Monitoring and Laboratory Division, which operates similar ambient monitoring equipment throughout the state. Although there may be remote ambient monitoring sites that do not have the necessary infrastructure to support a monitoring station, these costs would be difficult to estimate without the details of a monitoring system that has yet to be designed.

ARB anticipates that operators of storage facilities will choose to utilize a continuous automated monitoring system rather than manual inspections to meet the requirements of the regulation for most or all of the storage wells. In scenarios where a fully automated monitoring system is not feasible, ARB took manual inspection costs from stakeholder comments to estimate the cost portion of such a scenario. Please see response to comment F-9-22 for more information.

The cost effectiveness for the well stimulation provision is higher than the other provisions in the regulation but, as stated in the Staff Report, it is important to control this currently uncontrolled source of methane and potential co-pollutants from well stimulation fluids. ARB's estimate for controlling well stimulations includes the cost for a gas separator and a low NOx incinerator, plus installation. Although other costs may be associated with this provision, they were not included due to lack of data.

ARB staff evaluated the impacts or the regulation on small businesses, and on the industry as a whole, which appears in the Staff Report, in the Economic Chapter on page 128. It should be noted that although ARB staff conducted this analysis, the facilities covered by this regulation are not considered small businesses according to California Government Code 11342.610(b). An analysis on individual businesses was not performed because the data was not readily available, and it is not standard for ARB to analyze each business's impacts due to a regulation. The cost effectiveness published in the Staff Report evaluates the cost to the industry as a whole, but staff

acknowledges that each operator may experience differences based on factors specific to themselves. Several exemptions in the regulation limit impacts on smaller companies including an exemption based on production for storage tanks. In addition, the provisions for leak detection and repair scale with facility size generally as leak detection is for the number of components and equipment so the fewer components, the lower the cost.

Prior to the initial publishing of the regulation in the Staff Report, the Standardized Regulatory Impact Assessment (SRIA) represented the preliminary costs of the regulation. Because changes from the SRIA are summarized in Appendix B of the Staff Report with a corresponding change in cost and emissions, no further updated was required.

The benefits of toxic reductions was considered in the environmental assessment and recognized as a benefit although less than significant. In addition toxics, the regulation decreases VOCs. Neither of these are considered in the economic analysis because this is a greenhouse gas regulation pursuant to authority under AB32. Although these co-benefits are important, they are not part of the cost analysis for the regulation.

Comments Received After The 15-day Regulatory Notice

F-8-5 Comment: The comment suggests that the sensitivity requirement for ambient monitoring technology is not achievable in a cost-effective manner and recommends reviewing the instrument standard, revising for cost effectiveness.

F-8-5 Agency Response: In the 15 day regulatory package, ARB staff provided facilities with greater flexibility in choosing instruments, which was accomplished by adjusting the equipment specifications. The revised specifications were developed in conjunction with the ARB Monitoring and Laboratory Division as well as feedback from natural gas storage stakeholders. ARB currently has approximately a dozen full time monitoring sites in locations throughout California, and is currently using the same instruments that are also being used by some utilities. Staff can also provide a list of equipment that is currently be used in the field and is readily available for purchase.

SB-4-8 Comment: The comment states that ARB's cost estimates are much lower than industry cost estimates. The comment urges ARB staff, in the future, to use data collected to determine whether the cost of the regulation is effective.

SB-4-8 Agency Response: ARB staff made no changes in response to this comment. Staff appreciates the cost feedback and feedback they received throughout the development of the regulation. The costs used perform their analyses are reflective of current industry estimates. As outlines in the 15 day package, staff utilized cost information provided by at least one utility and by leak detection professionals. However, staff will continue to evaluate cost information, as it made available and may find a need to revise their cost-estimates for particular emission control systems in the future. Staff suggests that the commenter and facility owners or operators maintain cost records and notify ARB of significant discrepancies, as well as provide cost information for installing typical systems.

Standardized Regulatory Impact Assessment

OP-10-14 Comment: Part 2 of 2 The comment stated that the emission estimates are significantly different in the SRIA and 2013 MRR data. The comment also points out DOF's request for ARB to include direct cost of each alternative in the SRIA, as well as discuss how individual facility characteristics may affect the direct cost.

OP-10-14 Agency Response: Part 2 of 2 ARB staff made modifications to the economic analysis based on new data becoming available and continued development of the regulation. For example, since the SRIA, data became available that indicated that a small percentage of LDAR components were responsible for a disproportionate amount of emissions. Considering this increased the estimated emissions from LDAR components. In addition, in the continued development of the regulation, the number of impacted LDAR components, compressors, tank and separator systems, and other equipment changed. These changes are described starting on page B-3 of the Staff Report.

Due to the changes of the regulation since the SRIA, the alternatives presented in the SRIA were no longer viable. New alternatives with estimated costs are presented starting on page B-54 of the Staff Report. ARB acknowledges that individual facility characteristics may affect the direct cost, but the data to perform such an analysis is not readily available. Please refer to the consolidated response to comments OP-10-22 Part 2 of 3, OP-10-24 Part 2 of 2, OP-10-102, OP-10-103, and OP-10-104.

OP-10-22 Comment: Part 2 of 3 The comment articulates concern regarding the inclusion of gauge tanks in section 95668(a)(6) without having been workshopped, stating that the source was added with no cost-effectiveness analysis, as required in the Standardized Regulatory Impact Assessment (SRIA).

OP-10-24 Comment: Part 2 of 2 The comment states that the SRIA does not consider the impacts of controlling emissions from gauge tanks in its analysis.

OP-10-102 Comment: The comment summarizes the SRIA process and states that it does not, but should, include the proposed addition of gauge tanks in the regulation.

OP-10-103 Comment: The comment states that the SRIA did not consider the potential for oil and gas facilities to decrease in response to the regulation and states that the circulation tank requirements may result in that decrease in the commenter's opinion.

OP-10-104 Comment: The comment recommends removing gauge tanks from the regulation and control requirements for recirculation tanks, and if not, completing a brand-new SRIA to address the economic costs of such an action.

The consolidated response below addresses the above comments: OP-10-22 Part 2 of 3, OP-10-24 Part 2 of 2, OP-10-102, OP-10-103, and OP-10-104.

Agency Response: After reviewing stakeholder comments and conducting further outreach including in-person meetings, ARB staff opted to exempt gauge tanks under 100 bbl in size, due to negligible emissions. Tanks exceeding this limit will continue to be applicable under the regulation. In addition, ARB staff included additional language

on circulation tanks in the regulatory langauge released for 15 day comment. The additional language allows for the ARB Executive Officer to make a determination on installation of equiepment based on the technology assessment results. Although staff believe the technology exists for this provision, the additional language further ensures that the circulation tank requirements are not expected to result in reductions in oil and gas operations.

The SRIA process does not require the SRIA to be updated (see section 11346.3 (f) of the Government Code). The SRIA must be submitted to the Department of Finance (DOF) in time to allow DOF at least 30 days of review, allow for ARB staff to address DOF's comments, and incorporate the SRIA, DIF's comments and ARB's responses to those comments into the Staff Report before the Staff Report was published. ARB held workshops and stakeholder meetings for over a year after the SRIA was publicized, which allowed staff the time to create an exhaustive economic analysis, which was publicized in full, as Appendix B of the Staff Report. In addition, there are responses to SRIA comments from DOF in the Staff Report. Changes in the economic analysis that occurred since the SRIA were updated in the Economic Chapter in the Staff Report, with further updates and analysis in the 15-day regulatory notice.

Health Impacts

B-5-3 Comment: The comment points out the health impacts of methane co-pollutants, and requests that ARB strengthen this rule.

B-6-3 Comment: The comment states that there are co-benefits between cutting methane pollution and public health for adults and children.

B-6-4 Comment: Continued comment from B-6-3 and states that co-pollutants can lead to ozone formation, which is damaging to health.

B-6-5 Comment: Continued comment from B-6-4 and states that standards to reduce methane will reduce these health damaging air pollutants

B-6-6 Comment: Continued comment from B-6-5 and states that a large body of literature indicates that oil and gas development is associated with a dverse health impacts.

T-22-3 Comment: The comment states that there are public health co-benefits with cutting methane pollution, which is important for Californians, and most importantly, children.

T-22-4 Comment: The comment states that oil and gas activities contribute to smog due to emissions of VOCs and NOx, which are co-pollutants of methane.

T-22-5 Comment: The comment supports reducing methane emissions from oil and gas development, stating that reducing emissions will reduce the risk of health effects.

T-22-6 Comment: The comment urges protecting children, pregnant women, and the elderly, who are the most susceptible to the negative health impacts from oil and gas pollution.

T-27-3 Comment: The comment cautions against “confidential and proprietary” chemicals used in oil and gas production, with a narrative about oily residue found in local parks.

T-27-4 Comment: The comment reiterates comment B-8-4, stating concern about storing gas underground.

The consolidated response below addresses the above comments: B-5-3, B-6-3, B-6-4-, B-6-5, B-6-6, T-22-3, T-22-4, T-22-5, T-22-6, T-27-3, T-27-4

Agency Response: ARB staff appreciates the comment, and looks forward to working with stakeholders to gain adoption of one of the strongest and greenest methane regulations to date. ARB acknowledges the public health co-benefits of this regulation.

Emissions

Emissions – Benefits

OP-3-4 Comment: The comment directs ARB staff to review all the benefits of reducing toxic air chemicals as part of its regulatory analysis, to emphasize the effectiveness and inexpensive aspects. This comment requests that ARB focus this regulation not only on GHGs, but also on Toxic Air Contaminants (TACs).

OP-9-4 Comment: The comment urges ARB staff to ensure that they fully evaluate the costs and value of reducing GHGs from the oil and gas industry, including the co-benefits from reduction to exposure to toxics.

The consolidated response below addresses the above comments: OP-3-4, OP-9-4

Agency Response: This regulation was designed primarily to address ARB’s obligations under AB32 and to achieve GHG reduction goals identified in ARB’s Scoping Plan, among other planning documents. Like other ARB regulations for GHGs based on AB 32, it therefore is based on GHG control. However, AB 32 does direct staff to design GHG regulations under that statute to be consistent with criteria pollutant and toxic goals to the extent feasible, and staff has done so here. The rule produces significant TAC co-benefits, consistent with this direction, by practically limiting the emissions of TACs that would be co-emitted with methane via its methane controls. ARB also retains authority to promulgate TAC-specific regulations as warranted in the future.

ARB staff completed an economic analysis and an environmental analysis for this project, both of which are available in the Staff Report. Any time pollutants are kept from entering the atmosphere, it has a beneficial impact on public health. Staff detailed the public health benefit in Chapter X.D.3.b. of the Staff Report.

Furthermore, VOCs are regulated by Air Districts. Staff notes additional VOC reduction in Table 6: Statewide Non-GHG Air Emission Benefits on page 30 of the Staff Report. ARB will continue to evaluate toxics, as this is an area of combined authority.

Emissions – Estimates

OP-10-40 Comment: The comment puts forth ARB's emission costs and estimates.

OP-10-40 Agency Response: This table appears to have come from the Staff Report for this rulemaking. It is unclear how this relates to the rest of the letter or the rest or if there is a conclusion based on this table.

OP-10-69 Comment: The comment recommends ARB staff revise emission estimates and cost effectiveness with the data they provided to staff. The commenter says the latest emission estimates used in Appendix B Economic Analysis do not represent the actual emission estimates as ARB used significantly higher emission factors and leak rates than found in California's existing LDAR programs.

OP-10-69 Agency Response: ARB staff made no changes to the provision based upon the above recommendation. The emission factors used in Appendix B Economic Analysis, Table B-9 Emissions from LDAR Components, were calculated using data from ARB's 2009 Survey, CAPCOA's California Implementation Guide for Estimating Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities, and API's Fugitive Hydrocarbon Emissions from Oil and Gas Operations. The data accurately represents existing oil and gas operations and emission estimates. The values provided by the commenter are not appropriate because they represent areas and equipment already subject to an LDAR program.

Global Warming Potential

OP-9-7 Comment: The comment suggests that methane has not been integrated into CO_2e concentration models, which predict climate change. It goes on to suggest that the short-term effects of methane is much greater than previously thought.

OP-10-6 Comment: The comment details WSPA's disagreement with ARB staff using the 20-year GWP of 72. It states that staff did not reflect this change in the definition or the regulations, but only the Staff Report.

OP-10-7 Comment: The comment states that switching to the 20-year GWP is not trivial and that other ARB regulations utilize the 100-year GWP, making the estimated cost of this regulation three times smaller when compared to other GHG programs.

OP-10-8 Comment: The comment recommends ARB staff to use the 100-year GWP because other regulations at ARB, including the GHG inventory is based on that number, and not using the same number defeats the consistency of ARB's policies.

OP-10-9 Comment: The comment summarizes ARB's commitment to climate change consequences on a 50-100 year timeframe, as well as summarizing the rationale for IPCC's 20- and 100-year GWP numbers, stating that ARB's revised methodologies deviate from EPA standards.

OP-10-10 Comment: The comment suggests that if ARB chooses to use a 20-year horizon that they implement it for for CO_2 as well. Then CO_2 would be negligible, and ARB could reconsider all policies with respect to CO_2. The comment also states that ARB's appropriate use of 20-year GWP is confusing unless it is standardized across all of its policies.

OP-10-11 Comment: The comment recommends that ARB revise the regulation by using the 100-year GWP from the second or fourth IPCC report.

OP-10-12 Comment: The comment states that the definitions section of the regulation does not include a term for Global Warming Potential.

OP-16-13 Comment: The comment details support for ARB staff's usage of the 20-year GWP for methane, and urges staff to update to the IPCC Fifth Assessment Report (AR5), with a 20 year GWP of 87.

OP-17-16 Comment: The comment reiterates the desire of the commenter to utilize the 100-year GWP for consistency with other ARB programs such as the Mandatory Reporting Regulation and the Cap-and-Trade Program.

OP-17-17 Comment: The comment points out that ARB's LCFS regulation as well as ARB's own GHG inventory uses the 100-year GWP to quantify CO_2e. It is intended to point out inconsistencies in ARB's approach to methane.

OP-17-18 Comment: The comment states the apparent inconsistencies of using a 20-year GWP for methane in the oil and gas regulation, while using the 100-year GWP elsewhere in the same agency. It then goes on to suggest that the economic cost for LDAR is significantly higher per $MTCO_2e$, when using the 100 year GWP.

OP-19-5 Comment: The comment supports ARB staff's inclusion of the 20-year GWP but urges ARB to adopt AR5 to more accurately reflect state of the science accounts of the effects of methane.

T-25-1 Comment: The comment supports the use of the 20-year timeframe for estimating global warming potential.

The consolidated response below addresses the above comments: OP-9-7, OP-10-6, OP-10-7, OP-10-8, OP-10-9, OP-10-10, OP-10-11, OP-10-12, OP-16-13, OP-17-16, OP-17-17, OP-17-18, OP-19-5, and T-25-1

Agency Response: ARB staff made no change to the provision based upon the above discussion and recommendations.

ARB understands the importance of short-lived climate pollutants and recently adopted a Short Lived Climate Pollutants (SLCPs) Reduction Strategy, as directed by the legislature. The SLCP Strategy utilized the 20-year GWP since it better reflects the importance of these short-lived gases and better reflects the near term impact these gases, including methane, can have an impact on the atmosphere relative to CO_2. Since this regulation similarly focuses on a SLCP pollutant, the Staff Report mainly utilized the 20-year GWP value but did show the 100 year values for emissions for comparison purposes.

The rationale for both the use of the 20 year GWP and the 4th Assessment Report are further outlined in the following text from the Staff Report: "[The c]urrent practice in most of the world for developing GHG emission inventories, including California's GHG inventory, is to use GWP values from the 4th Assessment Report of the IPCC (AR4), which was released in 2007. California's inventory generally uses GWPs over a 100-yr timeframe. However, the use of GWPs with a time horizon of 20 years better captures the importance of the SLCPs and gives a better perspective on the speed at which SLCP emission controls will affect the atmosphere relative to CO_2 emission controls. Thus, the emission inventory and estimated reductions presented [in the Staff Report were] calculated using 20-year GWP for methane." (Staff Report, Chapter 1.A.2 pages 6-7.)" As noted above, staff chose to include emissions and cost per ton data using the 100 year GWP for comparison purposes. In the future, ARB may move to using the Fifth Assessment Report but currently uses the AR4 values throughout Agency rulemakings.

Global Warming Potential (GWP) does not need to be defined in the regulatory text, because the term does not appear in the regulation. During the regulatory development process, stakeholders made clear that they only wanted this regulation to cover methane emissions. ARB staff followed through on those recommendations, noting with the inclusion of "GWP" in the staff report is for simple purposes of comparing apples to apples, in other ARB-sponsored GHG-related programs.

Air District MOAs

Comments Received After The 15-day Regulatory Notice

F-3-5 Comment: The comment requests that ARB make available the District MOAs before the March 2017 board hearing.

F-3-5 Agency Response: As of the time of the March 2017 board hearing, the District MOAs were not final. Staff anticipates posting these agreements on the Oil and Gas homepage as they become available. These agreements will not change the requirements of the regulation.

ST-5-1 Comment: The comment urges ARB to work closely with the local air districts to ensure that the MOA regarding implementation is carefully planned and effective.

ST-5-1 Agency Response: ARB staff made no changes based upon the received comment. ARB staff will continue to work closely with local air districts to finalize an MOA for each district that intends to implement the regulation. We believe that individual MOAs for each district may be necessary in order to address the specific air district needs. We plan to finalize the individual MOAs this summer, ahead of the January 1, 2018 implementation date. We also plan to track the implementation of this regulation by the districts.

ST-9-2 Comment: The comment requests that ARB include key stakeholders in the MOA process as it moves forward.

ST-9-2 Agency Response: ARB staff made no changes based upon the received comment. The MOA is an agreement developed by ARB and the local air districts and does not change the control requirements. The process for developing these agreements does not typically include public input or participation. However, individual districts may include stakeholders earlier in their MOA processes. We believe it is important that ARB and the districts provide clear direction to all affected stakeholders on how an MOA will be implemented. Once the draft MOAs are finalized, they will be made available to the public by ARB.

Stakeholder Input

B-4-8 Comment: The comment states that the standards and exemptions listed in the regulation are based on a "one size fits all" approach and are insufficient for California's oil and gas operations, yet it does not specify a solution to satisfy the comment. Comments B-4-9 and B-4-10 give specific examples and those are responded to in the appropriate sections.

B-4-11 Comment: The comment again urges ARB to make use of a 15-day regulatory package to clarify outstanding issues noted in comments B-4-8, B-4-9 and B-4-10. .

The consolidated response below addresses the above comments: B-4-8, and B-4-11

Agency Response: Staff appreciates the note of cooperation, and looks forward to working with stakeholders to gain adoption of one of the strongest methane regulations to date. Please refer to responses to B-4-9 and B-4-10.

The technical team met with stakeholders and had several public workshops to discuss the feasibility of the regulation. The well-established public process made every effort to reach out to all facets of industry, to make compliance with the regulation transparent.

B-4-15 Comment: The comment states that the commenter believes this version of the rule is much improved but the commenter still has concerns about updates to the regulation and asks for an update before the board votes on adoption in March 2017.

B-4-15 Agency Response: ARB staff worked diligently with stakeholders to present a 15-day regulatory package, which was released for comment on February 3rd for comments and was the version presented at the March 2017 board date.

Workshop Comment Letter on Feb 2016

OP-19-ex1-1 Comment: The comment is supportive.

OP-19-ex1-1 Response: Staff appreciates the supportive comment.

OP-19-ex1-2 Comment: The comment supports quarterly inspections but requests the removal of the annual step down approach, which allows operators to adjust frequency based on the number or percentage of leaking components identified in prior surveys. The comment provides several references to studies that support the need for frequent inspections and include information on the cost-effectiveness in other states. The comment suggests that the proposal could incentivize operators to fail to identify or report leaks and provides a supporting report. The commenter recommends that CARB propose LDAR on fixed frequencies, maintaining the quarterly inspection frequency and remove any provision that allows operator to reduce that frequency. The comment goes on to offer recommendations if the reduction in frequency is kept.

OP-19-ex1-2 Response: Please refer to the consolidated response to OP-3-2 et al.

OP-19-ex1-3 Comment: The comment requests that ARB staff allow for an alternative compliance pathway to use other methods besides Method 21 for LDAR. The comment specifically recommends the use of optical gas imaging combined with Method 21 to provide speed and comprehensiveness while still allowing quantification. The comment mentions that five states, EPA, and BLM allow for OGI usage as a means of compliance. The comment recommends the use of OGI with Method 21 to lower costs but ensure detected leaks are quantified.

OP-19-ex1-3 Response: Please refer to response F-11-8. In addition, any technology used must be capable of detecting leaks down the required threshold, which is 1000ppm starting in 2020.

OP-19-ex1-4 Comment: The comment requests several LDAR exemptions be removed or narrowed to improve the protectiveness of the rule and increase emission reductions.

OP-19-ex1-4.1 Comment: The commenter requests that the regulation not exempt natural gas pipelines not owned by the facility because then the pipelines are not regulated.

OP-19-ex1-4.1 Response: Although the final language changed for clarity, the pipelines not owned by the facility are still exempt. Natural Gas pipelines are regulated under the SB 1371 proceedings.

OP-19-ex1-4.2 Comment: The comment requests that the exemption for components downstream of the transfer of custody must be removed because it is overly broad and threatens to exempt too many components.

OP-19-ex1-4.2 Response: The language was clarified so that the components must not be owned or operated by the production facility. Components exempt for a facility may be covered by either SB 1371 or by another facility subject to the LDAR component of this regulation including gathering and boosting stations. This provision clarifies which party is responsible for which components.

OP-19-ex1-4.3 Comment: The comment requests that the provision to exempt half inch and smaller stainless steel tube fittings must be removed since it is not included in any other state LDAR program. The comment requests that if the exemption is kept, a requirement for leak free demonstration be included.

OP-19-ex1-4.3 Response: This provision was modified since the workshop version referred to in this comment letter. The new language requires the fittings to be measured using Method 21 at the startup or during the first leak inspection.

OP-19-ex1-4.4 Comment: The comment requests that the exemption for unsafe to monitor components be removed and that those components be monitored within a certain timeframe.

OP-19-ex1-4.4 Response: The exemption was removed and the unsafe to monitor components are required to be monitored once a year in the regulation.

OP-19-ex1-5 Comment: The comment requests that CARB require all leaks of 500 ppm be repaired upon rule implementation. The comment cites rules in other states and the U.S. EPA that use 500 ppm or lower for some components and that this limit is technically feasible.

OP-19-ex1-5 Response: Please refer to the consolidated response to comments OP-17-9 Part 2 et al.

OP-19-ex1-6 Comment: The comment requests that ARB staff phase out existing low-bleed continuous devices. The regulation includes an exemption that allows for already installed low bleed devices to remain in use as long as they are under 6 scfh. The comment enumerates methods to eliminate emissions from pneumatic

devise. The comment recommends that staff eliminate the noted provision or, if not, limit the time period for the exemption.

OP-19-ex1-6 Response: Please refer to the consolidated response to comments for OP-4-3 et al.

OP-19-ex1-7 Comment: The comment requests that the regulation control emissions from intermittent bleed pneumatic devices. The comment commends ARB staff for adding testing requirements to ensure intermittent devices do not leak when not actuating but recommends a limit on emissions from intermittent pneumatic devices and cites other state regulations and reports. The comment recommends that staff require emissions from intermittent bleed devices be routed to a vapor collection system or be limited to non-continuous or under 6 scfh.

OP-19-ex1-7 Response: Please refer to the consolidated response to comments for OP-19-30 et al.

OP-19-ex1-8 Comment: The comment is supportive of ARB staff addressing reciprocating compressors especially those at well pads and gathering and boosting stations. The commenter requests that ARB go further and require that gas be captured and directed to a vapor collection system with monitoring and repair as a secondary option. The comment goes on to suggest that annual monitoring for midstream compressors is not enough and that the emission standard could be lowered. The comment requests that staff retain the requirement for measuring actual flow but on a quarterly not annual basis.

OP-19-ex1-8 Response: Please refer to responses to comments OP-17-52, OP-17-53, OP-19-40, OP-19-40, OP-19-44 and OP-19-46.

OP-19-ex1-9 Comment: The comment recommends that ARB staff strengthen the regulation by reducing the threshold at which repair of the rod packing is required. The comment provides cost information for standards at 20-25 scfh versus the current 2 scfm and notes that other options like vapor collection are available.

OP-19-ex1-9 Response: Please refer to the consolidated response to comments OP-19-42 et al.

OP-19-ex1-10 Comment: The comment requests that ARB staff consider requiring actual flow measurements at wellhead compressors instead of monitoring and repair requirements.

OP-19-ex1-10 Response: Please refer to response to comment OP-19-46.

OP-19-ex1-11 Comment: The comment recommends that ARB staff revert to a previously workshopped version of the regulation for centrifugal compressors with wet seals. That version required capture and routing to a vapor collection system. The current version allows for an operator to opt out and instead monitor and minimize emissions and install dry seals after a time period. The comment goes on to suggest a vapor recovery system is cost effective and that the emission range for wet seal compressors is an order of magnitude larger than the ARB standard and a system without vapor recovery would not be able to meet it, but that the word minimize is not defined and thus operators may interpret the language to allow them to operate well above the standard until 2020.

OP-19-ex1-11 Response: Please refer to Response B-4-9, OP-17-54, F-9-24, and F-9-25.

OP-19-ex1-12 Comment: The comment requests that ARB ensure that dry seal components are all subject to LDAR.

OP-19-ex1-12 Response: Please refer to Responses to comments OP-17-54, F-9-24, and F-9-25.

OP-19-ex1-13 Comment: The comment requests that tanks be required to have controls unless the operators can demonstrate otherwise. If not, the comment recommends that ARB staff clearly indicate when annual flash testing must comments and the timeline for systems that must install controls. The comment suggests that testing be carried out within 30 days of initial production and controls be in place within 60 days. The comment also recommends considering control from the first day of production if the tank is anticipated to exceed the emission threshold. The comment goes on to recommend that staff clarify new well testing timelines and not allow for extrapolation

OP-19-ex1-13 Response: Please see responses to comments OP-19-48, OP-19-49, and OP-19-50

OP-19-ex1-14 Comment: The comment requests that section 95668(a)(4)(D) of the workshop version be clarified to show how the operator or ARB staff would determine representativeness.

OP-19-ex1-14 Response: No changes were made in response to this comment. The term representativeness is clear and that operators would be able to provide documentation that the well was operating normally.

OP-19-ex1-15 Comment: The comment requests that section 95668(a)(7) of the workshop version be revised for a more frequent testing interval.

OP-19-ex1-15 Response: No changes were made to the provision based upon the above comment. Five years is an appropriate amount of time if several tests were below the limit. If there is a significant change in throughput or wells, then the regulation requires recalculation or additional testing.

OP-19-ex1-16 Comment: The comment requests that section 95668(a)(9) of the workshop version be clarified to specify how soon after the throughput increase the flash emission must be recalculated.

OP-19-ex1-16 Response: Section 95668(a)(9) now refers to section 95668(a)(8), which specifies re-analysis timeframes.

OP-19-ex1-17 Comment: The comment compares ARB's regulation to Colorado's regulation noting places of difference as outlined in earlier comments.

OP-19-ex1-17 Response: The comment is noted but does not specifically request any changes to the regulation. It includes language noted in earlier parts of the comment letter.

OP-19-ex1-18 Comment: The comment refers to a proposal presented at a workshop for mitigation if there is a catastrophic leak. The commenter commends ARB staff for considering a mitigation framework for catastrophic leaks and while urging staff to move forward, suggests it should not delay the rulemaking but should also consider a number of items including regulatory authority, accounting framework rigor, preventative measures, criteria for mitigation, penalties and compensation, emergency authorization, notification procedures, and emergency planning.

OP-19-ex1-18 Response: ARB staff appreciates the comment on the workshop concept. Staff decided not to move forward with the concept for several reasons including those noted in the comment to avoid delay in the current rulemaking and the need to consider all the items in the comment. Please refer to ISOR section I.A.1 paragraph 2 and section III.D. for more detail.

Support

The following comments provided general support for the regulatory actions: OP-3-1, OP-3-5, OP-4-1, OP-4-5, OP-5-1, OP-6-1, OP-8-1, OP-8-2, OP-9-1, OP-9-5, OP-11-1, OP-15-1, OP-16-1, OP-16-10, OP-16-12, OP-16-19, OP-17-1, OP-19-1, OP-19-2, OP-19-3, OP-19-17, OP-19-39, B-2-1, B-2-3, B-11-1, B-11-3, B-11-12, T-1-2, T-2-1, T-3-1, T-5-1, T-6-1, T-7-1, T-15-1, T-16-1, T-18-1, T-19-1, T-25-4, T-26-1, T-30-1, ST-1-1, ST-1-2, ST-2-1, ST-4-1, ST-6-1, ST-7-1, ST-7-3, ST-8-1, ST-9-1, ST-10-1, ST-11-1, ST-12-2, and SB-2-1

Agency Response: ARB staff appreciates the support for the adoption of the Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities, and all stakeholder commentary during the public process, which helps to refine and improve the regulation. Staff looks forward to working with stakeholders to implement what has been described by others as one of the strongest oil and gas methane regulations to date.

V. Peer Review

Health and Safety Code (HSC) section 57004 sets forth requirements for peer review of certain portions of rulemakings proposed by entities within the California Environmental Protection Agency, including ARB. The purpose of the peer review is to determine whether the scientific portions are based upon “sound scientific knowledge, methods, and practices” (HSC § 57004, subd. (d)(2)).

ARB staff developed a Test Procedure for Determining Annual Flash Emission Rate of Methane from Crude Oil, Condensate, and Produced Water (Test Procedure). The Test Procedure outlines how owners and operators at applicable oil and gas facilities will determine emission rates of methane from tank and separator systems. The determination of the flash emission rate of methane from tank and separator systems is fundamental to the compliance determination and reporting provisions of the Oil & Gas Regulation.

The intended purpose of the Test Procedure is to quantify emissions from crude oil, condensate, and produced water separator and tank systems open to the atmosphere. Testing is conducted by gathering pressurized liquid samples upstream of a separator and tank system. Because the intent is to replicate flashing emissions from a separator and tank system open to the atmosphere, samples must be gathered upstream of the system before emissions can flash from the liquid. After the samples are gathered, they are taken to a laboratory for conducting liquid and gas analyses in accordance with specified testing methods and procedures. The laboratory results are used to calculate the annual methane emissions using a calculation methodology in the Test Procedure.

In August 2016, ARB requested peer reviews of the Test Procedures, and the peer review was completed in November 2016. The peer review found that, in general, the test procedure was sound, although numerous editorial comments were suggested. The peer reviewers did not suggest that any portion of the proposed rule was not based upon sound scientific knowledge, methods, and practices; instead, they endorsed the rule and suggested various additional strengthening changes in some instances. Staff has made appropriate edits to the regulation, where applicable, based on these comments as well as from feedback from statewide and nationwide laboratories.

The regulatory activity for the Oil and Gas Regulation are posted on ARB's webpage at: https://www.arb.ca.gov/regact/2016/oilandgas2016/oilandgas2016.htm. The peer reviewers' written reviews are posted on the Oil & Gas Production, Processing, and Storage webpage at: https://www.arb.ca.gov/cc/oil-gas/peerreview/peerreview.htm and were added to the rulemaking file as part of the 15-Day Notice.

This section addresses the findings of peer reviewers reviewing the regulation consistent with section 57004 of the Health and Safety Code. Staff has summarized each of the findings and explained its response to each finding.

Joost de Gouw, National Oceanic and Atmospheric Administration

PR-1-1 Finding: The finding states that calculations used for methane emissions, emission reductions, and emission factors are defensible, however there are uncertainties in the estimates. The finding continues to explain that recent work has shown that emission factors depend strongly on the type of well and throughput. The finding further suggests to use cited literature or detailed analysis of extensive results listed in Tables D-12 and D-13 to determine more accurate emission factors and subsequent calculations of methane emissions and reductions.

PR-1-1 Agency Response: ARB staff made no changes in response to this finding. We agree that actual emissions from separator and tank systems can vary widely amongst different well sites, and there are even differences amongst well sites with the same API gravity crude oil. However, the flash analysis test procedure is used for determining site-specific emissions from separator and tank systems and is not associated with emission factors. During development of the regulation and the Staff Report, ARB staff did rely on emission factors to estimate the statewide emissions and reductions associated with implementing the regulation and test procedure. The Staff Report is not a living document and cannot be updated.

PR-1-2 Finding: The finding suggests ARB set up a verification effort to evaluate regional emissions of methane before, during, and after the implementation of the Regulation to provide evidence of success and to possibly adjust the Regulation to be more cost-effective. The reviewer suggests setting up such a study in the San Joaquin Valley, as that region is anticipated to have the most emission reductions. The finding further states that such an effort would provide a guide or blueprint for other states to effectively reduce methane emissions from the oil and gas industry.

PR-1-2 Agency Response: ARB staff made no changes in response to the finding. We appreciate this finding and feedback on the test procedure. The intent of the regulation is for ARB and the local air districts to verify emissions data, by way of compliance inspections at individual facilities, in order to validate test data and to ensure that the regulation is implemented as intended. Nevertheless, there are currently regional methane monitors throughout the State, with several now in the San Joaquin Valley, and several more stations scheduled to be added in the San Joaquin Valley. Accordingly, this network may be able to further validate methane reductions.

PR-1-3 Finding: The finding makes a general statement about errors in the Staff Report regarding figure references.

PR-1-4 Finding: The finding requests a reference in the Staff Report on page ES-1 on the GWP of methane, noting that the IPCC AR5 report has a different number for the 20-year GWP of methane (84 versus 72 as given in the Staff Report).

PR-1-5 Finding: The finding points out a potential misrepresentation of the global warming potential of methane versus carbon dioxide due to semantics used on page 2 of the ISOR.

PR-1-6 Finding: The finding states that the source of the numbers in Tables 5 and 6 on pages 29 and 30 of the ISOR are unclear.

PR-1-3, PR-1-4, PR-1-5, and PR-1-6 Combined Agency Response: ARB staff appreciates the findings. ARB chose to use the IPCC AR4 20 year GWP and not the AR5 20 year GWP. However, the Staff Report is a support document designed to provide background material in support of the regulation. The Staff Report is not a living document and cannot be updated.

Deepak Devegowda, University of Oklahoma

PR-2-1 Finding: The finding states that the definition of “percent water cut” may be inconsistent with what is practiced in the oil industry, which may cause inconsistencies in reported data.

PR-2-1 Agency Response: ARB staff made changes to the flash test procedure, reflected in the 15-day changes. Percent water cut is no longer required for the flash test procedure. The reasoning for removal of this definition and requirement is that the laboratory technician is not responsible for collecting this information, and this requirement has been shifted to the facility owner or operator.

PR-2-2 Finding: The finding suggests specifying, how and in what ratio, oil and water should be collected when collecting liquid samples where both oil (or liquid condensate) and water are being produced. The finding states that ignoring one or the other liquid phase can either underestimate or overestimate gas emissions.

PR-2-2 Agency Response: ARB staff made no changes in response to this finding. This procedure is primarily conducted at separators which are used for separating and oil and produced water. Sampling is performed by gathering a sample of oil

from the uppermost level of the separated emulsion and produced water is collected from the bottom. The technician ensures that they are collecting oil or water when they purge the sample lines prior to filling a cylinder. In the laboratory, the flash emission rate is determined for both the oil and the produced water samples, and the facility owner or operator multiples the flash emission rates by the volume of oil and the volume of water produced by the system for the calendar year.

PR-2-3 Finding: The finding suggests making the procedure illustrated in Figure 1, section 8.10 and Figure 3 in Section 9.7 more quantitative, such as specifying the necessary downstream pressure in relation to the upstream pressure. The finding suggests that using the procedure in GPA 2174-93 is a more suitable and precise approach for sample collection.

PR-2-3 Agency Response: ARB staff made no changes in response to this finding. However, we have modified the pressure gauge equipment specifications to require gages with greater usable range accuracy and specified that they must be intrinsically safe. Although we understand the nature of this finding, we received extensive feedback from laboratories running this procedure that a downstream pressure gauge is not necessary and that adding another gauge simply adds to the cost and time required to perform testing. The feedback we received was that laboratories do not find it problematic to determine the proper cylinder fill rate when using the downstream valve that is subjected to atmospheric conditions.

PR-2-4 Finding: The reviewer recommends that each sample collection cylinder be outfitted with its own pressure gauge to indicate that no fluid has leaked and to ensure that the pressure in the sample chamber returns to the value it was collected at when it is heated, as specified in Section 10.3(a).

PR-2-4 Agency Response: ARB staff made no changes in response to this finding. However, ARB staff modified the test procedure to provide a detailed Bubble Point Sample Integrity Check procedure which is used to determine if the integrity of a sample has been compromised. This procedure is designed to ensure that the laboratory can verify the sample collection pressure when the sample was gathered and provides pass or fail criteria to determine if a sample has been compromised and must be discarded.

PR-2-5 Finding: The finding finds that the recommended procedures for preparing and analyzing samples of oil/condensate and produced water from oil and gas production separator and tank systems for constituents and properties needed to estimate emissions from flashed gases from such separator and tank systems sound.

PR-2-5 Agency Response: ARB staff made no changes in response to this finding. We appreciate this finding and the feedback on the test procedure.

PR-2-6 Finding: The finding recommends providing an explicit approach for ensuring that the cumulative emissions from crude oil, condensate, and produced water contained in a single separator are determined using the calculation methodology.

PR-2-6 Agency Response: ARB staff made no changes in response to this finding. The test procedure is clear and states that the same calculation is used for determining emissions from crude oil, condensate, and produced water. The explicit approach suggested by the reviewer is included in section 95668(a)(5) of the regulation order, which states that the owner operator must sum the annual methane emissions from the crude oil, condensate, and produced water.

PR-2-7 Finding: The finding notes that the net methane emissions from the oil and gas extraction processes represent less than four percent of the overall methane emissions in the state; and though the reviewer strongly supports regulation of greenhouse gas emissions, the reviewer believes that without regulations to address larger sources of emissions, the test procedure as part of the Oil and Gas Regulation will have a limited impact on reaching a 40 percent reduction in methane emissions by 2030.

PR-2-7 Agency Response: ARB staff made no changes in response to this finding. The finding is beyond the scope of this rulemaking. Other sources of methane are being considered for control via ARB's Short Lived Climate Pollutant Reduction Strategy.

PR-2-8 Finding: The finding states that generally, the test procedure is largely free of any scientific issues or oversights, except as pointed out in previous findings.

PR-2-8 Agency Response: ARB staff made no changes in response to this finding. We appreciate this finding and the feedback on the test procedure.

PR-2-9 Finding: The finding states that the readability of the test procedure and the quality of the figures/tables provided are good.

PR-2-9 Agency Response: ARB staff made no changes in response to this finding. We appreciate this finding and the feedback on the test procedure.

Wayne Monnery, University of Calgary

PR-3-1 Finding: The finding recommends, in Section 4.3, stating when samples are to be taken.

PR-3-1 Agency Response: ARB staff made changes, as reflected in the 15-day changes, adding "…shall only be taken when a drain valve is closed," to Section 4.3.

PR-3-2 Finding: The finding recommends, in Section 4.6, specifying how often gauges should be calibrated.

PR-3-2 Agency Response: ARB staff made changes, as reflected in the 15-day changes, adding "…shall be calibrated at least twice per year," to Section 4.6.

PR-3-3 Finding: For Section 4.8, collecting and testing duplicate samples, the finding states that at least two are required but three samples are preferred.

PR-3-3 Agency Response: ARB staff made no changes in response to this finding. The test procedure was modified to incorporate a Bubble Point Sample Integrity

Check Procedure to ensure that samples have not been compromised during transit. This check also eliminates a need for collecting duplicate samples to reduce time and costs associated with the test procedure. The purpose of requiring daily field duplicates is so the laboratory can ensure that their laboratory instruments provide repeatable measurements.

PR-3-4 Finding: For Section 5.1, the finding recommends more accurate pressure gauges.

PR-3-5 Finding: For Section 5.2, the finding recommends more accurate pressure gauges.

PR-3-4 and PR-3-5 Combined Agency Response: ARB staff made changes, as reflected in the 15-day changes, requiring pressure gauges with ±0.1 percent accuracy.

PR-3-6 Finding: For Section 6.4, the finding states that high-pressure rated metal components and control valves should at least match the design pressure and temperature of the system being sampled.

PR-3-6 Agency Response: ARB staff made no changes in response to this finding. This requirement is necessary as a safety precaution and that the language is clear and understood by readers.

PR-3-7 Finding: The finding states, for Section 7.2(b), that the separator temperature and pressure must be known, either from instruments on the vessel being sampled or the sample train.

PR-3-7 Agency Response: ARB staff modified this language in the 15-day version of the regulation. This language was modified to read “if available” because not all vessel conditions are known prior to sampling and because the technician is required to perform measurements at the time of sampling.

PR-3-8 Finding: The finding suggests explaining why the piston cylinder method is preferred for condensate samples.

PR-3-8 Agency Response: ARB staff removed that section from the flash test procedures, as reflected in the 15-day changes. This language was removed because we received feedback from laboratories that both types of cylinders are used to perform sampling of the different liquids. Although it is preferable to use a piston-cylinder for certain liquids, we agreed that it was appropriate to eliminate this language.

PR-3-9 Finding: The finding suggests adding text to Section 8.6 to make the boundary clear between the existing sample port fittings on the vessel of interest and the sample train.

PR-3-9 Agency Response: ARB staff made no changes in response to this finding. We received feedback that the procedure is clear and understood by readers so that they can understand the sampling concepts. We also believe that many different vessels and sampling train scenarios exist. Therefore, this explanation and diagram

is intended to be a generic example which provides an illustration for conceptual purposes.

PR-3-10 Finding: The finding suggests noting, in Section 8.7, that there will likely be some bubbles in the liquid stream.

PR-3-10 Agency Response: ARB staff made no changes in response to this finding. Although we agree that in this situation there could be bubbles in a discharge stream, technicians are directed to reduce the flow rate to a point where no bubbles exist in section 8.6. The slower purge rate is preferred because it allows the technician to carefully evaluate the liquid. Therefore, we did not see a need to make this modification because the test procedure requires that the technician avoid purging at a rate that causes bubbles.

PR-3-11 Finding: The finding suggests modifying the valve closure wording, in Section 8.10.

PR-3-11 Agency Response: ARB staff modified this provision as part of the 15-day changes to state that approximately “70 percent” of the cylinder displacement liquid must be drained. We reviewed this section carefully and believe it is clear and understood by most readers.

PR-3-12 Finding: The finding suggests modifying Section 8.13 to read, “Close sample source valve A then disconnect the sample cylinder from the sampling train and verify that both valves are sealed.

PR-3-13 Finding: The finding suggests modifying the text in Section 8.13 to explain that valve A needs to be closed before purging.

PR-3-14 Finding: The finding states that if the procedures do not consider valve A as the sample source valve, then they need to be modified to include a sample source valve located on the outlet of the existing sample port of the vessel of interest.

PR-3-12, PR-3-13, and PR-3-14 Combined Agency Response: ARB staff made no changes in response to these findings. We received feedback that the procedure is clear and understood by readers so that they can understand the sampling concepts. We also believe that many different vessels and sampling train scenarios exist. Therefore, this explanation and diagram is intended to be a generic example which provides an illustration for conceptual purposes.

PR-3-15 Finding: The finding recommends adding a statement requiring double valve cylinder valves to be leak tested once per year with an inert gas.

PR-3-15 Agency Response: ARB modified the test procedure as part of our 15-day changes to incorporate a Bubble Point Sample Integrity Check procedure. This procedure will determine if a cylinder has been filled too rapidly as a result of using a cylinder that is not properly pressurized. It is the responsibility of the laboratory to ensure that their sampling cylinders and equipment are in proper working condition, and we suggest that laboratories include this type of procedure in their own Quality Assurance checks.

PR-3-16 Finding: The finding recommends specifying that the sample cylinder must be pressurized, preferably to the same pressure as the sample vessel or 3 to 5 psi higher.

PR-3-16 Agency Response: ARB modified the test procedure as part of our 15-day changes to incorporate a Bubble Point Sample Integrity Check procedure. This procedure will determine if a cylinder has been filled too rapidly as a result of using a cylinder that is not properly pressurized. We also received sufficient feedback that the procedure is clear and understood by most readers, so this change was not necessary.

PR-3-17 Finding: The finding recommends modifying Section 9.4 to make the boundary clear between the existing sample port fitting on the vessel of interest and the sample train.

PR-3-17 Agency Response: ARB staff made no changes in response to this finding. We received feedback that the procedure is clear and understood by readers so that they can understand the sampling concepts. We also believe that many different vessels and sampling train scenarios exist. Therefore, this explanation and diagram is intended to be a generic example which provides an illustration for conceptual purposes.

PR-3-18 Finding: The finding recommends modifying section 9.5 to indicate that there will likely be some bubbles in the liquid stream.

PR-3-18 Agency Response: ARB staff made no changes in response to this finding. Although we agree that in this situation there could be bubbles in a discharge stream, technicians are directed to reduce the flow rate to a point where no bubbles exist in section 8.6. The slower purge rate is preferred because it allows the technician to carefully evaluate the liquid. Therefore, we did not see a need to make this modification because the test procedure requires that the technician avoid purging at a rate that causes bubbles.

PR-3-19 Finding: The finding suggests stating, in Section 9.7, how the sampler is to judge the filling rate of the cylinder and the volume collected.

PR-3-19 Agency Response: ARB staff made changes, reflected in the 15-day changes, to use the indicator and scale on the piston cylinder.

PR-3-20 Finding: The finding suggests modifying Section 9.10 to ensure valve A is closed before removing the sampling train.

PR-3-21 Finding: The finding suggests modifying Section 9.11 to add text to close valve A.

PR-3-22 Finding: The finding states that if the procedures do not consider valve A as the sample source valve, then they need to be modified to include a sample source valve located on the outlet of the existing sample port of the vessel of interest.

PR-3-20, PR-3-21, and PR-3-22 Combined Agency Response: ARB staff made no changes in response to these findings. We received feedback that the procedure is clear and understood by readers so that they can understand the sampling concepts. We also believe that many different vessels and sampling train scenarios exist. Therefore, this explanation and diagram is intended to be a generic example which provides an illustration for conceptual purposes.

PR-3-23 Finding: The finding recommends adding a statement requiring the piston cylinder to be tested once per year with an inert gas to ensure there is no leakage across the piston.

PR-3-23 Agency Response: ARB modified the test procedure as part of our 15-day changes to incorporate a Bubble Point Sample Integrity Check procedure. This procedure will determine if a cylinder has been filled too rapidly as a result of using a cylinder that is not properly pressurized. It is the responsibility of the laboratory to ensure that their sampling cylinders and equipment are in proper working condition, and we suggest that laboratories include this type of procedure in their own Quality Assurance checks.

PR-3-24 Finding: The finding states that with the modifications outlined, the test procedure would provide a sound approach for taking samples of oil, condensate, and produced water upstream from oil and gas separator and tank systems.

PR-3-24 Agency Response: ARB staff made no changes in response to this finding. We appreciate this finding and the feedback on the test procedure.

Albert Presto, Carnegie Melon University

PR-4-1 Finding: The finding states that, overall, the flash test procedure provides a reasonable framework for estimating greenhouse gas emissions from flashing.

PR-4-2 Finding: The finding states that the sampling methods appear appropriate in the test procedures.

PR-4-3 Finding: The finding states that the procedures outlined in Sections 1-9 should provide samples of sufficient quality to determine flashing emissions.

PR-4-1, PR-4-2, and PR-4-3 Combined Agency Response: ARB staff made no changes in response to these findings. We appreciate each of these findings and the feedback on the test procedure.

PR-4-4 Finding: The finding suggests that the procedure should state that flashing can occur as a result of changes in pressure or temperature.

PR-4-4 Agency Response: ARB staff made no changes in response to this finding. Section 1 states that flashing can occur as a result of a decrease in pressure or an increase in temperature.

PR-4-5 Finding: The finding states that Sections 9.6 and 9.7 are confusing because it seems the procedure instructs to open valve D twice without closing it in between steps.

PR-4-5 Agency Response: ARB staff made changes, adding text to instruct valve D momentarily be closed between those steps, which is reflected in the 15-day changes.

PR-4-6 Finding: The reviewer asks if samplers need to be cleaned prior to each sampling as specified in GPA 2286-95.

PR-4-6 Agency Response: ARB staff made no changes in response to this finding. We received feedback from laboratories that cleaning cylinders between samples is common laboratory practice. They also reported that similar requirements are specified in quality assurance procedures followed by each laboratory and that similar requirements are specified in the test methods which are incorporated by reference.

PR-4-7 Finding: The finding states that the relevant sections of the test procedure and referenced test methods seem appropriate to achieve the goals of the sample analysis.

PR-4-7 Agency Response: ARB staff made no changes in response to these findings. We appreciate the finding and the feedback on the test procedure.

PR-4-8 Finding: The finding suggests including duplicate sample criteria in section 8 and 9 to ensure that technicians know to collect duplicates before they read section 10.

PR-4-8 Agency Response: ARB staff made no changes in response to this finding. The test procedure was modified to incorporate a Bubble Point Sample Integrity Check Procedure to ensure that samples have not been compromised during transit. This check also eliminates a need for collecting duplicate samples to reduce time and costs associated with the procedure. The purpose of requiring daily field duplicates is so the laboratory can ensure that their laboratory instruments provide repeatable measurements.

PR-4-9 Finding: The finding suggests outlining, in Section 10.2(d), steps to take if the sample temperature is below room temperature.

PR-4-9 Agency Response: ARB staff made changes to the flash test procedure, as reflected in the 15-day changes, to make the language more general, stating in Section 10.2(d), that the lab equipment must be “temperature controlled,” instead of “used for heating.” This language was carefully worded because different laboratories use different methods for stabilizing temperature. It is the responsibility of the laboratory to ensure that the sample is maintained at the proper temperature. However, how they achieve this is up to the individual lab.

PR-4-10 Finding: The finding suggests using units of milliliters instead of cubic feet per barrel, in Section 10.3(d), as most lab technicians would in milliliters in the lab.

PR-4-10 Agency Response: ARB staff made changes to the flash test procedure, as reflected in the 15-day changes. Changes to the Laboratory Flash Analysis Procedure section do not specify which units to use when measuring volume or mass. This allows laboratory technicians to use appropriate units, so long as the units are consistent and used correctly in calculations.

PR-4-11 Finding: The finding suggests, for Section 12.1(a), specifying the storage requirements for the sketch, i.e. hard copy, electronic, or both.

PR-4-11 Agency Response: ARB staff made no changes in response to this finding. The sketch is to be included in a report, along with laboratory results, which can be stored as hard copy, electronic, or both, so long as it is available for a minimum of 5 years for review by ARB or a local air district inspector.

PR-4-12 Finding: The finding suggests that a single sample may create uncertainty when estimating annual emissions.

PR-4-12 Agency Response: ARB staff made no changes in response to this finding. The purpose of the procedure is to ensure that site-specific measurements are taken at oil and gas facilities while taking into account the costs for producing this data. Collecting annual samples for a minimum of three years is sufficient to demonstrate that the results are representative of each system. In the event that there are discrepancies in annual test results, the ARB can request that additional samples be gathered and evaluated.

PR-4-13 Finding: The finding states that the calculations used to determine the annual emission rate, Equations 1-3 in Section 11, are all appropriate.

PR-4-13 Agency Response: ARB staff made no changes in response to this finding. We appreciate the finding and the feedback on the test procedure.

PR-4-14 Finding: The finding suggests that it may be difficult to determine if the test results represent upper or lower boundaries and that the results may depend on what is considered to be normal temperature.

PR-4-14 Agency Response: ARB staff made no changes in response to this finding. We agree that the test results may vary in given calendar year based on several factors including temperature. During the workshop process, we considered this aspect carefully along with the costs associated with collecting this data. Collecting annual samples for a minimum of three years is sufficient to demonstrate that the results are representative of each system. In the event that there are discrepancies in annual test results, the ARB can request that additional samples be gathered and evaluated.

PR-4-15 Finding: The finding contemplates how noting certain variables, such as temperature and production volume, on the day of sampling and comparing those to typical annual values can help identify the potential for “super emitters.”

PR-4-15 Agency Response: ARB staff made no changes in response to this finding. We appreciate the finding and are aware that some oil and gas facilities produce larger quantities of gas than others. This is the reason behind requiring the flash

analysis test procedure. The intent of the procedure is to properly characterize individual oil and gas systems, which will also assist with identifying sources with a high potential for emissions. Once facilities are identified as emitting more than 10 tons per year of methane, they will need to be controlled, thereby vastly reducing emissions under all temperatures and production volumes. In addition, the LDAR provision in the regulation is designed to find super emitter components by way of daily audio-visual inspections and quarterly Method 21 inspections.

PR-4-16 Finding: The finding speculates another way to identify "super emitters," by requiring follow-up sampling if the calculated annual emissions are above a certain threshold, retesting soon after the initial test to determine if the emissions are consistently high.

PR-4-16 Agency Response: ARB staff made no changes in response to this finding. The test procedure is designed to work in concert with the regulation. The procedure outlines steps for gathering and analyzing samples while the regulation specifies requirements based on the test results. Again, in the event that a system exceeds 10 tons per year of methane, the system must be controlled with the use of a vapor collection system in order to comply with the regulation. The regulation also includes a provision that allows a facility to test multiple samples taken in a given calendar year and then average the results if desired.

PR-4-17 Finding: The finding speculates that the results of the testing can be dependent on several variables and offers approaches to verify the one test, although questions if multiple samples taken in a single calendar year is within the scope of the regulation.

PR-4-17 Agency Response: ARB staff made no changes in response to this finding. We agree that the test results may vary in given calendar year based on several factors including temperature. During the workshop process, we considered this aspect carefully along with the costs associated with collecting this data. Collecting annual samples for a minimum of three years is sufficient to demonstrate that the results are representative of each system. In the event that there are discrepancies in annual test results, the ARB can request that additional samples be gathered and evaluated. The regulation also includes a provision that allows a facility to test multiple samples taken in a given calendar year and then average the results if desired.

PR-4-18 Finding: The finding suggests to "flag" data or samples that fall outside of the typical range, e.g., if collected on an abnormally hot or cold day.

PR-4-18 Agency Response: ARB staff made no changes in response to this finding. We agree that test results may vary for a number of factors, and we have included a provision in the regulation to account for results that appear to be biased or unrepresentative. The regulation also specifies that ARB may request additional testing if the results are not representative of similar systems. We also believe that the Bubble Point Sample Integrity Procedure, contained within the test procedure, will help to ensure that samples are collected and analyzed as intended.

PR-4-19 Finding: The finding states that the emissions estimated by the procedure may be overestimated by assuming all vapors are vented to the atmosphere. The

finding suggests also calculating expected emissions, using a recovery or destruction efficiency for sites with vapor control systems.

PR-4-19 Agency Response: ARB staff made no changes based on this finding. The intent of this procedure is to determine emissions from uncontrolled separator and tank systems. It could be possible for an owner or operator to use the test results to estimate emissions from systems that use a vapor collection system by reducing the results by the control efficiency of the system.